TVA Tennessee Valley Authority
Office of Power
Power Research Staff
Chattanooga, Tennessee 37401
PRS-14

EPA United States Environmental Protection Agency
Office of Research and Development
Office of Energy, Minerals, and Industry
IERL, Research Triangle Park, NC 27711
EPA-600/7-76-021

October 1976

TVA'S 1-MW PILOT PLANT: VERTICAL DUCT MIST ELIMINATION TESTING

Progress Report

Interagency Energy-Environment Research and Development Program Report

RESEARCH REPORTING SERIES

Research reports of the Office of Research and Development, U.S. Environmental Protection Agency, have been grouped into seven series. These seven broad categories were established to facilitate further development and application of environmental technology. Elimination of traditional grouping was consciously planned to foster technology transfer and a maximum interface in related fields. The seven series are:

1. Environmental Health Effects Research
2. Environmental Protection Technology
3. Ecological Research
4. Environmental Monitoring
5. Socioeconomic Environmental Studies
6. Scientific and Technical Assessment Reports (STAR)
7. Interagency Energy-Environment Research and Development

This report has been assigned to the INTERAGENCY ENERGY-ENVIRONMENT RESEARCH AND DEVELOPMENT series. Reports in this series result from the effort funded under the 17-agency Federal Energy/Environment Research and Development Program. These studies relate to EPA's mission to protect the public health and welfare from adverse effects of pollutants associated with energy systems. The goal of the Program is to assure the rapid development of domestic energy supplies in an environmentally--compatible manner by providing the necessary environmental data and control technology. Investigations include analyses of the transport of energy-related pollutants and their health and ecological effects; assessments of, and development of, control technologies for energy systems; and integrated assessments of a wide range of energy-related environmental issues.

This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

PRS - 14
EPA-600/7-76-021
October 1976

TVA'S 1-MW PILOT PLANT: VERTICAL DUCT MIST ELIMINATION TESTING -- PROGRESS REPORT

by

G.A. Hollinden, R.F. Robards, and N.D. Moore (TVA/Chattanooga)
T.M. Kelso and R.M. Cole (TVA/Muscle Shoals)
Tennessee Valley Authority

Power Research Staff
Chattanooga, Tennessee 37401

and

Office of Agricultural and Chemical Development
Muscle Shoals, Alabama 35660

Interagency Agreement No. EPA-IAG-D5-0721
Program Element No. EHB528

EPA Project Officer: John E. Williams

Industrial Environmental Research Laboratory
Office of Energy, Minerals, and Industry
Research Triangle Park, NC 27711

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development
Washington, DC 20460

DISCLAIMER

This report has been prepared by the Tennessee Valley Authority and reviewed by the U.S. Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of either agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

ABSTRACT

TVA has recently demonstrated washing techniques that maintain continuous mist eliminator performance for lime/limestone closed-loop scrubbing systems at its 1-MW pilot plant at the Colbert power plant. The systematic test program which developed these washing techniques is reviewed for both the limestone and lime systems. Continuous operation of the Chevron-type mist eliminator, positioned horizontally in a vertical duct, in the limestone system was maintained (after extensive testing) by washing the bottom of the mist eliminator intermittently with all the available clarified liquor immediately followed by an allocated amount of the allowable makeup water. The top of the mist eliminator was washed intermittently with the remaining allocation of allowable makeup water. Continuous mist eliminator performance in the lime system was maintained by washing the bottom of the mist eliminator intermittently with an allocated amount of allowable makeup water. The remainder of the allocated makeup water was used to intermittently wash the top of the mist eliminator.

CONTENTS

FIGURES

INTRODUCTION

TVA has operated the 1-MW wet lime/limestone pilot plant at the Colbert Steam Plant since February 1971. Until recently, this pilot plant was used primarily for testing limestone scrubbing with major attention directed toward the full-scale 550-MW Widows Creek limestone scrubbing system.

Results from this testing suggested utilizing a vertical mist eliminator in a horizontal duct. This type of mist elimination design permits the use of a separate wash system for the mist eliminator than that of the scrubber. More recently, the pilot plant tests were designed to evaluate similar methods for washing this type of mist eliminator without exceeding the water balance of the closed-loop limestone wet scrubbing process. The quantity of fresh water required for effective washing of the mist eliminator on a once-through basis was four to five times the amount required for makeup to the closed-loop slurry system. One such method of maintaining continuous operation of the mist eliminator in the horizontal duct while operating in a closed-loop slurry system is the use of sodium carbonate in the recyclable mist eliminator wash system. This additive increases the solubility of sulfates thus reducing the tendency for scale formation. The additive method may not be applicable for washing the mist eliminator in the vertical duct because of the difficulty in separating the wash liquor from the scrubber liquor. Such separation is necessary to avoid loss of sodium carbonate which would be prohibitively expensive.

The major objective of the current study is to develop reliable closed-loop mist eliminator washing techniques for lime/limestone systems where the mist eliminator is positioned in the vertical duct. This report covers the systematic operation of a Chevron-type mist eliminator leading to its 1000 hour long-term run in the limestone mode and 560 hour run in the lime mode.

SUMMARY AND CONCLUSIONS

Pilot-plant tests have demonstrated washing methods that maintain continuous mist eliminator performance. Continuous performance of a horizontally mounted mist eliminator operating in the limestone mode is difficult because the wash water required for proper washing cannot be separated from the slurry system. Closed-loop operation precludes using copious amounts of fresh water to maintain reliable mist eliminator performance since the allowable makeup water rate is approximately 0.7 gpm or 0.2 gpm/ft^2 of duct area. The recommended wash rate is 5 gpm/ft^2. An intermittent wash using additional sources of wash liquor had to be used.

Washing the mist eliminator intermittently in the limestone mode with fresh makeup water was not successful. This may partly be attributed to operating the limestone mode at a stoichiometry of 1.5. Operation at this stoichiometry increases the plugging potential with soft mud-like solids due to excess limestone in the scrubbing slurry being entrained into the mist eliminator. The accumulation was at such a rate that another liquid source was needed to wash the mist eliminator. The clarified liquor to the scrubber system was accumulated and used to wash the mist eliminator along with the allowable amount of makeup water. Previous testing has shown that washing the mist eliminator with a blend of clarified liquor and makeup water results in chemical scaling and plugging. This chemical scale occurs when the supersaturated clarified liquor reacts with the remaining SO_2 in the flue gas, thus, resulting in the deposition of calcium-sulfur salts on the mist eliminator blades. Washing with clarified liquor followed by makeup water was successful in removing the soft mud-like solids and the calcium-sulfur salts from the mist eliminator. Continuous mist eliminator performance in the limestone mode was maintained by washing the bottom of the mist eliminator intermittently with all the available clarified liquor immediately followed by an allocated amount of the allowable makeup water. The top of the mist eliminator was washed intermittently with the remaining allocation of allowable makeup water.

Washing the mist eliminator intermittently in the lime mode with fresh makeup water was successful. The lime system operated at a stoichiometry of 1.0 which alleviated having excess alkali material in the scrubbing slurry being entrained into the mist eliminator. Continuous mist eliminator performance in the lime mode was maintained by washing the bottom of the mist eliminator intermittently with an allocated amount of allowable makeup water. The remainder of the allocated makeup water was used to wash the top of the mist eliminator intermittently. Proper implimentation of the available wash water and the wash frequency is the key contributor in maintaining continuous mist eliminator performance. These results do not say that all mist eliminator problems are solved, but the progress in that direction is certainly encouraging.

WORK COMPLETED

The pilot plant operated on a closed-loop basis. The only liquor purged from the system was that contained in the discarded spent solids (filter cake). The quantity of liquor amounted to about 140 pounds per hour when the filter cake contained 60 to 65 percent solids. Figure 1 shows a flow diagram of the pilot plant, while operating in the limestone mode. Fredonia limestone (75% - 200 mesh) was fed to the system at a rate sufficient to maintain a Ca:SO_2 mole ratio of 1.5 based on the concentration of SO_2 in the inlet flue gas. Scrubbing slurry containing 15 percent suspended solids and 1.3 percent dissolved solids was recirculated to the venturi and absorber at a liquid-to-gas ratio (L/G) of 10 and 50 gallons per 1000 cubic feet, respectively. The scrubber contained two stages (each 12 in deep) of 10-gram thermoplastic rubber (TPR) spheres manufactured by Moldcraft.

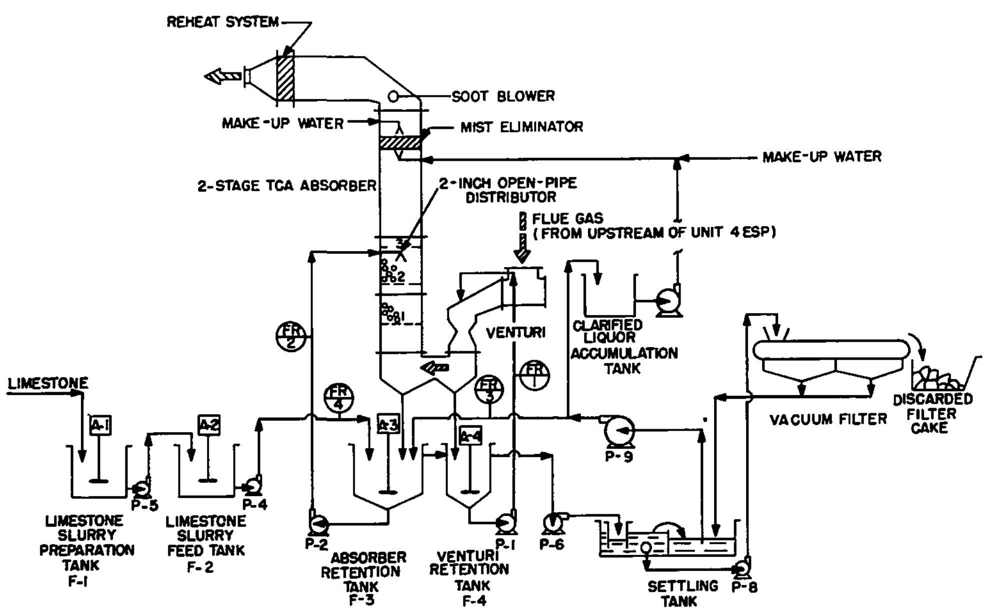

FIGURE 1

TCA SCRUBBER FLOW DIAGRAM

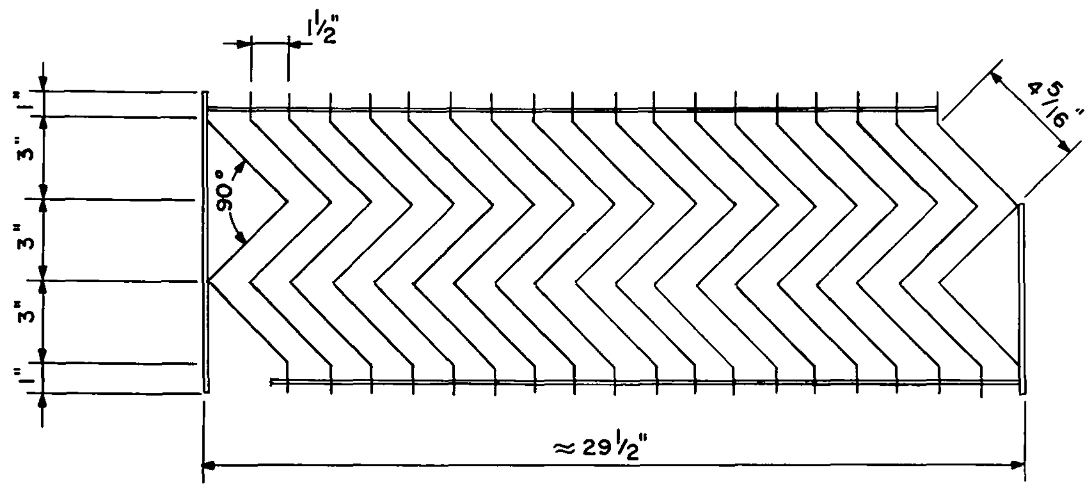

FIGURE 2

CHEVRON MIST ELIMINATOR

The Turbulent Contact Absorber (TCA) operated at a superficial velocity of 12.6 to 13.8 feet per second. The concentration of SO_2 in the inlet flue gas varied from about 1600 to 2700 ppm. The SO_2 removal averaged 72 percent. This low SO_2 removal is attributed to the absorber inlet spray header being lowered (approximately 15 ft) to just beneath the third grid so that the mist eliminator could be installed between the third and fifth grids. The particulate loading in the inlet and outlet averaged 4.5 and 0.02 grains per standard cubic foot, respectively. The pressure drop across the venturi and TCA-type absorber (containing 3 grids and 2 stages of the TPR spheres) averaged 9 and 7 inches of water, respectively. The mist eliminator tested was the three-pass, 90-degree bend, Chevron-type with $1\text{-}\frac{1}{2}$ in spacings as shown in Figure 2. The mist eliminator was placed in the horizontal position in the vertical absorber tower. Figure 3 shows the test module for viewing the operation of the mist eliminator.

The initial run was designed to observe drainage and mist entrainment from the mist eliminator washes at superficial gas velocities of 5, 7.5, 10. 12.6, and 16 ft/s using only air and water. Proper drainage of the mist eliminator occurred at 12.6 ft/s--the planned operating velocity.

The operation and washing conditions for all runs with the mist eliminator positioned in the vertical tower are summarized in Table 1.

Run ME-10 began on July 29, 1975, using flue gas and limestone slurry with an initial pressure drop across the mist eliminator of 0.2 inch H_2O. The mist eliminator was washed intermittently with only fresh makeup water--0.7 gal/min or 336 gal/shift. Two-thirds of this water was used to wash the bottom of the mist eliminator at one-hour intervals. The remainder of the water washed the top of the mist eliminator every two hours. The pressure drop gradually increased and leveled off several times

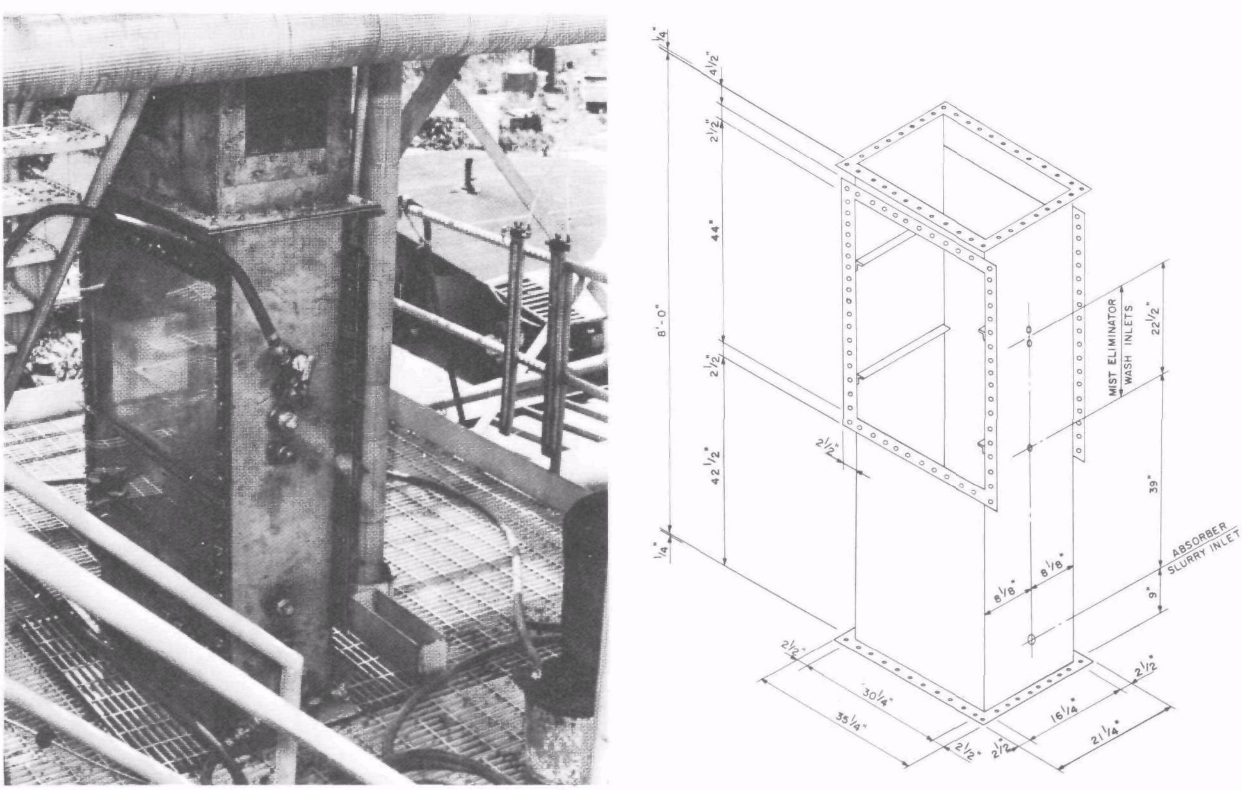

FIGURE 3

MIST ELIMINATOR TEST MODULE

TABLE 1

SUMMARY OF MIST ELIMINATOR OPERATIONS

Run	Duration of Test	ΔP (in. H_2O)	Top Wash Pressure (psi)	Top Wash Rate (gpm)	Top Wash Duration (min)	Top Wash Interval (h)	Top Wash Type Wash	Bottom Wash Pressure (psi)	Bottom Wash Rate (gpm)	Bottom Wash Duration (min)	Bottom Wash Interval (h)	Bottom Wash Type Wash	Total ME Wash (gal/shift)	Comments
ME-9	12 h													Air/water test.
ME-10	202 h	0.2 → 1.5	10	8	3.5	2	FW	20	11.7	2.4	1	FW	337	Top two passes clean. Lower lip plugged with mud-like deposits.
ME-11	120 h	0.1 → 0.5	10	8.2	1.6	2	FW	20	11.7	1.5	0.5	FW	333	Top two pases clean. Lower lip plugged with mud-like deposits with indications of scale in mud.
ME-12	96 h	0.1 → 0.2	10	8.2	1.6	2	FW	20 20	11.7 11.7	1.8 1.53	0.5 0.5	CL* FW	337 339	Top two passes clean. Bottom center plugged probably due to spray pattern.
ME-13	84 h	0.1 → 0.4	10	8.2	1.6	2	FW	20 20	11.4 11.4	1.8 1.53	0.5 0.5	CL* FW	328 332	Used 2 nozzles at 5.7 gpm. Suddenly started plugging. Upset unknown.
ME-14	213 h	0.1 → 0.2	10	8.2	1.6	2	FW	20 20	11.4 11.4	5.4 1.55	0.5 0.5	CL* FW	985 335	Similar to ME-13. May begin having problems maintaining solids concentration. May have been stopped premature--one small area causing pluggage--rest clean with little mud on bottom edges (always there).
ME-15	1000 h	0.1 → 0.1	10	8.2	1.6	2	FW	20 20	11.4 11.4	2.7 0.78	0.25 0.25	CL* FW	985 338	Nozzles were raised to cover a missed area 9-9-75. ME momentarily removed after 500 hours for photographing. Units 3,4, and 5 off-line--pilot plant shut down 10-6 to 10-8. ME remained clean through 1,000 hours.
ME-16	166 h	0.1 → 0.2	10	8.2	1.6	2	FW	15 20	6.0 11.4	2.7 0.78	0.25 0.25	SL* FW	518 338	Second pass plugging. Nozzles plugging and cleaned by blast of air (30 psi)--may have helped clean ME. Nozzles eroded.
ME-17	134 h	0.1 → 0.2	10	8.2	1.6	2	FW	15 20	6.0 11.4	2.7 0.78	0.25 0.25	SL* FW	518 338	Separate and rotating slurry header. Plugging in second pass.
ME-18	560 h	0.1 → 0.1	10	8.2	1.6	2	FW	20	11.4	0.65	0.25	FW	289	Lime mode: 0.6 gpm makeup--288 gal/shift ME remained clean while using only fresh makeup water

FW: Fresh makeup water 0.7 gpm: 336 gal/shift
CL: Clarified liquor
SL: Slurry

*Followed immediated with fresh water wash

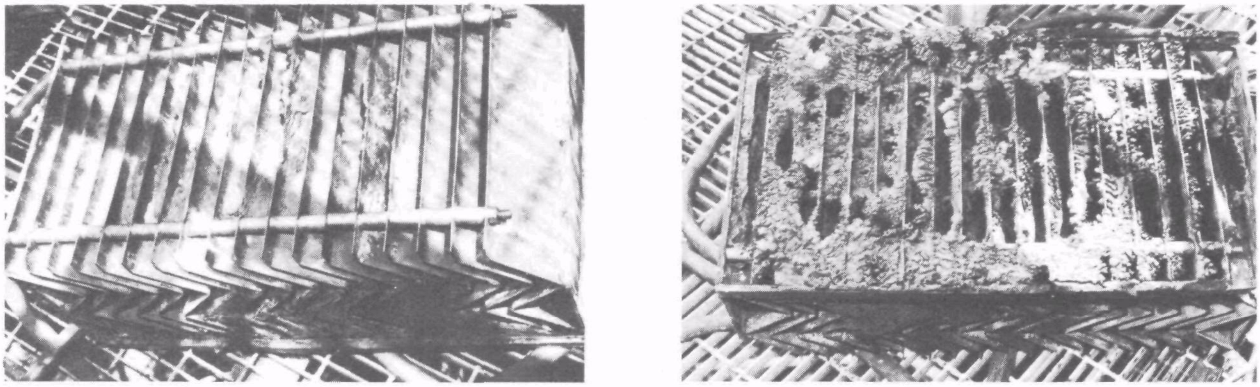

FIGURE 4
TOP AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 202 HOURS OF OPERATION (TEST ME-10)

before the run was terminated at a pressure drop of 1.5 inches H_2O. The run lasted approximately 200 hours. During this run, the top two passes remained clean indicating a sufficient, if not excessive, top wash. The bottom pass was plugged with soft, mud-like deposits mainly on the lower lip of the mist eliminator. Figure 4 shows the accumulation of this material on the mist eliminator. It was decided that a pressure drop of 1.5 inches H_2O was excessive as a terminating point--no stopping point had been determined up to this point. A more realistic termination point of 0.5-inch H_2O was selected for the next run.

Run ME-11 began on August 6, 1975, with an initial pressure drop of 0.1 inch H_2O. Since the top passes remained clean during the previous run, half of the makeup water used to wash these passes was added to the bottom wash. The frequency of the bottom wash was reduced to every 30 minutes. The pressure drop rose slowly until reaching the termination point after about 120 hours. Figure 5 shows the appearance of the mist eliminator at the end of this run. Its appearance was similar to that in the previous run. The lower lip was partially plugged with soft solids, but there

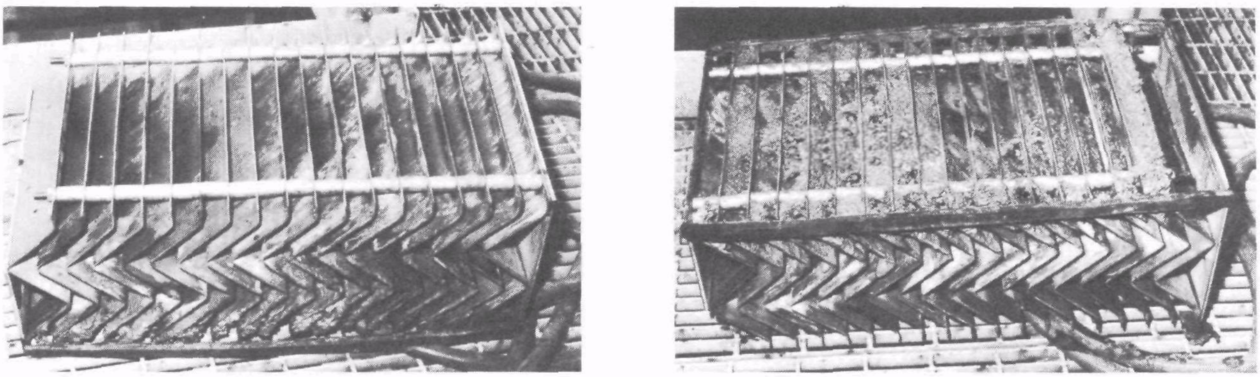

FIGURE 5

TOP AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 120 HOURS OF OPERATION (TEST ME-11)

were indications of scale deposits in this mud. The scale formation was probably due to the remaining SO_2 in the flue gas reacting with soft solids already attached to the mist eliminator thus forming the hard calcium sulfate salts. From experience at Colbert and Shawnee and from calculations on pressure drop versus percent pluggage of the mist eliminator, a pressure drop increase of 0.1-in H_2O when starting at 0.1-in H_2O gives a 30 percent pluggage. Therefore, a new termination point of 0.2-in H_2O was chosen for all subsequent runs.

Run ME-12 began on August 10, 1975, with an initial pressure drop of 0.1-in H_2O. Since the top two passes remained clean during the previous run and reducing more water from this wash to add to the bottom wash would be an almost insignificant addition, some of the available clarified liquor was used to supplement the bottom wash. Previous mist eliminator tests, prior to this project, had indicated that washing with a mixture of clarified liquor--saturated with $CaSO_4$--and fresh water would result in scale formation on the blades. With this experience, it was decided to use clarified

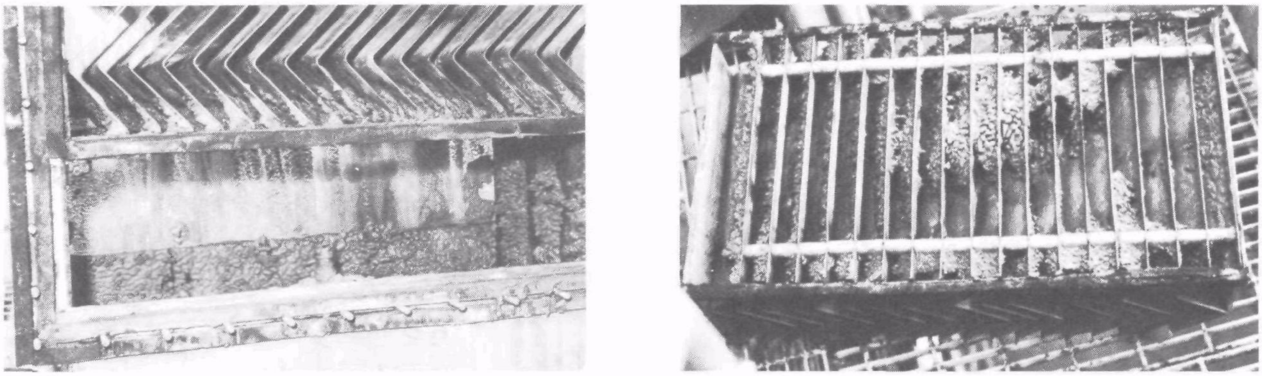

FIGURE 6

SIDE AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 96 HOURS OF OPERATION (TEST ME-12)

liquor as the bottom wash and to immediately follow this wash with the fresh makeup water. Such operation reduces the possibility of any clarified liquor remaining on the blades for any length of time and becoming supersaturated with $CaSO_4$ and cause scaling to occur. The pressure drop during this run remained fairly constant for approximately 100 hours when the center of the lower lip began plugging thus causing termination of the run. Figure 6 shows the plugged area that caused the increase in pressure drop. The small area that had accumulated the soft deposits was believed to be caused by an uneven distribution of the wash and additional nozzles were recommended for subsequent runs.

Run ME-13 began on August 19, 1975, with an initial pressure drop of 0.1-in H_2O. Two nozzles were used for the bottom wash with a total wash similar to the previous runs using one nozzle. The duration of the bottom wash was adjusted to account for the difference while the top wash remained the same. The pressure drop remained constant for approximately 100 hours when it suddenly rose to 0.4-in H_2O. The reason for this increase is not certain. Figure 7 shows the appearance of the mist eliminator at

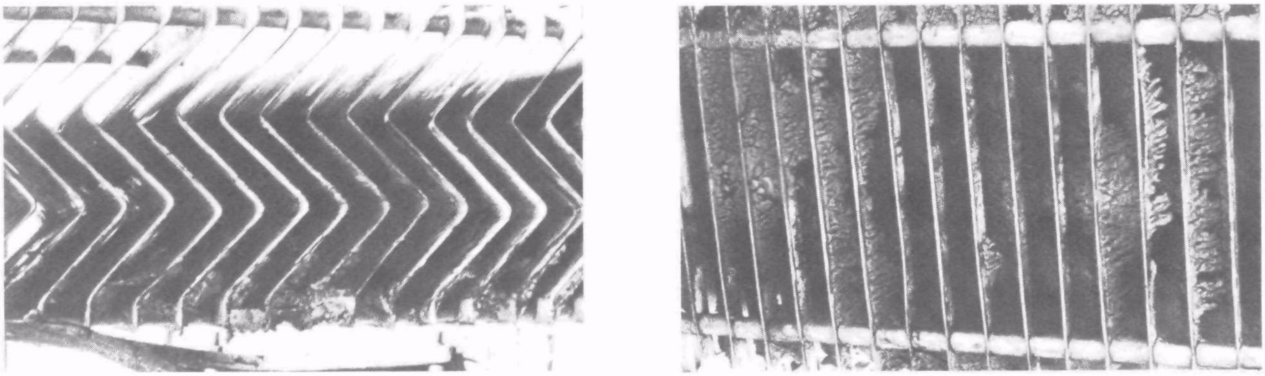

FIGURE 7

SIDE AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 84 HOURS OF OPERATION (TEST ME-13)

the end of this run.

Run ME-14 began on August 23, 1975, with an initial pressure drop of 0.1-in H_2O. It was decided to increase the clarified liquor wash to the maximum available--approximately 100 gal/shift or three times that used previously. The fresh makeup water wash immediately followed this clarified liquor wash. There was some concern about maintaining adequate solids concentration with the addition of this clarified liquor. However, the concentrations were held fairly close to design conditions. After approximately 200 hours of operation, the run was terminated after reaching a pressure drop of 0.2-in H_2O. This termination may have been premature because of the variability of the pressure drop readings. Figure 8 shows the accumulation of mud on the mist eliminator at the end of this run.

Run ME-15 began on September 1, 1975, with an initial pressure drop of 0.1-in H_2O. The only difference between this run and the previous run is the frequency of the bottom wash was changed from every 30 minutes to every 15 minutes. The washing duration was therefore adjusted to maintain the same total wash on the bottom. The pressure drop of 0.1-in H_2O was maintained for 1000 hours. The mist eliminator was momentarily removed after 500 hours for photographing. Figure 9 shows the appearance of the mist eliminator at that time. Figure 10 shows the appearance of the mist eliminator after completion of the long-term run.

Run ME-16 began on October 14, 1975, to test the effect of washing the mist eliminator with absorber slurry and fresh makeup water. An initial pressure drop across the mist eliminator was 0.1-in H_2O. The bottom of the mist eliminator was washed at 15-min intervals with absorber slurry followed immediately by the majority of the fresh makeup water. The top wash remained the same. A buildup of soft mud-like solids occurred in the second pass of the mist eliminator. More than likely, this buildup was caused by an accumulation of slurry solids that were carried into the mist eliminator during the slurry wash sequence. The same header was used for the slurry wash as the makeup water wash. High-pressure air was used frequently to dislodge slurry solids from the two spray nozzles. This resulted in a portion of the solids which originally accumulated in the second pass to be blown into the third pass where they were removed by the top wash. The net effect of using high-pressure air to aid in cleaning the mist eliminator is uncertain. After 166 hours of operation, the pressure drop reached 0.2-in H_2O and the run was terminated.

Run ME-17 began on October 21, 1975, using the same washing techniques as ME-16 with the exception that a separate spray header with larger nozzles was used for the slurry wash. These nozzles plugged with slurry solids and high-pressure air was unsuccessful to unplug these nozzles because a sufficient back pressure could not be maintained. The solids accumulated in the second pass of the mist eliminator at a faster rate than the

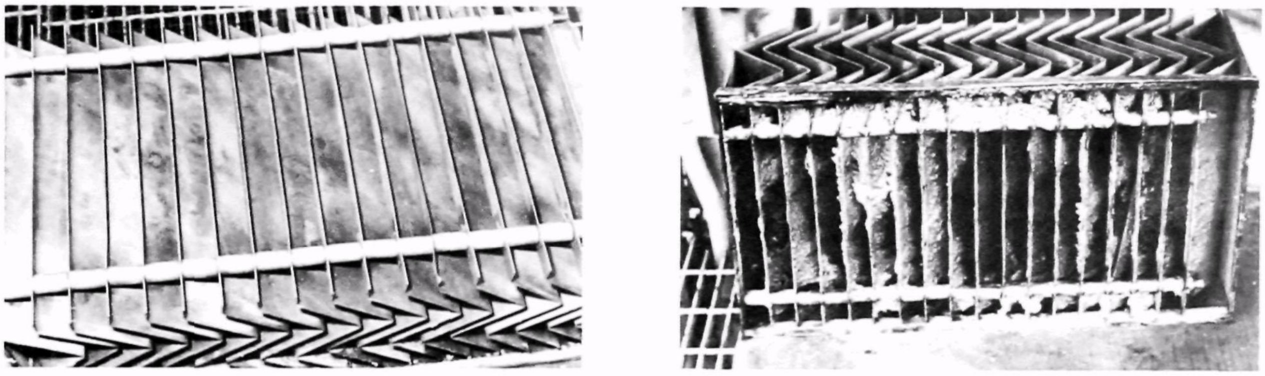

FIGURE 8

TOP AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 213 HOURS OF OPERATION (TEST ME-14)

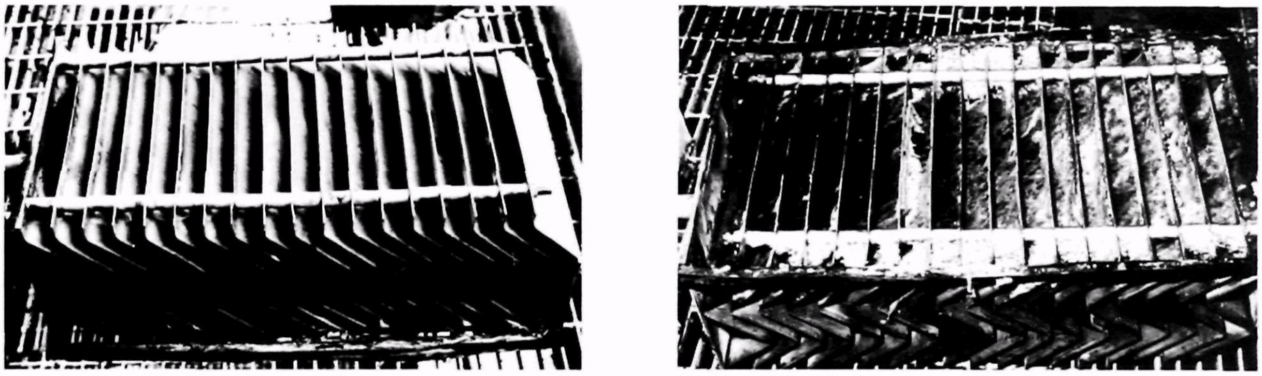

FIGURE 9

TOP AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 500 HOURS OF OPERATION (TEST ME-15)

FIGURE 10

SIDE, TOP, AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 1000 HOURS OF OPERATION (TEST ME-15)

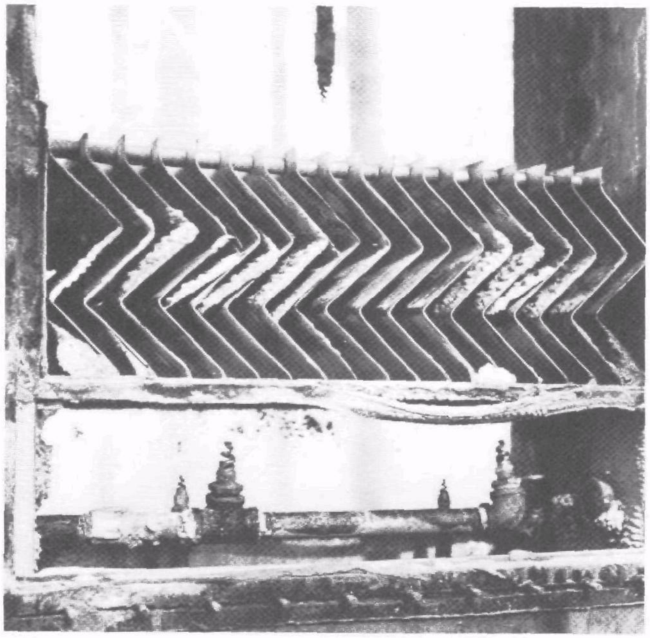

FIGURE 11

SIDE VIEW OF MIST ELIMINATOR AFTER 134 HOURS OF OPERATION (TEST ME-17)

previous run. This may be due to the elimination of high-pressure air hitting the mist eliminator. The run was terminated after 134 hours of operation when the pressure drop reached 0.2-in H_2O. Figure 11 shows the spray headers and the mud deposits in the second pass at the end of the run.

Run ME-18 began on November 29, 1975, using lime as the absorbent in the scrubber. The chemistry of the absorption of SO_2 is different in the lime mode which results in higher utilization of the absorbent and, therefore, a reduction in the amount of water removed with the sludge. The makeup water requirement for the lime mode is approximately 0.6 gal/min/MW as compared to 0.7 gal/min/MW for limestone. This reduces the quantity of water available to wash the mist eliminator. As a base case the mist eliminator was washed intermittently with fresh makeup water only. The top was washed every 2 hours and the bottom every 15 minutes. The pressure drop across the mist eliminator remained 0.1-in H_2O

through 560 hours of operation. At that time, the pilot plant was shut down for the Christmas holidays. Figure 12 shows the appearance of the mist eliminator at the end of the lime run. This run completed the mist eliminator tests in the vertical duct. Trends in operating data for all runs are graphically displayed in Figure 13.

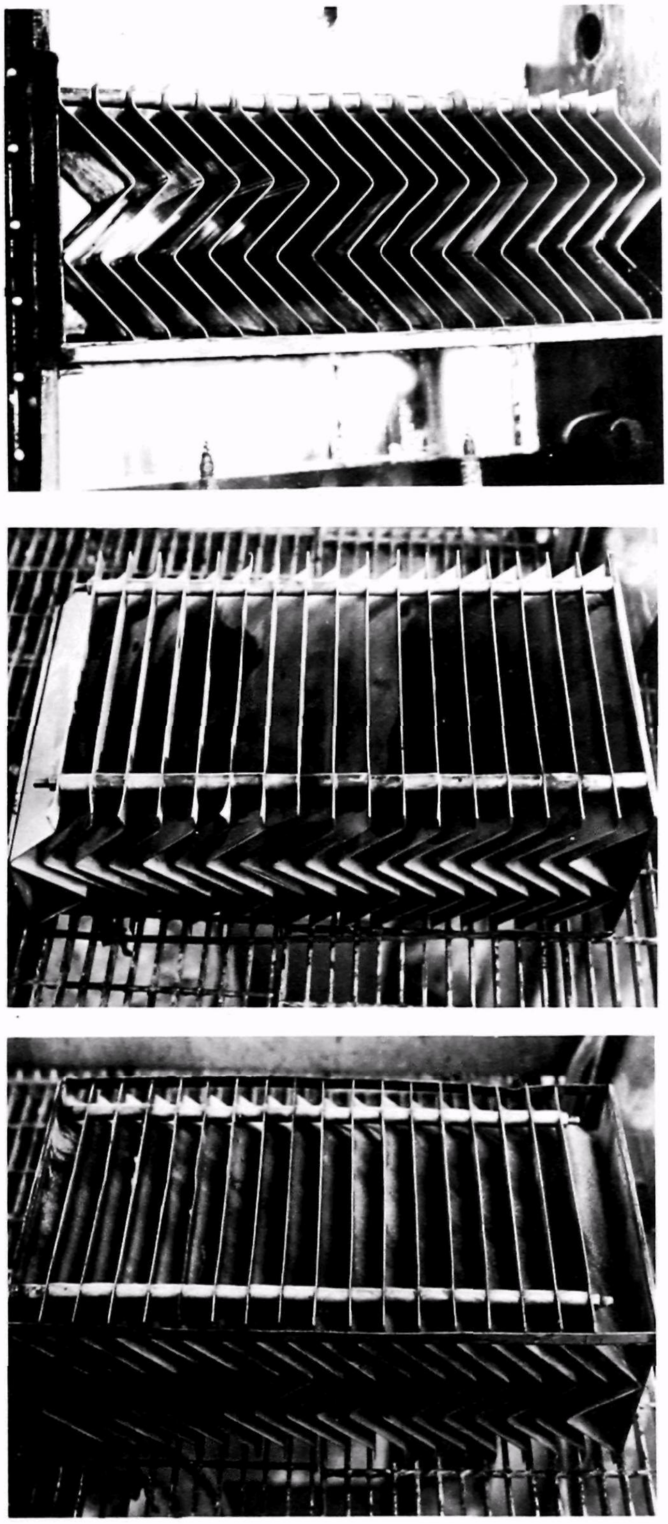

FIGURE 12

SIDE, TOP, AND BOTTOM VIEWS OF MIST ELIMINATOR AFTER 560 HOURS OF OPERATION (TEST ME-18)

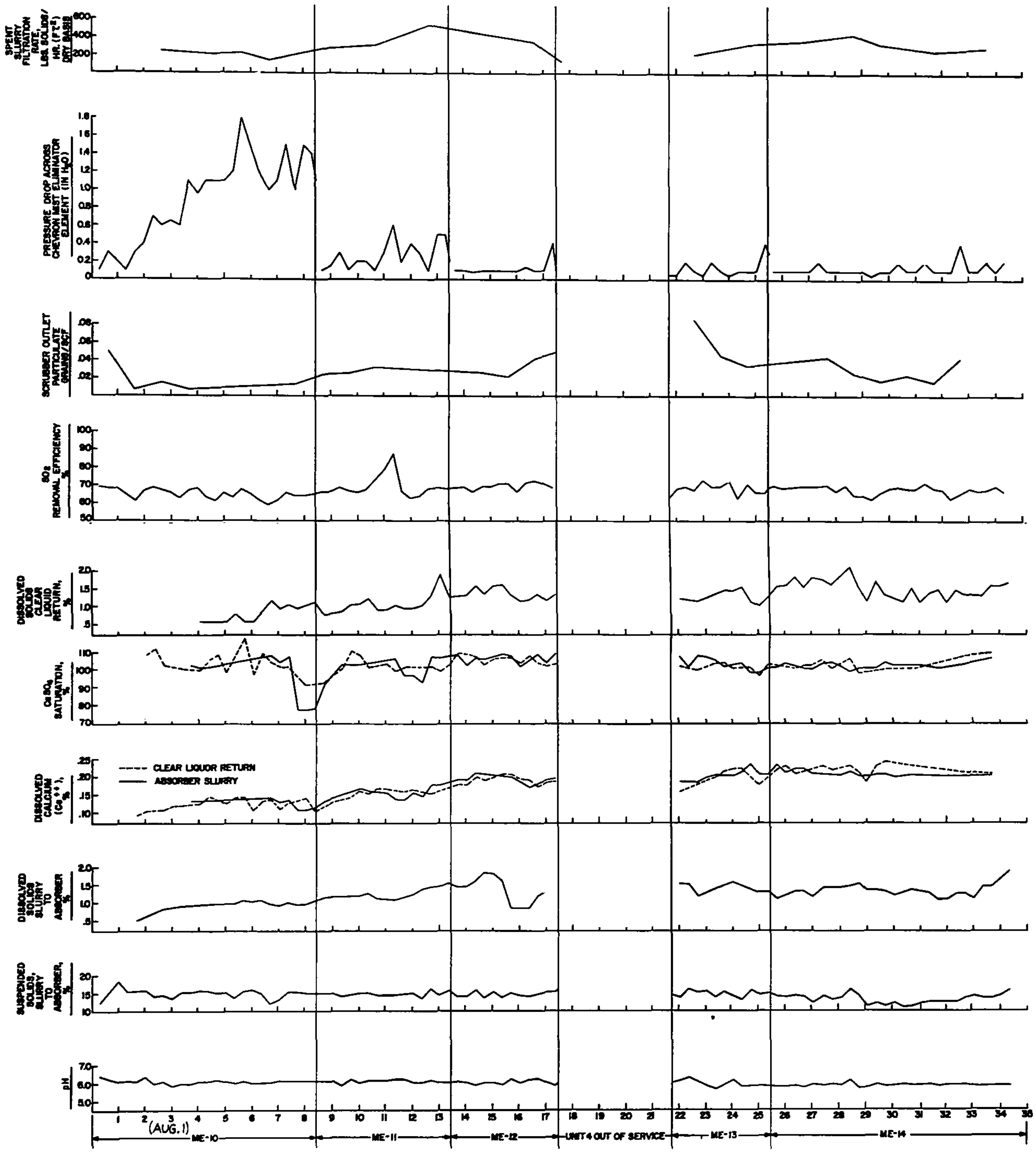

FIGURE 13

TRENDS IN OPERATING DATA

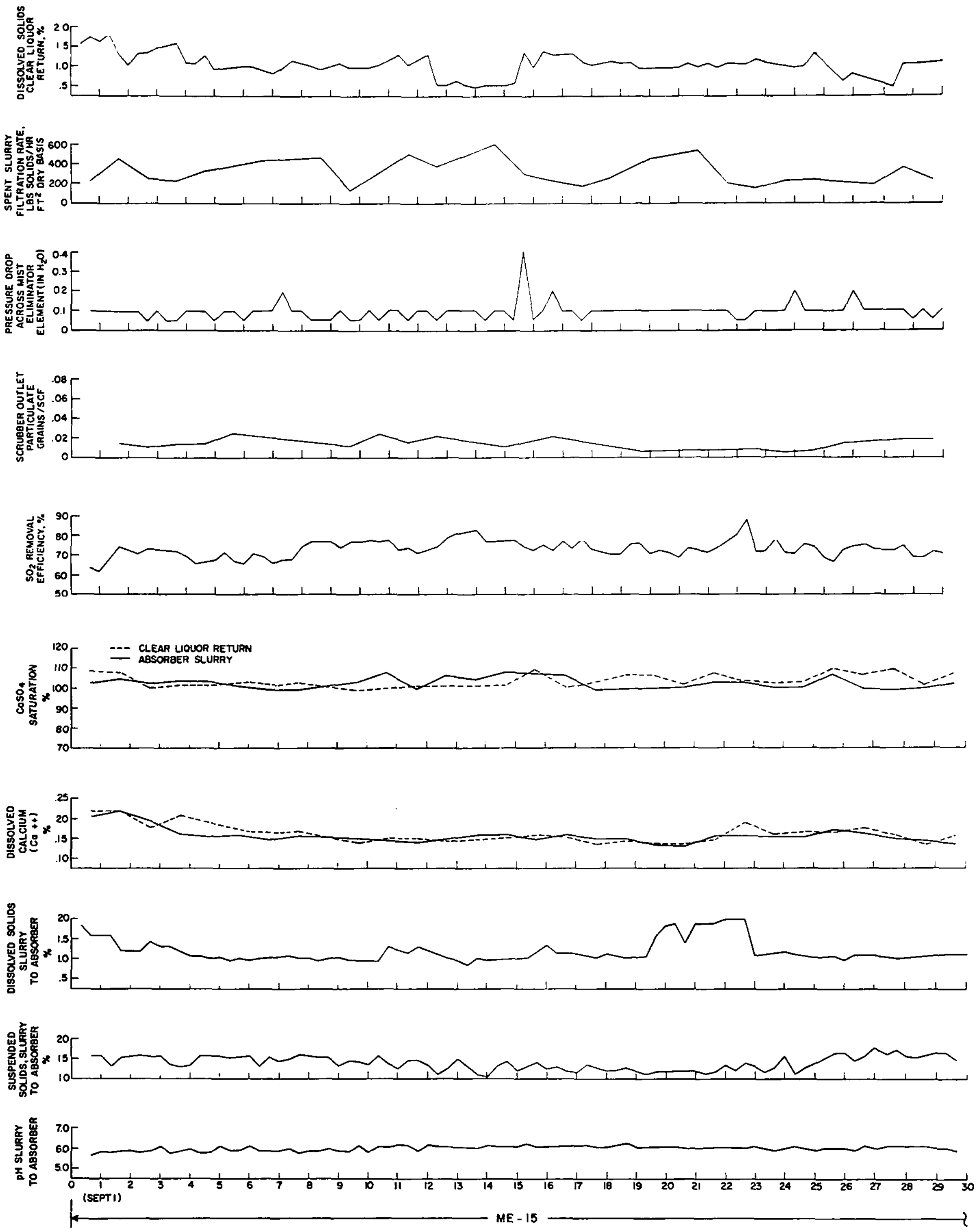

FIGURE 13 (CONT.)

TRENDS IN OPERATING DATA

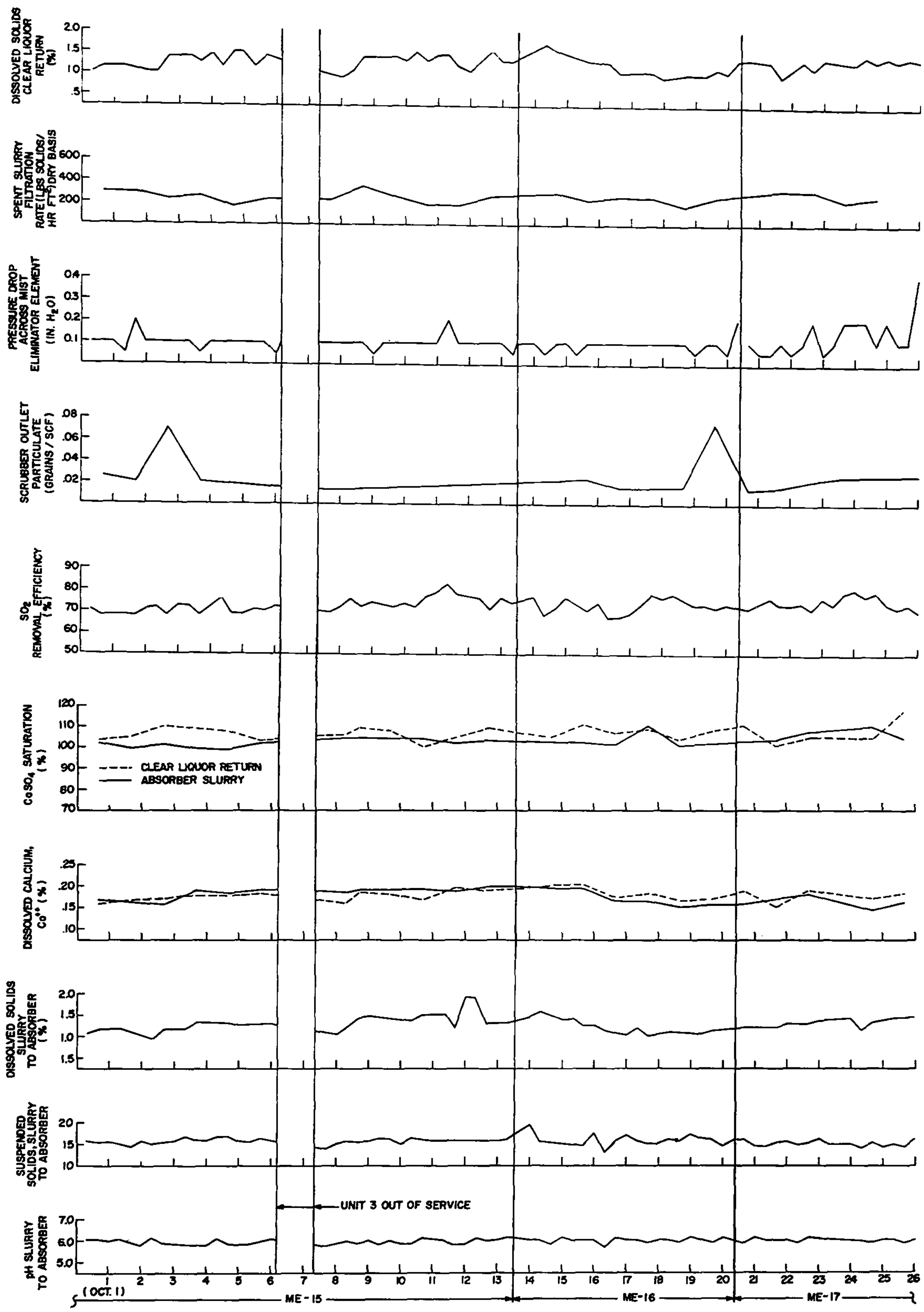

FIGURE 13 (CONT.)
TRENDS IN OPERATING DATA

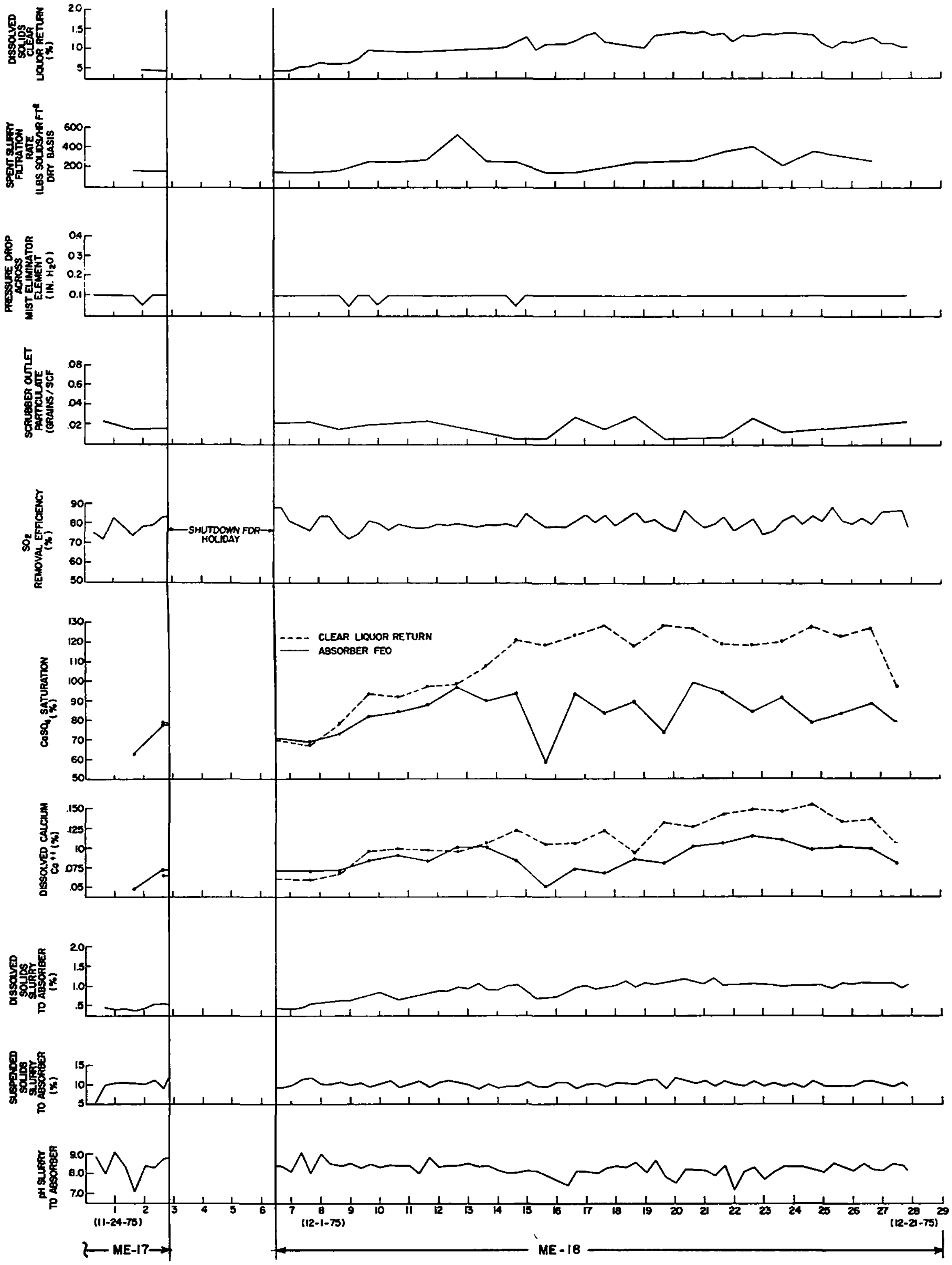

FIGURE 13 (CONT.)

TRENDS IN OPERATING DATA

FUTURE WORK

The remaining task scheduled for this project is the development of a high velocity scrubber and mist eliminator combination. A modified TCA scrubber, using lime as the absorbing media, will be operated at a gas velocity of 16 ft/sec. The Chevron mist eliminator will be positioned horizontally in the vertical duct and will initially be washed similarly to the previous lime runs.

CONVERSION FACTORS

The Environmental Protection Agency policy is to express all measurements in metric units. Implementing this practice will result in undue lack of clarity. The following conversion factors are provided to convert the nonmetric units to the International System of Units (SI).

To Convert From	To	Multiply By
Inches H_2O	Millimeter Mercury (mm Hg)	1.868×10^{0}
Pound/inch^2 (psi)	Atmosphere (atm)	6.805×10^{-2}
Pound (lb)	Kilogram (kg)	4.536×10^{-1}
Gallon/minute (gpm)	Liter/minute (l/min)	3.785×10^{0}
Gallon (gal)	Liter (l)	3.785×10^{0}
Foot/second (ft/sec)	Meter/second (m/sec)	3.048×10^{-1}
Foot^2 (ft^2)	Meter^2 (m^2)	9.290×10^{-2}
Foot^3 (ft^3)	Meter^3 (m^3)	2.832×10^{-2}
Degree Fahrenheit (^{o}F)	Degree Centigrade (^{o}C)	$t_C = (t_F - 32)/1.8$

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-600/7-76-021	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE TVA's 1-MW Pilot Plant: Vertical Duct Mist Elimination Testing--Progress Report		5. REPORT DATE October 1976 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) G. A. Hollinden, R. F. Robards, N. D. Moore (TVA-Chatt), T. M. Kelso, and R. M. Cole (TVA-MShoals)		8. PERFORMING ORGANIZATION REPORT NO. PRS-14
9. PERFORMING ORGANIZATION NAME AND ADDRESS TVA, Power Research Staff, Chattanooga, TN 37401 and TVA, Office of Agricultural and Chemical Development, Muscle Shoals, AL 35660		10. PROGRAM ELEMENT NO. EHB528 11. CONTRACT/GRANT NO. EPA-IAG-D5-0721
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 Progress Report; 6-12/75 14. SPONSORING AGENCY CODE EPA-ORD

15. SUPPLEMENTARY NOTES EPA project officer for this report is John E. Williams, Mail Drop 61, Ext 2915.

16. ABSTRACT

The report reviews (for both the lime and limestone systems) the systematic test program which developed recent TVA-demonstrated washing techniques that maintain continuous mist eliminator performance for lime/limestone closed-loop scrubbing systems at TVA's 1-MW pilot plant at the Colbert power plant. Continuous operation of the chevron-type mist eliminator, positioned horizontally in a vertical duct, in the limestone system was maintained (after extensive testing) by washing the bottom of the mist eliminator intermittently with all the available clarified liquor, immediately followed by an allocated amount of the allowable makeup water. The top of the mist eliminator was washed intermittently with the remaining allocation of allowable makeup water. Continuous mist eliminator performance in the lime system was maintained by washing the bottom of the mist eliminator intermittently with an allocated amount of allowable makeup water. The remainder of the allocated makeup water was used to wash the top of the mist eliminator intermittently.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Scrubbers Washing Calcium Oxides Limestone	Air Pollution Control Stationary Sources Mist Eliminators	13B 07A 13H 07B

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS *(This Report)* Unclassified	21. NO. OF PAGES 29
	20. SECURITY CLASS *(This page)* Unclassified	22. PRICE

EPA Form 2220-1 (9-73)