United States
Environmental Protection
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Industrial Environmental Research
Laboratory
Research Triangle Park NC 27711

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Report Abstracts

Industrial Environmental Research Laboratory RTP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Industrial Environmental Research Laboratory
Research Triangle Park, North Carolina 27711

August 1979

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TECHNICAL REPORT DATA
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1. REPORT NO. EPA-600/2-79-108	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Reduction of Air Emissions from Gasoline Storage Tanks		5. REPORT DATE May 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Arnold Gunther		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Stop-Los Company, 29 Lorelei Road, West Orange, New Jersey 07052		10. PROGRAM ELEMENT NO. 1AB604
		11. CONTRACT/GRANT NO. 68-02-2679
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development, Industrial Environmental Research Laboratory, Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 1/78 - 1/79
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Bruce Tichenor, Mail Drop 62, 919/541-2547.

16. ABSTRACT The report gives results of a project to determine the technical and economic feasibility of using flexible plastic membranes to control emissions from gasoline storage tanks. The emission rates and the expected life of the membranes were to be established. A demonstration pilot unit was built and operated. The emission rates were determined, as well as the life expectancy of the membranes. The results indicate that emission control of 99-plus percent, compared to uncontrolled tanks, can be achieved readily, and that the life expectancy of the membranes is in the order of 20 years of continuous service. The estimated installed cost of these devices for commercial application is very competitive with conventionally used floating roofs.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution	Air Pollution Control	13B
Gasoline	Stationary Sources	21D
Storage Tanks	Flexible Plastic Membranes	13D
Emission		14B
Membranes		11G
Plastics		11I

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 36
	20. SECURITY CLASS (This page) Unclassified	22. PRICE

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TECHNICAL REPORT DATA
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1. REPORT NO. EPA-600/2-79-114	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Particulate Sampling and Support: Final Report		5. REPORT DATE June 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Kenneth M. Cushing and Wallace B. Smith		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Southern Research Institute, 2000 Ninth Avenue, South, Birmingham, Alabama 35205		10. PROGRAM ELEMENT NO. INE623
		11. CONTRACT/GRANT NO. 68-02-2131
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development, Industrial Environmental Research Laboratory, Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 11/75 - 11/78
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is D. Bruce Harris, Mail Drop 62, 919/541-2557.

16. ABSTRACT The report summarizes results of research, development, and support tasks performed during the 3-year period of the contract (11/75-11/78). The tasks encompassed many aspects of particulate sampling and measurement in industrial gaseous process and effluent streams. Under this contract: cascade impactors were calibrated and evaluated; novel particle sampling cyclones were designed and evaluated; technical and procedures manuals were prepared for control device evaluation and particle sampling methods; an electrostatic precipitator backup was designed for high flow rate systems; and advanced concepts in monitoring particle mass and size, using optical systems, were evaluated. A number of smaller tasks, involving lower levels of effort, are also discussed. The appendix lists technical documents published under the contract.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Impactors	Pollution Control	13B	13I
Dust	Cyclone Separators	Stationary Sources	11G	07A
Sampling	Electrostatic Precipitators	Particulate	14B	
Measurement		Cascade Impactors		
Optical Measurement				
Industrial Processes			13H	

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1. REPORT NO. EPA-600/2-79-137	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE At-sea Incineration: Evaluation of Waste Flow and Combustion Gas Monitoring Instrumentation Onboard the M/T Vulcanus		5. REPORT DATE July 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) D.A.Ackerman, R.J.Johnson, E.L.Moon, A.E.Samonov, and K.H.Scheyer		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS TRW, Inc. One Space Park Redondo Beach, California 90278		10. PROGRAM ELEMENT NO. 1AB606
		11. CONTRACT/GRANT NO. 68-02-2660
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 9/77 - 5/79
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Ronald A. Venezia, Mail Drop 62, 919/541-2547.

16. ABSTRACT The report describes the test operations and results of measuring organochlorine waste flowrate and CO, CO2, and O2 in the effluent gas during incineration of industrial chemical waste onboard the M/T Vulcanus. The data was obtained during shipboard test burns in the North Sea during November and December 1978 and February 1979. Program objectives were to gather data on durability and accuracy of both the waste flowmeters and the CO, CO2, and O2 monitoring system when used on a continuous routine basis. Combustion efficiency exceeded 99.95% in all cases, meeting IMCO requirements of 99.95 + or - 0.05%. The ultrasonic and vortex waste flowmeters and the CO, CO2, and O2 monitoring system performed satisfactorily during the burns. The CO, CO2, and O2 equipment was operated continuously for a maximum of 12 hours. The vortex flowmeters indicated gradual waste buildup, although buildup did not occur in the ultrasonic flowmeter piping. Monthly inspection and cleaning of the vortex meters would avoid extensive solids buildup. Use of spare instruments ensured continuous acquisition of combustion data throughout the burns. Post-test inspection of the analyzers indicated only minor corrosion and wear.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Combustion	Pollution Control	13B	21B
Chlorine Organic Compounds	Evaluation	Stationary Sources		14B
	Instruments	Organochlorine	07C	
Incinerators	Monitors	At-sea Incineration		
Oceans	Flowmeters	Chemical Waste	08F	
Waste Disposal	Carbon Dioxide			
Carbon Monoxide	Oxygen		07B	

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1. REPORT NO. EPA-600/7-79-007	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Management of Coal Preparation Fine Wastes Without Disposal Ponds		5. REPORT DATE January 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) D. C. Hoffman, R. W. Briggs, and S. R. Michalski		8. PERFORMING ORGANIZATION REPORT NO. DOE FE-11270-1
9. PERFORMING ORGANIZATION NAME AND ADDRESS Dravo Corporation 3600 Neville Island Pittsburgh, Pennsylvania 15225		10. PROGRAM ELEMENT NO. EHE623A
		11. CONTRACT/GRANT NO. EPA Interagency Agreement DXE685AK
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 7/77 - 6/78
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES Project officers: D. A. Kirchgessner (IERL-RTP); and R. E. Hucko (DoE), Div. of Solid Fuel Mining and Preparation, Pittsburgh PA 15213.

16. ABSTRACT The report gives results of a study to ascertain some physical/chemical properties of a diverse sampling of fine coal refuse and to investigate the effect of chemical stabilization. Samples of fine coal refuse were obtained from some of the major coal seams in the Eastern bituminous coal fields. One proprietary and two common chemicals were used to test chemical stabilization on nine samples of fine coal refuse. The study showed that chemical stabilization can be used to drastically improve some physical/chemical properties of the fine refuse for better handling and disposal. The proprietary chemical Calcilox is the most effective over the range of samples tested. Portland Type 1 cement is also effective, but greatly influenced by waste solids concentration. The final chemical tested, lime, is inferior to the other two, and generally ineffective in improving the fine waste's physical/chemical properties.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution	Physical Properties	Pollution Control	13B
Coal Preparation	Chemical Properties	Stationary Sources	08I
Wastes		Calcilox	07D
Stabilization			
Portland Cement Type 1			11B
Calcium Oxides			07B

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1. REPORT NO. EPA-600/7-79-008	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Surface Phenomena in the Dewatering of Coal		5. REPORT DATE January 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) D. V. Keller, Jr., G. J. Stelma, and Y. M. Chi		8. PERFORMING ORGANIZATION REPORT NO. DoE FE-9001-1
9. PERFORMING ORGANIZATION NAME AND ADDRESS Syracuse University Department of Chemical Engineering and Materials Science Syracuse, New York 13210		10. PROGRAM ELEMENT NO. EHE623A
		11. CONTRACT/GRANT NO. EPA Interagency Agreement DXE685AK
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 6/75 - 11/78
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES Project officers: D. A. Kirchgessner (IERL-RTP); and R. E. Hucko (DoE), Div. of Solid Fuel Mining and Preparation, Pittsburgh PA 15213.

16. ABSTRACT The report gives results of a study of the influence of certain surfactants on the dewatering of fine coal. The surfactants were found to have a two-fold effect: they were found to affect the pressure differentials required for dewatering, in addition to the residual water contents of the coal beds attainable by this dewatering. Both effects were attributed to surfactant adsorption. Adsorption at the liquid/air interface resulted in a decrease in the interfacial tension between the two phases. The effect this decrease had on the pressure differentials required for dewatering agreed with that predicted by the capillary theory applied to the system. Adsorption at the solid/liquid interface was correlated with the complex behavior of the residual water contents as a function of surfactant addition.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution	Pollution Control	13B
Coal	Stationary Sources	08G,21D
Dewatering		13H,07A
Surfactants		11K

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1. REPORT NO. EPA-600/7-79-029b	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Emissions Assessment of Conventional Stationary Combustion Systems; Volume I. Gas- and Oil-fired Residential Heating Sources		5. REPORT DATE May 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) N. F. Surprenant, R. R. Hall, K. T. McGregor, and A. S. Werner (GCA/Technology Division)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS TRW, Inc. One Space Park Redondo Beach, California 90278		10. PROGRAM ELEMENT NO. EHE624A
		11. CONTRACT/GRANT NO. 68-02-2197
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 9/76 - 3/79
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Ronald A. Venezia, MD-62, 919/541-2547.

16. ABSTRACT The report gives results of an assessment of emissions from gas- and oil-fired residential heating sources, through a critical examination of existing emissions data, followed by a phased measurement program to fill gaps in the emissions data base. Initially, five gas-fired and five oil-fired residential sources were tested. Mass emission rates of criteria pollutants, trace elements, and organics (including POM) were determined. Subsequent test program evaluation led to a decision to conduct additional tests at one gas-fired and two oil-fired sites, to determine the effect of the burner on/off cycle on emissions. Particulate, SO4, SO2, and SO3 emission data were also obtained at the oil-fired sites. Assessment results indicate that residential sources are of potential significance based on multiple source severity factors calculated for an array of homes burning gas or oil. Pollutants for which multiple source severity factors exceed 0.05 (the level which may be potentially significant) are: NOx from gas-fired sources, and SO3, NOx, and Ni from oil-fired sources. Measured criteria pollutant emission factors were generally comparable to EPA emission factors (in AP-42), except for total HC emissions from oil-fired sources which were 3 times greater. However, POM compounds known to be carcinogenic were not found above the detection limit of 0.3 micrograms/cubic meter.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Dust	Pollution Control	13B	11G
Assessments	Sulfur Oxides	Stationary Sources	14B	07B
Emission	Organic Compounds	Residential Furnaces		07C
Heating	Nitrogen Oxides	Particulate	13H,13A	
Combustion	Hydrocarbons		21B	
Natural Gas			21D	
Fuel Oil				

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1. REPORT NO. EPA-600/7-79-050e	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Proceedings of the Third Stationary Source Combustion Symposium; Volume V. Addendum		5. REPORT DATE February 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Joshua S. Bowen, Symposium Chairman, and Robert E. Hall, Symposium Vice-chairman		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS See Block 12.		10. PROGRAM ELEMENT NO. EHE624
		11. CONTRACT/GRANT NO. NA (Inhouse)
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Proceedings; 3/79
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Robert E. Hall, MD-65, 919/541-2477. EPA-600/7-77-073a thru -073e and EPA-600/2-76-152a thru -152c are proceedings of earlier symposiums on the same theme.

16. ABSTRACT The proceedings document the approximately 50 presentations made during the symposium, March 5-8, 1979, in San Francisco. Sponsored by the Combustion Research Branch of EPA's Industrial Environmental Research Laboratory-RTP, the symposium dealt with subjects relating both to developing improved combustion technology for the reduction of air pollutant emissions from stationary sources, and to improving equipment efficiency. The symposium was in seven parts, and the proceedings are in five volumes: I. Utility, Industrial, Commercial, and Residential Systems; II. Advanced Processes and Special Topics; III. Stationary Engine and Industrial Process Combustion Systems; IV. Fundamental Combustion Research and Environmental Assessment; and V. Addendum. The symposium provided contractor, industrial, and government representatives with the latest information on EPA inhouse and contract combustion research projects relating to pollution control, with emphasis on reducing NOx while controlling other emissions and improving efficiency.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Air Pollution	Gas Turbines	Air Pollution Control	13B	13G
Combustion	Nitrogen Oxides	Stationary Sources	21B	07B
Field Tests	Efficiency	Environmental Assessment	14B	
Assessments	Utilities			
Combustion Control	Industrial Processes	Combustion Modification		
Fossil Fuels		Trace Species	21D	13H
Boilers	Hydrocarbons	Fuel Nitrogen	13A	07C

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1. REPORT NO. EPA-600/7-79-066	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Chemically Active Fluid-Bed Process for Sulphur Removal During Gasification of Heavy Fuel Oil--Fourth Phase		5. REPORT DATE February 1979 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) A.W. Ramsden and Z. Kowszun		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Esso Research Centre Abingdon, Oxfordshire OX136AE England		10. PROGRAM ELEMENT NO. 1AB013; ROAP 21ADD-BE 11. CONTRACT/GRANT NO. 68-02-1479
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 6/74 - 12/76 14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Samuel L. Rakes, MD-61, 919/541-2825. EPA-600/2-76-248 and EPA-650/2-74-109 are earlier related reports.

16. ABSTRACT The report gives results of Phase 4 of a study on the CAFB process for gasification/desulfurization of liquid and solid fuels in a bed of hot lime. A new pilot unit was designed and constructed, incorporating such novel features as: a new fluidizing air distributor, high-flow/low-pressure-drop cyclones, and improved refractory construction. Conclusions include: (1) confirmation of the process description by a statistically derived equation; (2) bed age has a significant effect on desulfurization efficiency; (3) heavy residua can be gasified and desulfurized; (4) solid fuels show potential as feedstocks; (5) trace element retention depends on stone replenishment rate (a rate sufficient to maintain bed depth--0.2 molar--is adequate to maintain trace element capture and sulfur removal performance); (6) satisfactory performance of the redesigned pilot unit; (7) a carbon burn-back procedure was not completely effective in cleaning the cyclones; (8) confirmation that coal and Texas lignite are suitable feedstocks for the CAFB and that ash accumulation and fusion do not appear to be limiting; and (9) Texas limestone is satisfactory as bed material if it is available in a suitable particle size range. Remaining work includes performance tests and evaluation.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Fuel Oil	Pollution Control	13B	11H,21D
Fluidized Bed Processors		Stationary Sources	13I,07A	
Gasification	Residual Oils	CAFB Process	13H	
Limestone	Heavy Oils	Chemically Active Fluid Bed	08G	
Desulfurization	Coal		07D	
Trace Elements	Lignite	Fluidized Lime Bed	06A,06P	
Design	Refractories			11B

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1. REPORT NO. EPA-600/7-79-094	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Assessment of a High-velocity Fabric Filtration System Used to Control Fly Ash Emissions		5. REPORT DATE April 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) J. D. McKenna, J. C. Mycock, K. D. Brandt, and J. F. Szalay		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Enviro-Systems and Research, Inc. 2141 Patterson Avenue, SW Roanoke, Virginia 24016		10. PROGRAM ELEMENT NO. EHE 624
		11. CONTRACT/GRANT NO. 68-02-2148
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 12/76-12/77
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is J. H. Turner, MD-61, 919/541-2925.

16. ABSTRACT The report gives results of a full-scale investigation (following a pilot plant study) of applying high-velocity fabric filtration to coal-fired boiler fly ash control. Two filter systems were applied separately to two 60,000 lb steam/hr coal-fired boilers. Performance evaluated over a year included total mass removal efficiency and fractional efficiencies. One filter system used Teflon felt as the filter medium; the other used Gore-Tex, a PTFE laminate on PTFE woven backing. During the year, a limited number of glass felt and woven glass bags were introduced into the house containing Gore-Tex. Installed, operating, and annualized costs were computed for five filter media (Teflon felt, Gore-Tex PTFE laminate, two weights of woven glass, and a felted glass fabric) in a fabric filter systems capable of handling 70,000 acfm. The lighter weight woven glass fabric is the least expensive filter medium overall and (assuming that a 4-year bag life is feasible) this makes fabric filtration an economically attractive alternative to electrostatic precipitation. The 15 oz woven glass fabric had a projected annualized cost of $0.36/acfm at an air-to-cloth ratio of 5.8/1.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Fluorocarbon Fibers	Pollution Control	13B	
Filtration	Glass Fibers	Stationary Sources	07D	11B
Fabrics	Felts	Fabric Filters	11E	
Fly Ash	Woven Fabrics	Bag Houses	21B	
Coal		High Velocity Tests	21D	
Boilers			13A	

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS *(This Report)* Unclassified	21. NO. OF PAGES 114
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1. REPORT NO. EPA-600/7-79-096	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Chemical Aspects of Afterburner Systems		5. REPORT DATE April 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) R. H. Barnes, M. J. Saxton, R. E. Barrett, and A. Levy		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Battelle Columbus Laboratories 505 King Avenue Columbus, Ohio 43201		10. PROGRAM ELEMENT NO. 1NE829
		11. CONTRACT/GRANT NO. 68-02-2629
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 3/77 - 3/79
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is John H. Wasser, MD-65, 919/541-2476.

16. ABSTRACT

The report reviews the chemistry and reaction kinetics of oxidation and pyrolysis reaction that occur in afterburners (or fume incinerators) that are used to destroy organic pollutants in air or gas streams. Chemical kinetic rate data are compiled for both complex and global reaction mechanisms of interest for the design and analysis of afterburner systems. Direct-flame, thermal and catalytic afterburner systems are covered. Details are also given on techniques for estimating chemical rate data when experimental data are unavailable. Appropriate equations are given for calculating the chemical performance characteristics of afterburner systems, and recommendations are made for using chemical rate data for the analysis of afterburner systems.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Oxidation	Pollution Control	13B	07B,07C
Afterburners	Pyrolysis	Stationary Sources	21J	
Fumes	Organic Compounds	Chemical Rate Data		
Incinerators	Catalysis			
Chemical Properties			07D	
Kinetics			20K	

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1. REPORT NO. EPA-600/7-79-106	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Potential Production and Marketing of FGD Byproduct Sulfur and Sulfuric Acid in the U.S. (1983 Production)		5. REPORT DATE April 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) S.V. Tomlinson, F.M. Kennedy, F.A. Sudhoff, and R.L. Torstrick		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Tennessee Valley Authority National Fertilizer Development Center Muscle Shoals, Alabama 35660		10. PROGRAM ELEMENT NO. EHE624A
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12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 6/76 - 12/78
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Charles J. Chatlynne, MD-61, 919/-541-2915.

16. ABSTRACT The report updates to 1983 a 1978-base, computerized marketing evaluation of sulfur and H2SO4 as flue gas desulfurization (FGD) byproducts from U.S. coal-burning power plants. Least-costs of compliance were calculated using comparisons of clean fuel with 50¢ and 70¢/million Btu premiums, limestone scrubbing, and scrubbing systems with byproduct sulfur and H2SO4 production. Market potential of sales to sulfur-burning H2SO4 plants was also determined. At the 50¢ premium, H2SO4 production was the least-cost method at five plants, four of which had combined sales of 800,000 tons/yr. At the 70¢ premium, H2SO4 production was the least cost method at 26 plants, 7 of which had sales totaling 1.2 million tons. New boilers coming online by 1983 accounted for 60% of the sales. Market potential was relatively insensitive to sulfur price. Sulfur production was not selected at any plant, but reduction of total FGD costs by 3-25% would make it competitive with sulfur delivered from Port Sulphur at 10 plants with a total production of 266,000 tons. Results indicate the need of a longer time projection and continued updating of the model data bases.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Sulfuric Acid	Pollution Control	13B	
Flue Gases	Marketing	Stationary Sources	21B	05C
Scrubbers	Forecasting	Clean Fuel	07A,13I	
Desulfurization	Mathematical		07D	
Byproducts	Models		14B	12A
Sulfur	Coal		07B	21D
Limestone	Combustion		08G	

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	20. SECURITY CLASS *(This page)* Unclassified	22. PRICE

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TECHNICAL REPORT DATA
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1. REPORT NO. EPA-600/7-79-107	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Pilot Demonstration of Sodium Carbonate Conditioning		5. REPORT DATE April 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Steven Schliesser		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Acurex Corporation P.O. Box 12796 Research Triangle Park, North Carolina 27709		10. PROGRAM ELEMENT NO. EHE624A
		11. CONTRACT/GRANT NO. 68-02-2646
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 6/77 - 12/77
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Leslie E. Sparks, MD-61, 919/541-2851.

16. ABSTRACT The report describes a performance evaluation, conducted with a pilot electrostatic precipitator (ESP), studying the effects of injecting anhydrous sodium carbonate into the exhaust of a utility boiler burning Western coal. In situ resistivity measurements, ESP operating conditions, particulate concentration and size distribution measurements, and analyses of fly ash composition constitute the data assembled from this demonstration. The following results reflect the effects of conditioning the base fly ash with a 1-2% concentration as sodium oxide: (1) a sixfold reduction in resistivity; (2) a threefold improvement in average current density; (3) a threefold reduction in emission rate, significant enough to move performance from noncompliance to compliance; and (4) an enhancement in the fractional efficiency characteristics, particularly in the fine particle range. The characteristics of sodium carbonate conditioning are discussed, including the injection considerations, material specifications, and the distinctive rationale for resistivity reduction.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Sodium Oxides	Pollution Control	13B	
Electrostatic Precipitators		Stationary Sources	13I	
Flue Gases	Coal	Conditioning Agents	21B	21D
Treatment	Combustion		14B	
Fly Ash				
Sodium Carbonates			07B	

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1. REPORT NO. EPA-600/7-79-117	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Technical Assessment of Thermal DeNOx Process		5. REPORT DATE May 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) C. Castaldini, K. G. Salvesen, and H. B. Mason		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Acurex Corporation Energy and Environmental Division 485 Clyde Avenue Mountain View, California 94042		10. PROGRAM ELEMENT NO. EHE624A
		11. CONTRACT/GRANT NO. 68-02-2611, Task 10
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Task Final; 11/77 - 12/78
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is David G. Lachapelle, MD-65, 919/-541-2236.

16. ABSTRACT The report gives results of a technical/economic assessment of Exxon's Thermal DeNOx Process, applied to coal-fired utility boilers. The assessment was performed in parallel with a study in which the performance/cost of the process was estimated for eight coal-fired utility boilers representative of the Nation's boiler population. The report concludes that the process is a promising technique for controlling NOx emissions from utility steam generators. However, a number of limitations need to be evaluated when the process is retrofitted to coal-fired boilers. Flue gas temperature fluctuations (caused primarily by load following, furnace slag deposition, and tube fouling) may limit NOx reductions to approximately 50%. In addition, operational and environmental impacts of NH3 emissions and ammonium bisulfate formation could further limit the performance of the process and affect its applicability. These limitations are best evaluated on full scale. Total operating costs are estimated between 0.27 and 1.23 mills/kWhr, exclusive of license fee. Actual costs depend primarily on boiler size, initial NOx concentration, and level of control required. The assessment also considered the impact of widespread process implementation on the ammonia market, feedstock supplies, and their costs. The impacts were found to be small.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Utilities	Pollution Control	13B	
Assessment	Boilers	Stationary Sources	14B	13A
Ammonia	Coal	NH3 Injection	07B	21B
Performance	Ammonium Compounds	Thermal DeNOx Process		
Cost Estimates		Utility Boilers	14A	
Nitrogen Oxides		Ammonium Bisulfate		

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1. REPORT NO. EPA-600/7-79-118	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE In-stack Plume Opacity from Electrostatic Precipitator/Scrubber System at Harrington Unit 1		5. REPORT DATE May 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Leslie E. Sparks		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS See block 12, below.		10. PROGRAM ELEMENT NO. EHE624A
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12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Inhouse; 8-9/78
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES Author Sparks' phone is 919/541-2925.

16. ABSTRACT The report gives results of theoretical modeling of particulate emission and in-stack plume opacity for the electrostatic precipitator (ESP)/scrubber system at Southwestern Public Service Company's Harrington Unit 1. The theoretical results of an emission rate of 17.8 ng/J and opacity of 35% are in good agreement with data from compliance testing of the unit. The calculations indicate that 20% opacity can be achieved (1) by increasing specific collector area (SCA) of the ESP by 25% and leaving the scrubber pressure drop alone, (2) by increasing scrubber pressure drop by a factor of 4 and leaving the ESP alone, (3) by replacing the existing marble bed scrubber with a venturi scrubber, increasing the pressure drop by 20%, and leaving the ESP alone, or (4) by doubling the SCA of the ESP and removing the scrubber. Calculations showing the impact of high in-stack opacity on the downwind appearance of the plume are also included.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Gas Scrubbing	Pollution Control	13B	13H
Flue Gases	Dust	Stationary Sources	21B	11G
Opacity	Mathematical Modeling	Particulate	14B	
Plumes				12A
Electrostatic Precipitators			13I	
Scrubbers			07A	

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1. REPORT NO. EPA-600/7-79-120	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE ENVIRONMENTAL ASSESSMENT REPORT: Lurgi Coal Gasification Systems for SNG		5. REPORT DATE May 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) M. Ghassemi, K. Crawford, and S. Quinlivan		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS TRW Environmental Engineering Division One Space Park Redondo Beach, California 90278		10. PROGRAM ELEMENT NO. EHE623A
		11. CONTRACT/GRANT NO. 68-02-2635
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Final; 5/78 - 4/79
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is William J. Rhodes, Mail Drop 61, 919/541-2851.

16. ABSTRACT The report is a compilation and analysis of data on the equipment and processes constituting the Lurgi Substitute Natural Gas (SNG) systems, the control/disposal alternatives for a media, the performance and cost of control alternatives, and present and proposed environmental requirements. It provides the best technical basis currently available for establishing environmental standards for Lurgi SNG plants. Lurgi SNG systems are divided into four operations (coal preparation, coal gasification, gas purification, and gas upgrading) and a number of auxiliary processes (air pollution control, raw water treatment, oxygen production, etc.); each operation consists of a number of processes. Data are provided on the characteristics of input materials, products, and waste streams associated with each process. Pollution control alternatives for air emissions, water effluents, solid wastes, and toxic substances in an integrated facility were examined for performance, costs, energy requirements, and ability to comply with current and anticipated environmental standards. The adequacy of the data was evaluated and the additional data needed to support standards development and enforcement and health and ecological effects and control research and development were identified. On-going and planned programs which may supply some of the needed data are reviewed.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Water Treatment	Pollution Control	13B	
Assessments	Toxicity	Stationary Sources	14B	06T
Coal Gasification		Substitute Natural Gas	13H	
Manufactured Gas		Lurgi	21D	
Coal Preparation		Gas Upgrading	08I	
Gas Purification			07A	

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS *(This Report)* Unclassified	21. NO. OF PAGES 341
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1. REPORT NO. EPA-600/7-79-133	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Wastewater Treatment in Coal Conversion		5. REPORT DATE June 1979
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) R.E.Hicks, D.J.Goldstein, F.B.Seufert, and I.W.Wei		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Water Purification Associates 238 Main Street Cambridge, Massachusetts 02142		10. PROGRAM ELEMENT NO. EHE623A
		11. CONTRACT/GRANT NO. 68-03-2207
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15. SUPPLEMENTARY NOTES IERL-RTP project officer is William J. Rhodes, Mail Drop 61, 919/541-2851.

16. ABSTRACT The report describes water treatment control technology specific to fuel conversion plant sites in the western U.S. Most plants converting coal to other fuels use a large quantity of clean water (as steam) and put out a large quantity of dirty water that is condensed when the products from the coal reactor are cooled. Treatment of this foul condensate is the subject of this report. The report discusses each aspect of water treatment separately. Procedures for removing phenolic compounds are discussed: they include distillation, extraction, and adsorption. The report includes design equations, step-by-step design procedures, and calculations for a typical unit. It also provides physical data that are required for design. The discussion of ammonia separation and recovery includes design equations and physical data. Illustrative calculations show how the design procedure is used. For biological treatment, the design procedures show how to destroy organic contamination (including phenol) in the condensate. It also discusses cooling tower control. An economical use of the foul condensate is treating it for makeup to a plant's cooling system. The report also reviews established procedures for sizing plant equipment.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Bioassay	Pollution Control	13B	06A
Coal Gasification	Cooling Towers	Stationary Sources	13H	13A,07A
Waste Water	Organic Compounds	Coal Conversion		
Water Treatment		Biological Treatment		
Phenols		Organic Contamination	07C	
Ammonia			07B	

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