



Utility FGD Survey October 1983- September 1984

**Volume 2: Design
Performance Data
For Operating
FGD Systems (Part 1)**

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Alabama Electric, Tombigbee 2 through
Montana Power, Colstrip 2

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NOTICE

The data in this information transfer document are supplied voluntarily by utility representatives, flue gas desulfurization (FGD) system suppliers and designers, regulatory agencies, and others. The accuracy or completeness of the information contained herein is not warranted by the Stationary Source Control Division of EPA or the designated contractor. Portions of the work upon which this publication is based were performed pursuant to Contract Nos. RP982-32 (Electric Power Research Institute) and 68-02-3173 (Environmental Protection Agency).

A project summary will be distributed to organizations and individuals indicating a specific interest in the field of FGD technology. Interested parties can be added to the Project Summary mailing list by contacting Carolyn Fowler at the Industrial Environmental Research Laboratory (919/541-2915) or the secretary of the Emission and Effluent Technology Branch of the EPA (919/541-2578). Copies of preceding issues of this report through December 1981 can be purchased from the National Technical Information Service, Springfield, Virginia 22161, (703) 487-4650. Succeeding issues of this report can be purchased from the Electric Power Research Institute Research Reports Center, P.O. Box 50490, Palo Alto, California 94303, (415) 965-4081.

This report summarizes the FGD system design and performance data contained in a computerized data base known as the Flue Gas Desulfurization Information System (FGDIS). Access to the FGDIS is available through the National Technical Information Service (NTIS) for a nonprofit user's fee. Users also have access to additional design and performance data stored within the data base that cannot conveniently be printed in this report. Direct access to the data base affords analyses of the data (e.g., averages, maxima, minima, and standard deviations of various parameters), the use of simple mathematical functions, the capability of virtually unlimited data cross-referencing, and data tabulation to fit the user's individual information needs. An FGDIS users manual is available from NTIS (NTIS No. PB 83 146 209).

Requests for further information concerning the FGDIS and periodic FGDIS training seminars should be directed to Michael Melia or Skip Jones, PEI Associates, Inc. (513/782-4700). Information concerning access to the FGDIS can be obtained from Walter Finch, NTIS, 5285 Port Royal Road, Springfield, Virginia 22161 (703/487-4808).

USE OF THIS REPORT

This report is the first fully compiled edition since the July 1982-March 1983 issue released in April 1984, which contains more complete design and performance data since the FGS system startup dates. This report supersedes all previous issues. Volume 1 includes several categorical summaries of key data and the appendix sections. Volume 2, Parts 1 and 2 contain all available design and performance data for operational FGD systems (Section 13).

The Executive Summary contains the number and capacity of FGD systems as of the end of December 1984, future (December 1993) projections of controlled and uncontrolled generating capacity, and unit-by-unit summaries of status changes (e.g., contract awarded, under construction, or operational) and performance and status highlights for the period.

Appendix sections include definitions, a table of unit notation and simplified process flow diagrams, as well as data on terminated FGD systems, particle scrubbers and Japanese FGD systems.

ABSTRACT

The Utility FGD Survey report, which is generated by a computerized data base system, represents a survey of operational and planned domestic utility flue gas desulfurization (FGD) systems. The three volume set summarizes information contributed by the utility industry, system and equipment suppliers, system designers, research organizations, and regulatory agencies. The data cover system design, fuel characteristics, operating history, and actual system performance. Also included is a unit-by-unit discussion of problems and solutions associated with the boilers, scrubbers, and FGD systems.

The development status (operational, under construction, or in the planning stages), system supplier, process, waste disposal practice, and regulatory class are tabulated alphabetically by utility company. Simplified process flow diagrams of FGD systems, definitions, and a glossary of terms are attached to the report. Current data for domestic FGD systems show 124 systems in operation, 25 systems under construction, and 68 systems planned. The current FGD-controlled capacity in the United States is 47,255 MW.

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SECTION 13

DESIGN AND PERFORMANCE
FOR OPERATIONAL DOMESTIC FGD SYSTEMS

ALABAMA ELECTRIC, TOMBIGBEE 2
THROUGH
MONTANA POWER, COLSTRIP 2

SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ALABAMA ELECTRIC	
PLANT NAME	TOMBIGBEE	
UNIT NUMBER	2	
CITY	LEROY	
STATE	ALABAMA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	525	
GROSS UNIT GENERATING CAPACITY - MW	255	
NET UNIT GENERATING CAPACITY W/FGD - MW	235	
NET UNIT GENERATING CAPACITY WO/FGD - MW	243	
EQUIVALENT SCRUBBED CAPACITY - MW	179	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	449.72	(953000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	143.9	(291 F)
STACK HEIGHT - M	122.	(400 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.0	(16.5 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26572.	(11424 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10000-11000
AVERAGE ASH CONTENT - %	14.73	
RANGE ASH CONTENT - %	15-18	
AVERAGE MOISTURE CONTENT - %	6.64	
RANGE MOISTURE CONTENT - %	3.0-20.0	
AVERAGE SULFUR CONTENT - %	1.61	
RANGE SULFUR CONTENT - %	1.5-1.75	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1
NUMBER OF SPARES	0
TYPE	HOT SIDE
SUPPLIER	RESEARCH-COTTRELL
INLET FLUE GAS CAPACITY - CU.M/S	449.7 (953000 ACFM)
INLET FLUE GAS TEMPERATURE - C	143.9 (291 F)
PRESSURE DROP - KPA	.1 (1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.5

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS
A-E FIRM	BURNS & MCDONNELL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	59.50
ENERGY CONSUMPTION - %	3.1
CURRENT STATUS	1
COMMERCIAL START-UP	9/78
INITIAL START-UP	9/78
CONTRACT AWARDED	8/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT %	1.48	
DESIGN COAL HEAT CONTENT - J/G	29075.0	(12500 BTU/LB)
DESIGN COAL ASH CONTENT - %	10.00	
DESIGN MOISTURE CONTENT - %	8.00	
DESIGN CHLORIDE CONTENT - %	.04	
SPACE REQUIREMENTS SQ M	4645.0	(50000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	72.0	

** QUENCHER/PRESATURATOR

NUMBER	2	
TYPE	SPRAY	
INLET GAS FLOW - CU. M/S	127.41	(270000 ACFM)
INLET GAS TEMPERATURE - C	143.9	(291 F)
LIQUID RECIRCULATION RATE - LITERS/S	35.	(550 GPM)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	PEABODY PROCESS SYSTEMS	
DIMENSIONS - FT	24.0 DIA X 90.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER	
LINER MATERIAL TRADE NAME/COMMON TYPE	RESISTA-FLAKE 1151	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	6	
LIQUID RECIRCULATION RATE LITER/S	1259.	(19980 GPM)
L/G RATIO - L/CU.M	9.9	(74.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.0	(4.0 IN-H2O)
SUPERFICIAL GAS VELOCITY M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW CU. M/S	127.41	(270000 ACFM)
INLET GAS TEMPERATURE - C	54.4	(130 F)
SO2 REMOVAL EFFICIENCY - %	85.0	
PARTICLE REMOVAL EFFICIENCY - %	99.5	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
MANUFACTURER	SHAH-HEIL
CONFIGURATION	HORIZONTAL

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	1	
FREEBOARD DISTANCE - M	1.22	(4.0 FT)
PRESSURE DROP - KPA	.1	(.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	MAKEUP	
WASH FREQUENCY	INTERMITTENTLY	
** REHEATER		
NUMBER	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
LOCATION	ABSORBER OUTLET DUCT	
PERCENT GAS BYPASSED - AVG	30.0	
TEMPERATURE INCREASE - C	26.7	(48 F)
INLET FLUE GAS FLOW RATE - CU. M/S	134.92	(285900 ACFM)
INLET FLUE GAS TEMPERATURE - C	143.9	(291 F)
OUTLET FLUE GAS TEMPERATURE - C	81.1	(178 F)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	PEABODY PROCESS SYSTEMS	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	225.10	(477000 ACFM)
FLUE GAS TEMPERATURE - C	143.9	(291 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
MANUFACTURER	MOSSER	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	HIGH ALLOY	
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
MANUFACTURER	MOSSER	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	HIGH ALLOY	
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
** DAMPERS		
NUMBER	2	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
MANUFACTURER	MOSSER	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	SCRUBBER INLET	
CONFIGURATION	RECTANGULAR	
DIMENSIONS	7 FT X 12 FT	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	SCRUBBER OUTLET TO STACK
CONFIGURATION	RECTANGULAR
DIMENSIONS	5.5 FT X 12 FT AND 13 FT X 16 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	FLUOROELASTOMER
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	9.1 (10 TPH)
PRODUCT QUALITY - % SOLIDS	35.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	1
MIST ELIMINATOR WASH	1
LIMESTONE SLURRY STORAGE	1
HYDROCLONE UNDERFLOW	****
MILL RECYCLE SUMP	1
WASTE SLURRY SUMP	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	6
LIMESTONE MILL SLURRY RECIRCULATION	2
LIMESTONE SLURRY FEED	2
MIST ELIMINATOR WASH	3
WASTE SLURRY	2
SUPERNATE RETURN	1
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	5.6 (6.2 TPH)
% CASO3 - DRY	17.0
% CASO4 DRY	70.0
% CACH2 DRY	.0
% CACO3 - DRY	5.0
% ASH DRY	1.0
% OTHER COMPOUNDS - DRY	7.0
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	34.8 ACRE X 25 FT
SITE SERVICE LIFE - YRS	20

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

** PROCESS CONTROL AND INSTRUMENTATION

CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	PERCENT SOLIDS
CONTROL LEVELS	PH 5.8-6.0
MONITOR TYPE	TBI
MONITOR LOCATION	RECYCLE TANK
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK

** WATER BALANCE

WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	10.5 (166 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	.3 (4 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
RECEIVING WATER STREAM	TOMBIGBEE RIVER
MAKEUP WATER ADDITION - LITERS/S	9.9 (157 GPM)
SOURCE OF MAKEUP WATER	COOLING TOWER BLOWDOWN

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	95% CaCO ₃
SOURCE/SUPPLIER	ALLIED PRODUCTS CO.
CONSUMPTION	3.5 TPH [1.1 MOL/MOL SO ₂]
UTILIZATION - %	90.0
POINT OF ADDITION	BALL MILL

** FGD SPARE CAPACITY INDICES

ABSORBER - %	.0
--------------	----

** FGD SPARE COMPONENT INDICES

ABSORBER	.0
----------	----

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂ PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR
9/78	A		81.4		20.7				
	B		63.9		16.3				
	SYSTEM	81.4	72.7		18.5		720	183	133

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATION OF THE FGD SYSTEM BEGAN ON SEPTEMBER 23. THE SCRUBBER MODULES WERE FORCED OUT OF SERVICE 34 HOURS WHEN, AFTER CLOSING THE SYSTEM ISOLATION DAMPERS THE UTILITY WAS UNABLE TO OPEN THEM AGAIN.

10/78	A		57.0		45.7				
	B		57.7		46.2				
	SYSTEM	66.3	57.4		46.0		744	596	342

** PROBLEMS/SOLUTIONS/COMMENTS

BOILER SHUTDOWN.

ON OCTOBER 18 THE SUPERNATE LINE STARTED LEAKING. REPAIRS WERE MADE TO THE FIBERGLASS PIPING.

11/78	A		82.4		78.2				
	B		49.3		46.8				
	SYSTEM	88.9	65.9		62.5		720	684	450

** PROBLEMS/SOLUTIONS/COMMENTS

IN LATE OCTOBER AND EARLY NOVEMBER A FIBERGLASS ELBOW IN THE WASTE SLURRY PIPE RUPTURED AND HAD TO BE REPLACED.

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THE WASTE SLURRY AND SUPERNATE PIPING FAILURES WERE CORRECTED BY THE
 ARCHITECT-ENGINEER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/78	A		97.6		91.8					
	B		93.2		87.6					
	SYSTEM	97.8	95.4		89.7		744	700	668	

** PROBLEMS/SOLUTIONS/COMMENTS

DOWNTIME DURING DECEMBER WAS NOT ATTRIBUTABLE TO THE FGD SYSTEM.

1/79	A		75.3		75.1					
	B		65.8		65.6					
	SYSTEM	89.2	70.6		70.4		744	742	524	

** PROBLEMS/SOLUTIONS/COMMENTS

SOME PLUGGING WAS ENCOUNTERED IN THE MIST ELIMINATOR DUE TO AN ESP OUTAGE.
 THE SYSTEM WAS DOWN FOR 75 HOURS SO THAT THE MIST ELIMINATORS COULD BE
 CLEANED.

2/79	A		95.0		42.0					
	B		96.3		42.6					
	SYSTEM	98.4	95.7		42.3		672	297	284	

3/79	A		93.1		92.2					
	B		94.4		93.6					
	SYSTEM	94.5	93.8		92.9		744	737	691	

4/79	A		100.0		40.6					
	B		100.0		40.6					
	SYSTEM	100.0	100.0		40.6		720	292	292	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS REPORTED THAT NO UNUSUAL PROBLEMS HAVE OCCURRED.

5/79	A		48.8		47.6					
	B		58.9		57.4					
	SYSTEM	92.7	53.9		52.5		744	725	391	

6/79	A		1.8		1.0					
	B		95.4		51.8					
	SYSTEM	98.3	48.6		26.4		720	391	190	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED WELL DURING MAY AND JUNE
 WITH THE EXCEPTION OF DOWN TIME REQUIRED TO REPLACE THE MIST ELIMINATORS.
 THE MIST ELIMINATORS WERE DEFORMED DURING A TEMPERATURE EXCURSION.

7/79	A		21.0		16.5					
	B		70.9		55.9					
	SYSTEM	93.0	46.0		36.2		744	587	270	

8/79	A		88.9		67.6					
	B		24.9		19.0					
	SYSTEM	99.2	56.9		43.3		744	566	322	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER WAS NOT OPERATED FOR ABOUT 6 HOURS DUE TO A NECESSARY
 ADJUSTMENT TO THE MODICON CONTROLLER.

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THE SCRUBBER WAS BYPASSED FOR ABOUT 37 HOURS DUE TO AN ESP OUTAGE.

9/79	A		83.3		68.3			
	B		21.8		17.9			
	SYSTEM	100.0	52.6		43.1	720	591	311

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SYSTEM WAS AVAILABLE AT ALL TIMES DURING SEPTEMBER.

10/79	SYSTEM	100.0			.0	744	0	0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT NO. 2 GENERATOR WAS DOWN THE ENTIRE MONTH OF OCTOBER.

11/79	SYSTEM	100.0			.0	720	0	0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE GENERATOR REMAINED DOWN THROUGH NOVEMBER.

12/79	A		22.6		4.0			
	B		6.0		1.1			
	SYSTEM	96.7	14.3		2.6	744	133	19

** PROBLEMS/SOLUTIONS/COMMENTS

THE OPERABILITY OF THE FGD UNIT WAS LOW DUE TO THE START-UP OF THE BOILER.

THE FGD SYSTEM WAS NOT AVAILABLE FOR 24 HOURS DUE TO A RUPTURED WASTE SLURRY LINE.

1/80	A		35.8		21.1			
	B		56.7		33.5			
	SYSTEM	90.7	46.3		27.3	744	439	203

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY UNIT 2 WAS UNAVAILABLE 69 HOURS DUE TO REPAIRS NEEDED ON AN ABRADED EXPANSION JOINT AND A RUPTURED WASTE SLURRY LINE.

2/80	A		84.3		84.3			
	B		74.7		74.7			
	SYSTEM	99.3	79.5		79.5	696	696	554

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT 2 FGD SYSTEM OPERATED ALL BUT 5 HOURS DURING FEBRUARY, IN WHICH TIME THE BOILER WAS BEING BROUGHT ON-LINE.

3/80	A		81.6		75.0			
	B		79.4		73.0			
	SYSTEM	100.0	80.5		74.0	744	684	551

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD SYSTEM PROBLEMS WERE ENCOUNTERED DURING MARCH. THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME.

4/80	A		61.3		61.3			
	B		86.6		86.5			
	SYSTEM	100.0	74.0		73.9	720	719	532

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT FOR THE MONTH OF APRIL THE SYSTEM WAS
 AVAILABLE 100% OF THE TIME.

5/80	A		34.9		34.7				
	B		92.8		92.2				
	SYSTEM	100.0	63.9		63.5	744	739	472	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE 100% OF THE MONTH OF MAY.

6/80	A	100.0	88.0	100.0	11.0				
	B	.0	.0	.0	.0				
	SYSTEM	50.0	44.0	50.0	5.5	720	90	40	7.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS OUT OF SERVICE THE ENTIRE MONTH OF JUNE DUE TO A DAMAGED
 DAMPER DRIVE MOTOR.

MODULE A WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH, BUT WAS NEEDED
 ONLY 79 HOURS.

7/80	A	100.0	97.6	100.0	54.5				
	B	.0	.0	.0	.0				
	SYSTEM	50.0	48.8	50.0	27.3	744	415	203	26.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE B-MODULE REMAINED OUT OF SERVICE THROUGH JULY DUE TO THE DAMAGED
 DAMPER DRIVE MOTOR.

THE A-MODULE OPERATED ON AN AS NEEDED BASIS WITH NO PROBLEMS.

8/80	A	100.0	84.0	84.0	18.3				
	B	.0	.0	.0	.0				
	SYSTEM	50.0	42.0	42.0	9.2	744	162	68	14.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST MODULE B REMAINED OUT OF SERVICE DUE TO DAMAGED DAMPER
 OPERATOR MOTORS.

9/80	A	100.0	78.4	78.4	45.4				
	B	.0	.0	.0	.0				
	SYSTEM	50.0	39.2	39.2	22.7	720	417	164	42.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER MODULE B DID NOT OPERATE DUE TO A BURNED-UP DAMPER DRIVE
 MOTOR.

10/80	A	100.0	.0		.0				
	B	.0	.0		.0				
	SYSTEM	50.0	.0		.0	744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE UNIT WAS OUT OF SERVICE FOR A TURBINE/GENERATOR
 INSPECTION.

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

REPAIR ON MODULE B DAMPER MOTOR DRIVE CONTINUED THROUGHOUT THE MONTH.

11/80	A	100.0	74.3	74.3	15.5				
	B	.0	.0	.0	.0				
	SYSTEM	50.0	37.2	37.2	7.8	720	150	56	10.0
12/80	A	100.0	90.5	90.5	86.4				
	B	62.4	62.9	62.9	60.1				
	SYSTEM	81.2	76.7	76.7	73.2	744	710	545	45.9

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B DAMPER REPAIRS WERE COMPLETED BY MID-DECEMBER. THE UTILITY REPORTED THAT NO OTHER MAJOR PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER 1980.

1/81	SYSTEM	744
2/81	SYSTEM	672
3/81	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE FIRST QUARTER 1981 WAS NOT AVAILABLE AT THIS TIME.

4/81	SYSTEM	720
5/81	SYSTEM	744
6/81	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE SECOND QUARTER 1981 WAS NOT AVAILABLE.

7/81	SYSTEM	744
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE MONTH OF JULY WAS NOT AVAILABLE AT THIS TIME.

8/81	A	100.0	51.6	100.0	51.6				
	B	96.5	87.7	100.0	87.7				
	SYSTEM	98.2	69.7	100.0	69.7	744	744	518	51.8
9/81	A	100.0	99.9	100.0	49.9				
	B	95.1	95.2	100.0	92.0				
	SYSTEM	97.6	70.9	100.0	70.9	720	720	511	6.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTHS OF AUGUST AND SEPTEMBER.

10/81	A	16.9	3.5	3.5	.6				
	B	16.9	99.6	99.6	16.8				
	SYSTEM	16.9	51.5	51.5	8.7	744	125	65	4.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT AND THE FGD SYSTEM WERE OUT OF SERVICE FOR MOST OF OCTOBER FOR SCHEDULED MAINTENANCE.

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/81	A	41.2	89.4	89.6	41.1					
	B	41.2	68.9	86.9	31.7					
	SYSTEM	41.2	79.1	88.2	36.4		720	331	262	22.9
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING NOVEMBER THE SCHEDULED MAINTENANCE STARTED IN OCTOBER WAS COMPLETED.										
12/81	A	100.0	97.1	100.0	96.8					
	B	100.0	10.7	100.0	10.7					
	SYSTEM	100.0	53.9	100.0	53.8		744	742	400	42.8
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER.										
1/82	A	93.3	93.4	93.4	93.4					
	B	93.3	.6	.8	.6					
	SYSTEM	93.3	45.5	47.1	45.5		744	744	350	46.8
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JANUARY THE LIMESTONE FEED SYSTEM FROZE CAUSING AN UNAVAILABILITY OF LIMESTONE SLURRY TO THE FGD SYSTEM.										
2/82	A	100.0	98.3	100.0	81.5					
	B	100.0	.0	.0	.0					
	SYSTEM	100.0	49.1	100.0	40.7		672	557	274	38.2
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING FEBRUARY NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.										
3/82	A	78.2	48.5	66.9	44.0					
	B	98.6	52.7	97.3	47.8					
	SYSTEM	88.4	50.6	82.1	45.9		744	675	342	38.4
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MARCH THE MODULE A HYDROCLONE MALFUNCTIONED CAUSING SOME OUTAGE TIME.										
4/82	A	84.3	74.2	82.5	74.0					
	B	86.0	43.8	99.7	43.8					
	SYSTEM	85.1	59.0	91.1	58.9		720	718	424	54.0
5/82	A	100.0	84.2	100.0	20.7					
	B	100.0	93.7	100.0	23.0					
	SYSTEM	100.0	88.9	100.0	21.9		744	183	163	14.2
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING THE MONTHS OF APRIL AND MAY.										
6/82	SYSTEM	99.2	99.5	99.5	99.5		720	720	716	52.8
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED EXPERIENCING PROBLEMS WITH THE 2A OUTLET DAMPER DURING JUNE.										
7/82	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	58.0

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/82	SYSTEM	90.2	88.8	88.8	88.8		744	744	661	57.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED EXPERIENCING PROBLEMS WITH THE 2A AND 2B DAMPERS DURING AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/82	SYSTEM	97.8	97.1	97.1	97.8		720	664	704	48.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE 2A DAMPERS WERE OUT OF SERVICE DURING PART OF SEPTEMBER FOR REPAIRS.

THE SCRUBBER WAS TAKEN OUT OF SERVICE DURING PART OF SEPTEMBER WHILE THE PRECIPITATOR WAS TURNED OFF.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/82	SYSTEM	.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE BOILER WAS SHUT DOWN DURING OCTOBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/82	SYSTEM	74.7	98.4	98.4	73.9		720	540	532	49.1

** PROBLEMS/SOLUTIONS/COMMENTS

A BROKEN DAMPER CHAIN RESULTED IN DOWN TIME DURING NOVEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/82	SYSTEM	95.2	95.0	95.0	90.8		744	711	676	48.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/83	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	59.2

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED BY THE UTILITY DURING JANUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/83	SYSTEM	100.0	99.4	99.4	93.2		672	630	626	66.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS SHUT DOWN DURING PART OF FEBRUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/83	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	74.6

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED BY THE UTILITY DURING MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/83	SYSTEM	89.7	98.1	98.1	82.0		720	602	591	60.6

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/83	SYSTEM				.0		744	0	0	

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

6/83	SYSTEM				.0		720	0	0	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT THE BOILER WAS SHUT DOWN DURING MAY AND JUNE FOR A SCHEDULED MAINTENANCE OUTAGE.										
7/83	A	83.9	73.6		62.9					
	B	83.9	22.6		19.4					
	SYSTEM	83.9	48.1		41.1		744	637	306	51.3
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY.										
8/83	A	96.9	78.3		78.2					
	B	100.0	21.7		21.7					
	SYSTEM	98.5	50.0		49.9		744	743	372	65.8
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE A WAS OUT OF SERVICE DURING PART OF AUGUST FOR PRESATURATOR MAINTENANCE.										
9/83	A	100.0	25.7		25.4					
	B	100.0	73.8		73.1					
	SYSTEM	100.0	49.8		49.3		720	712	355	51.9
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING SEPTEMBER.										
10/83	A	81.5	13.1		10.8					
	B	81.5	97.4		80.5					
	SYSTEM	81.5	55.2	55.2	45.6		744	615	340	53.3
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING OCTOBER.										
11/83	SYSTEM				.0		720	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS OFF LINE DURING NOVEMBER FOR A SCHEDULED FALL OUTAGE.										
12/83	A	.0	.0		.0					
	B	.0	.0		.0					
	SYSTEM	.0	.0	.0	.0		744	149	0	9.9
** PROBLEMS/SOLUTIONS/COMMENTS										
SUB-FREEZING WEATHER CONDITIONS FORCED THE FGD SYSTEM OUT OF SERVICE DURING DECEMBER. PIPING ASSOCIATED WITH LIMESTONE SLURRY FEED AND REAGENT PREPARATION HAD FROZEN, PLUGGED, AND/OR BURSTED.										
1/84	A	45.4	18.8		18.8					
	B	80.0	62.5		62.5					
	SYSTEM	62.7	40.6	40.6	40.6		744	744	302	55.2

ALABAMA ELECTRIC: TOMBIGBEE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE ABSORBER WAS INOPERABLE DUE TO FROZEN PIPES.

THE UTILITY REPORTED LIMESTONE FEED AND BALL MILL PROBLEMS DURING JANUARY.

2/84	A	100.0	81.4		81.4				
	B	100.0	90.5		90.5				
	SYSTEM	100.0	85.9	85.9	85.9	696	696	598	62.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING FEBRUARY.

3/84	A	31.9	85.5		30.2				
	B	31.9	84.7		29.9				
	SYSTEM	31.9	85.1	30.1	30.1	744	263	224	25.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE ABSORBER WAS REMOVED FROM SERVICE DURING MARCH TO HELP DRY OUT THE STACK.

THE UTILITY REPORTED THAT A UNIT TURBINE OUTAGE INSPECTION OCCURRED.

4/84	A	.0			.0				
	B	.0			.0				
	SYSTEM	.0			.0	720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED A UNIT SHUT DOWN DUE TO A TURBINE OUTAGE.

5/84	A	12.9	3.4		.8				
	B	12.9	54.3		12.2				
	SYSTEM	12.9	28.8	6.5	6.5	744	167	48	10.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE ABSORBER WAS DOWN SEVERAL DAYS DURING MAY TO ALLOW HOT FLUE GAS TO DRY THE STACK.

6/84	A	100.0	77.0		77.0				
	B	100.0	53.7		53.7				
	SYSTEM	100.0	65.3	65.3	65.3	720	720	470	61.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/84	SYSTEM					744			
8/84	SYSTEM					744			
9/84	SYSTEM					720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ALABAMA ELECTRIC
PLANT NAME	TOMBIGBEE
UNIT NUMBER	3
CITY	LEROY
STATE	ALABAMA
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	525
GROSS UNIT GENERATING CAPACITY MW	255
NET UNIT GENERATING CAPACITY W/FGD - MW	235
NET UNIT GENERATING CAPACITY WO/FGD - MW	243
EQUIVALENT SCRUBBED CAPACITY MW	179
 ** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	RILEY STOKER
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	449.72 (953000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	143.9 (291 F)
STACK HEIGHT M	122. (400 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	5.0 (16.5 FT)
 ** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	26572. (11424 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	10000-11000
AVERAGE ASH CONTENT - %	14.73
RANGE ASH CONTENT - %	15-18
AVERAGE MOISTURE CONTENT - %	6.64
RANGE MOISTURE CONTENT %	3.0-20.0
AVERAGE SULFUR CONTENT %	1.61
RANGE SULFUR CONTENT - %	1.5-1.75
AVERAGE CHLORIDE CONTENT %	.04
RANGE CHLORIDE CONTENT %	*****
 *** PARTICLE CONTROL	
 ** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
 ** ESP	
NUMBER	1
NUMBER OF SPARES	0
TYPE	HOT SIDE
SUPPLIER	RESEARCH-COTTRELL
INLET FLUE GAS CAPACITY CU.M/S	449.7 (953000 ACFM)
INLET FLUE GAS TEMPERATURE C	143.9 (291 F)
PRESSURE DROP - KPA	.1 (1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.5
 ** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
 *** FGD SYSTEM	

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS
A-E FIRM	BURNS & MCDONNELL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	59.50
ENERGY CONSUMPTION - %	3.1
CURRENT STATUS	1
COMMERCIAL START-UP	6/79
INITIAL START-UP	6/79
CONTRACT AWARDED	8/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	1.48	
DESIGN COAL HEAT CONTENT - J/G	29075.0	(12500 BTU/LB)
DESIGN COAL ASH CONTENT - %	10.00	
DESIGN MOISTURE CONTENT - %	8.00	
DESIGN CHLORIDE CONTENT - %	.04	
SPACE REQUIREMENTS - SQ M	4645.0	(50000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	72.0	

** QUENCHER/PRESATURATOR

NUMBER	2	
TYPE	SPRAY	
INLET GAS FLOW - CU. M/S	127.41	(270000 ACFM)
INLET GAS TEMPERATURE - C	143.9	(291 F)
LIQUID RECIRCULATION RATE - LITERS/S	35.	(550 GPM)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	PEABODY PROCESS SYSTEMS	
DIMENSIONS - FT	24.0 DIA X 90.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER	
LINER MATERIAL TRADE NAME/COMMON TYPE	RESISTA-FLAKE 1151	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	6	
LIQUID RECIRCULATION RATE - LITER/S	1259.	(19980 GPM)
L/G RATIO - L/CU.M	9.9	(74.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.0	(4.0 IN-H2O)
SUPERFICAL GAS VELOCITY M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	127.41	(270000 ACFM)
INLET GAS TEMPERATURE - C	54.4	(130 F)
SO2 REMOVAL EFFICIENCY - %	85.0	
PARTICLE REMOVAL EFFICIENCY - %	99.5	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
MANUFACTURER	SHAH-HEIL
CONFIGURATION	HORIZONTAL

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	1	
FREEBOARD DISTANCE - M	1.22	(4.0 FT)
PRESSURE DROP - KPA	.1	(.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	MAKEUP	
WASH FREQUENCY	INTERMITTENTLY	
** REHEATER		
NUMBER	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
LOCATION	ABSORBER OUTLET DUCT	
PERCENT GAS BYPASSED - AVG	30.0	
TEMPERATURE INCREASE - C	26.7	(48 F)
INLET FLUE GAS FLOW RATE - CU. M/S	134.92	(285900 ACFM)
INLET FLUE GAS TEMPERATURE - C	143.9	(291 F)
OUTLET FLUE GAS TEMPERATURE - C	81.1	(178 F)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	PEABODY PROCESS SYSTEMS	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	225.10	(477000 ACFM)
FLUE GAS TEMPERATURE - C	143.9	(291 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
MANUFACTURER	MOSSER	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	HIGH ALLOY	
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
MANUFACTURER	MOSSER	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	HIGH ALLOY	
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
** DAMPERS		
NUMBER	2	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
MANUFACTURER	MOSSER	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	SCRUBBER INLET	
CONFIGURATION	RECTANGULAR	
DIMENSIONS	7 FT X 12 FT	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

SHELL SPECIFIC MATERIAL TYPE
 LINER GENERIC MATERIAL TYPE
 LINER SPECIFIC MATERIAL TYPE

AISI 1110
 NONE
 N/A

** DUCTWORK

LOCATION
 CONFIGURATION
 DIMENSIONS
 SHELL GENERIC MATERIAL TYPE
 SHELL SPECIFIC MATERIAL TYPE
 LINER GENERIC MATERIAL TYPE
 LINER SPECIFIC MATERIAL TYPE

SCRUBBER OUTLET TO STACK
 RECTANGULAR
 5.5 FT X 12 FT AND 13 FT X 16 FT
 CARBON STEEL
 AISI 1110
 ORGANIC
 FLUOROELASTOMER

** REAGENT PREPARATION EQUIPMENT

FUNCTION
 DEVICE
 DEVICE TYPE
 MANUFACTURER
 NUMBER
 FULL LOAD DRY FEED CAPACITY - M.TONS/HR
 PRODUCT QUALITY - % SOLIDS

WET BALL MILL
 COMPARTMENTED
 NR
 KENNEDY VAN SAUN
 1
 9.1 (10 TPH)
 35.0

** TANKS

SERVICE

 ABSORBER RECYCLE
 MIST ELIMINATOR WASH
 LIMESTONE SLURRY STORAGE
 HYDROCLONE UNDERFLOW
 MILL RECYCLE SUMP
 WASTE SLURRY SUMP

NUMBER

 1
 1
 1

 1
 1

** PUMPS

SERVICE

 ABSORBER RECIRCULATION
 LIMESTONE MILL SLURRY RECIRCULATION
 LIMESTONE SLURRY FEED
 MIST ELIMINATOR WASH
 WASTE SLURRY
 SUPERNATE RETURN

NUMBER

 6
 2
 2
 3
 2
 1

** SOLIDS CONCENTRATING/DEWATERING

DEVICE

NONE

*** SLUDGE

FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY) 5.6 (6.2 TPH)
 % CASO3 - DRY 17.0
 % CASO4 - DRY 70.0
 % CAO2 - DRY .0
 % CACO3 - DRY 5.0
 % ASH - DRY 1.0
 % OTHER COMPOUNDS - DRY 7.0

** TREATMENT

METHOD
 DEVICE
 PROPRIETARY PROCESS

BLEED
 N/A
 N/A

** DISPOSAL

NATURE
 TYPE
 LOCATION
 SITE TRANSPORTATION METHOD
 SITE TREATMENT
 SITE DIMENSIONS
 SITE SERVICE LIFE - YRS

FINAL
 POND
 ON-SITE
 PIPELINE
 CLAY LINING
 34.8 ACRE X 25 FT
 20

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

** PROCESS CONTROL AND INSTRUMENTATION

CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	PERCENT SOLIDS
CONTROL LEVELS	PH 5.8-6.0
MONITOR TYPE	TBI
MONITOR LOCATION	RECYCLE TANK
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK

** WATER BALANCE

WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	10.5 (166 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	.3 (4 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
RECEIVING WATER STREAM	TOMBIGBEE RIVER
MAKEUP WATER ADDITION - LITERS/S	9.9 (157 GPM)
SOURCE OF MAKEUP WATER	COOLING TOWER BLOWDOWN

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	95% CaCO ₃
SOURCE/SUPPLIER	ALLIED PRODUCTS CO.
CONSUMPTION	3.5 TPH (1.1 MOL/MOL SO ₂)
UTILIZATION - %	90.0
POINT OF ADDITION	BALL MILL

** FGD SPARE CAPACITY INDICES

ABSORBER - %	.0
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** FGD SPARE COMPONENT INDICES

ABSORBER	.0
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-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂ PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS	FAC.
7/79	A		23.7		9.4					
	B		27.8		11.0					
	SYSTEM	72.7	25.8		10.2		744	295	76	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM IS CURRENTLY UNDERGOING SHAKEDOWN/DEBUGGING OPERATIONS.

8/79	A		59.4		39.1					
	B		44.5		29.3					
	SYSTEM	99.7	52.0		34.2		744	490	255	

** PROBLEMS/SOLUTIONS/COMMENTS

AN ADJUSTMENT TO THE MODICON CONTROLLER CAUSED A SCRUBBER OUTAGE OF ABOUT TWO HOURS.

THE SCRUBBER WAS DOWN DURING AN ESP OUTAGE FOR APPROXIMATELY 34 HOURS.

9/79	A		73.0		13.9					
	B		11.0		2.1					
	SYSTEM	100.0	42.0		8.0		720	137	58	

** PROBLEMS/SOLUTIONS/COMMENTS

CONTINUING GENERATOR PROBLEMS RESULTED IN LOW FGD SYSTEM UTILIZATION DURING SEPTEMBER.

10/79	A		82.7		82.7					
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ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B SYSTEM	99.5	90.9 86.8		90.9 86.8		744	744	646	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE FGD SYSTEM WAS SHUT DOWN FOR 37 HOURS FOR BOILER START-UPS AND ESP TESTS.										
PROBLEMS WITH THE LIMESTONE BALL MILL LUBRICATION SYSTEM, WHICH CAUSED A SHORTAGE OF REAGENT SLURRY, KEPT THE FGD SYSTEM OFF LINE FOR 4 HOURS.										
11/79	A B SYSTEM		78.6 89.3 84.0		78.6 89.3 84.0		720	720	605	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING NOVEMBER THE FGD UNIT WAS DOWN 23 HOURS BECAUSE THE ESP FLYASH HANDLING SYSTEM JAMMED AND THE ESP WAS SHUT DOWN.										
THE WASTE SLURRY LINE RUPTURED, FORCING THE UNIT OUT OF SERVICE FOR 24 HOURS.										
12/79	A B SYSTEM		78.4 87.6 83.0		68.7 76.8 72.8		744	652	541	
** PROBLEMS/SOLUTIONS/COMMENTS										
NO FGD SYSTEM PROBLEMS WERE ENCOUNTERED DURING DECEMBER. THE FGD SYSTEM WAS AVAILABLE FOR THE ENTIRE MONTH.										
1/80	A B SYSTEM		69.2 45.4 57.3		30.5 20.0 25.3		744	328	188	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JANUARY UNIT 3 WAS AVAILABLE THE ENTIRE MONTH.										
2/80	A B SYSTEM		33.3 100.0 66.7		1.2 3.5 2.4		696	24	16	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING FEBRUARY THE UNIT 3 BOILER AND FGD SYSTEM OPERATED ONLY 24 HOURS. THE FGD SYSTEM WAS AVAILABLE THE ENTIRE MONTH.										
3/80	SYSTEM	100.0			.0		744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MARCH THE UNIT 3 GENERATOR WAS KEPT OUT OF SERVICE. THE FGD SYSTEM WAS AVAILABLE THE ENTIRE MONTH.										
4/80	SYSTEM				.0		720	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT DURING APRIL THE BOILER DID NOT OPERATE.										
5/80	A		8.3		.7					

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
	B		.0		.0				
	SYSTEM	95.8	4.2		.3		744	60	5

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE 713 HOURS DURING MAY; HOWEVER, THE BOILER ONLY OPERATED 60 HOURS DUE TO BOILER RELATED PROBLEMS.

THE B MODULE WAS OUT FOR 31 HOURS WHEN THE INLET DAMPER SWITCH FAILED CAUSING THE DRIVE MOTOR TO BURN OUT.

6/80	A	100.0	59.1	100.0	52.8				
	B	100.0	58.6	100.0	52.4				
	SYSTEM	100.0	58.9	100.0	52.6		720	643	379 52.0

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD SYSTEM-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/80	A	100.0	45.5	100.0	39.7				
	B	100.0	90.0	100.0	78.6				
	SYSTEM	100.0	67.8	100.0	59.2		744	650	440 47.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH OF JULY. THE MODULES ARE UTILIZED ON AN AS NEEDED BASIS.

8/80	A	100.0	95.7	100.0	75.8				
	B	100.0	91.6	100.0	72.6				
	SYSTEM	100.0	93.7	100.0	74.2		744	590	552 63.4

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF AUGUST.

9/80	A	90.6	91.4	91.4	46.8				
	B	90.6	73.7	73.7	37.8				
	SYSTEM	90.6	82.4	82.4	42.2		720	369	304 32.4
10/80	A	97.4	68.4	68.4	68.4				
	B	97.4	60.9	60.9	60.9				
	SYSTEM	97.4	63.4	63.4	63.4		744	744	472 69.4
11/80	A	99.3	83.6	83.6	83.6				
	B	99.3	87.9	87.9	87.9				
	SYSTEM	99.3	85.7	85.7	85.7		720	720	617 55.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER THROUGH NOVEMBER PROBLEMS WERE ENCOUNTERED WITH THE PROGRAMABLE CONTROLLER. THE UTILITY REPLACED THE CENTRAL PROCESSING UNIT IN OCTOBER AND IN NOVEMBER A NEW PROGRAM WAS RUN. THE UTILITY REPORTED THAT NO OTHER MAJOR FGD-RELATED PROBLEMS WERE EXPERIENCED DURING THIS TIME.

12/80	A	100.0	88.8	88.8	88.8				
	B	100.0	66.0	66.0	66.0				
	SYSTEM	100.0	77.4	77.4	77.4		744	744	576 41.2

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO PROBLEMS WERE ENCOUNTERED WITH THE UNIT OR THE FGD SYSTEM DURING DEC-
 EMBER.

1/81	SYSTEM					744			
2/81	SYSTEM					672			
3/81	SYSTEM					744			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE FIRST QUARTER 1981 WAS NOT AVAILABLE AT THIS TIME.

4/81	SYSTEM					720			
5/81	SYSTEM					744			
6/81	SYSTEM					720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE SECOND QUARTER 1981 WAS NOT AVAILABLE.

7/81	SYSTEM					744			
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE MONTH OF JULY WAS NOT AVAILABLE AT THIS TIME.

8/81	A	87.6	56.4	100.0	56.0				
	B	99.6	50.6	100.0	50.3				
	SYSTEM	93.6	53.5	100.0	53.1	744	739	395	45.0
9/81	A	30.1	99.7	100.0	24.1				
	B	30.1	99.7	100.0	26.8				
	SYSTEM	30.1	99.7	100.0	25.4	720	217	183	18.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER LOW SYSTEM UTILIZATION WAS DUE TO THE FACT THAT THE UNIT
 AND THE FGD SYSTEM WERE SHUTDOWN FOR SCHEDULED REPAIRS.

10/81	A	96.8	40.2	92.4	39.5				
	B	96.8	76.0	95.9	74.8				
	SYSTEM	96.8	58.1	94.1	57.2	744	732	425	62.8
11/81	A	99.2	95.3	98.9	74.5				
	B	99.2	56.5	98.1	44.2				
	SYSTEM	99.2	75.9	98.5	59.3	720	563	427	43.4
12/81	A	95.6	87.8	95.2	87.7				
	B	95.6	15.4	77.6	15.4				
	SYSTEM	95.6	51.6	86.4	51.5	744	743	383	48.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FOURTH QUARTER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED
 PROBLEMS WERE ENCOUNTERED.

1/82	A	93.3	78.6	91.9	76.2				
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ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	93.3	14.7	67.9	14.2					
	SYSTEM	93.3	46.6	79.9	45.2		744	721	336	45.7
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JANUARY THE LIMESTONE FEED SYSTEM FROZE CAUSING AN UNAVAILABILITY OF LIMESTONE SLURRY TO THE FGD SYSTEM.										
2/82	A	98.7	61.8	97.9	61.8					
	B	98.7	45.9	97.2	45.9					
	SYSTEM	98.7	53.8	97.5	53.8		672	672	362	51.7
3/82	A	100.0	86.6	100.0	86.6					
	B	100.0	13.4	100.0	13.4					
	SYSTEM	100.0	50.0	100.0	50.0		744	744	372	45.1
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE MONTHS OF FEBRUARY AND MARCH.										
4/82	A	98.7	63.5	97.1	41.3					
	B	98.9	40.8	96.0	26.5					
	SYSTEM	98.8	52.2	96.5	33.9		720	468	244	26.9
5/82	A	98.8	98.8	98.8	98.3					
	B	99.2	99.2	99.0	79.3					
	SYSTEM	99.0	99.0	98.9	88.8		744	744	661	78.9
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING APRIL AND MAY NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.										
6/82	SYSTEM	100.0	100.0	100.0	100.0		720	720	720	68.4
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.										
7/82	SYSTEM	100.0	99.4	99.4	99.4		744	744	740	64.7
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE A WAS OUT OF SERVICE DURING PART OF JULY DUE TO DAMPER PROBLEMS.										
8/82	SYSTEM	100.0	95.3	95.3	95.3		744	744	709	67.4
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.										
9/82	SYSTEM	100.0	99.7	99.7	99.7		720	720	718	57.3
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED BY THE UTILITY DURING SEPTEMBER.										
10/82	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	76.3

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED BY THE UTILITY
 DURING OCTOBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/82	SYSTEM	100.0	98.5	98.5	36.2		720	265	261	24.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SCRUBBER WAS TAKEN OUT OF SERVICE DURING
 NOVEMBER WHILE THE PRECIPITATOR WAS OUT OF SERVICE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/82	SYSTEM	100.0	91.5	91.5	49.0		744	398	365	24.1

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS OUT OF SERVICE DURING PART OF DECEMBER DUE TO PLUGGED INLET
 NOZZLES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/83	SYSTEM	100.0	99.6	99.6	66.6		744	498	496	30.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUT DOWN DURING PART OF JANUARY FOR A SCHEDULED OUTAGE.

THE 3A QUENCHER EXPERIENCED LOW FLOW PROBLEMS DURING JANUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/83	SYSTEM	.0			.0		672	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUT DOWN DURING FEBRUARY FOR A SCHEDULED OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/83	SYSTEM	.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCHEDULED SHUTDOWN CONTINUED THROUGH MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/83	SYSTEM	16.1	66.5	66.5	16.3		720	177	118	14.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MAKE-UP WATER LINES WERE REPAIRED DURING APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/83	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	81.3

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/83	SYSTEM	99.9	99.4	99.4	99.4		720	720	716	78.8

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS OUT OF SERVICE DURING PART OF JUNE FOR MAINTENANCE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/83	A	100.0	85.0		84.7					
	B	100.0	99.9		99.6					
	SYSTEM	100.0	92.4		92.2		744	742	686	71.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/83	A	97.7	40.6		40.6					

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	100.0	59.5		59.5					
	SYSTEM	98.9	50.1		50.1		744	744	373	63.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS OUT OF SERVICE DURING PART OF AUGUST FOR PRESATURATOR MAINTENANCE.

9/83	A	70.1	32.4		22.7					
	B	70.1	66.6		46.7					
	SYSTEM	70.1	49.5		34.7		720	505	250	34.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUT DOWN DURING SEPTEMBER FOR A SCHEDULED FALL OUTAGE.

10/83	A	18.0	57.7		11.7					
	B	18.0	64.8		13.2					
	SYSTEM	18.0	61.3	61.3	12.5		744	151	93	11.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN DURING MOST OF OCTOBER FOR A SCHEDULED FALL OUTAGE.

11/83	A	77.9	69.4		69.4					
	B	82.4	61.0		61.0					
	SYSTEM	80.1	65.2	65.2	65.2		720	720	470	66.0

** PROBLEMS/SOLUTIONS/COMMENTS

BROKEN LIMESTONE FEED LINES WERE REPORTED DURING NOVEMBER.

A FOUR-HOUR OUTAGE OCCURRED DURING NOVEMBER FOR MAINTENANCE ON THE LIMESTONE PREPARATION EQUIPMENT.

THE UTILITY REPORTED PROBLEMS PLACING MODULE A IN SERVICE DURING NOVEMBER DUE TO COMPUTER-RELATED PROBLEMS.

THE FGD SYSTEM WAS OUT OF SERVICE FOR FIVE DAYS DURING NOVEMBER TO DRY OUT THE STACK.

12/83	A	85.2	63.7		63.7					
	B	91.5	72.9		72.9					
	SYSTEM	88.4	68.3	68.3	68.3		744	744	508	68.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED PROBLEMS WITH AN INLET DAMPER AT MODULE A DURING DECEMBER.

SUB-FREEZING WEATHER CONDITIONS FORCED THE FGD SYSTEM OUT OF SERVICE DURING DECEMBER CAUSING FROZEN, PLUGGED, AND/OR BURSTED PIPE LINES.

INCLEMENT WEATHER FORCED THE LIMESTONE PREPARATION EQUIPMENT OUT OF SERVICE DURING DECEMBER.

1/84	A	74.2	74.2		74.2					
	B	25.3	.0		.0					
	SYSTEM	49.7	37.1	37.1	37.1		744	744	276	51.3

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE ABSORBER WAS INOPERABLE DURING JANUARY DUE TO FROZEN PIPES.

MECHANICAL PROBLEMS WITH MODULE B DISCHARGE DAMPER OCCURRED IN JANUARY.

LIMESTONE FEED AND BALL MILL PROBLEMS WERE REPORTED DURING THE MONTH.

2/84	A	47.0	95.9		46.5				
	B	.0	.0		.0				
	SYSTEM	23.5	47.9	23.2	23.2	696	337	162	22.8

** PROBLEMS/SOLUTIONS/COMMENTS

MECHANICAL PROBLEMS CONTINUED ON THE MODULE B DISCHARGE DAMPER DURING FEBRUARY.

3/84	A	55.2	58.4		40.3				
	B	59.7	48.5		33.4				
	SYSTEM	57.5	53.4	36.8	36.8	744	513	274	40.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE 3B DISCHARGE DAMPER WAS INOPERABLE IN MARCH DUE TO MECHANICAL PROBLEMS.

MODULE A WAS INOPERABLE DUE TO A PLUGGED HYDROCLONE.

4/84	A	73.8	72.6		72.5				
	B	73.8	48.8		48.7				
	SYSTEM	73.8	60.7	60.6	60.6	720	719	436	73.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OUT OF SERVICE DURING PART OF APRIL TO ALLOW HOT FLUE GAS TO DRY THE STACK. WATER CARRYOVER HAD COLLECTED IN THE BASE OF THE STACK MAKING IT DIFFICULT TO MAINTAIN ADEQUATE TEMPERATURES ABOVE DEW POINT.

5/84	A	98.5	94.0		92.6				
	B	98.5	74.1		73.0				
	SYSTEM	98.5	84.1	82.8	82.8	744	733	616	73.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE ABSORBER WAS UNAVAILABLE IN MAY DUE TO THE REPLACEMENT OF MAKE-UP WATER VALVES AND THE ROTATION OF MAKE-UP WATER NOZZLES.

6/84	A	100.0	82.4		82.4				
	B	99.4	77.1		77.1				
	SYSTEM	99.7	79.7	79.7	79.7	720	720	574	67.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/84	SYSTEM					744			
8/84	SYSTEM					744			
9/84	SYSTEM					720			

ALABAMA ELECTRIC: TOMBIGBEE 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA ELECTRIC POWER	
PLANT NAME	APACHE	
UNIT NUMBER	2	
CITY	COCHISE	
STATE	ARIZONA	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	344.	(.800 LB/MMBTU)
NOX EMISSION LIMITATION NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	530	
GROSS UNIT GENERATING CAPACITY - MW	195	
NET UNIT GENERATING CAPACITY W/FGD - MW	175	
NET UNIT GENERATING CAPACITY WO/FGD - MW	183	
EQUIVALENT SCRUBBED CAPACITY - MW	98	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	520.98	(1104000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	376.7	(710 F)
STACK HEIGHT M	122.	(400 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	4.9	(16.2 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
RANGE HEAT CONTENT BTU/LB		9500-10800
AVERAGE ASH CONTENT - %	15.00	
RANGE ASH CONTENT %	15-20	
AVERAGE MOISTURE CONTENT - %	13.00	
RANGE MOISTURE CONTENT - %	9.0-15.0	
AVERAGE SULFUR CONTENT - %	.70	
RANGE SULFUR CONTENT - %	0.4-0.6	
AVERAGE CHLORIDE CONTENT %	.01	
RANGE CHLORIDE CONTENT - %	0.00-0.03	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMSER	0
TYPE	NONE

** ESP

NUMBER	1
NUMBER OF SPARES	0
TYPE	HOT SIDE
SUPPLIER	AIR CORRECTION DIVISION, UOP
INLET FLUE GAS CAPACITY - CU.M/S	521.0 (1104000 ACFM)
INLET FLUE GAS TEMPERATURE C	376.7 (710 F)
PRESSURE DROP KPA	.1 (1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY %	99.6

** PARTICLE SCRUBBER

NUMSER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
A-E FIRM	BURNS & MCDONNELL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION %	4.1
CURRENT STATUS	1
COMMERCIAL START-UP	1/79
INITIAL START-UP	8/78
CONTRACT AWARDED	7/74

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	1.00	
DESIGN COAL HEAT CONTENT - J/G	23260.0	(10000 BTU/LB)
DESIGN COAL ASH CONTENT - %	17.00	
DESIGN MOISTURE CONTENT - %	18.00	
DESIGN CHLORIDE CONTENT - %	.00	
SPACE REQUIREMENTS - SQ M	4046.7	(43560 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	72.0	

** QUENCHER/PRESATURATOR

NUMBER	2	
TYPE	CYCLONIC SPRAY QUENCHER	
SUPPLIER	RESEARCH-COTTRELL	
INLET GAS FLOW - CU. M/S	188.76	(400000 ACFM)
INLET GAS TEMPERATURE - C	132.2	(270 F)
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
LIQUID RECIRCULATION RATE LITERS/S	567.	(9000 GPM)
L/G RATIO L/CU. M	2.7	(20.0 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	1	
GENERIC TYPE	COMBINATION TOWER	
SPECIFIC TYPE	SPRAY/PACKED	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	RESEARCH-COTTRELL	
DIMENSIONS - FT	30.0 DIA X 110.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER	
LINER MATERIAL TRADE NAME/COMMON TYPE	FLAKELINE 103	
GAS CONTACTING DEVICE TYPE	SPRAY ZONE & VERTICAL CROSS CHANNEL FIXED GRID P	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	567.	(9000 GPM)
L/G RATIO L/CU.M	5.3	(40.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.6	(2.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	94.38	(200000 ACFM)
INLET GAS TEMPERATURE C	68.3	(155 F)
SO2 REMOVAL EFFICIENCY - %	97.0	
PARTICLE REMOVAL EFFICIENCY %	99.6	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	MUNTERS	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
FREEBOARD DISTANCE - M	.61	(2.0 FT)
DISTANCE BETWEEN STAGES - CM	30.48	(12.0 IN)
DISTANCE BETWEEN VANES - CM	10.2	(4.00 IN)
VANE ANGLES - DEGREES	45	
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYVINYL CHLORIDE	
WASH WATER SOURCE	FRESH	
WASH FREQUENCY	INTERMITTENT [LOWER STAGE]; ONCE EVERY HOUR [UPP	
WASH RATE - L/S	12.6	(200 GAL/MIN)
** REHEATER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	50.0	
TEMPERATURE INCREASE C	43.3	(78 F)
INLET FLUE GAS TEMPERATURE - C	46.1	(115 F)
OUTLET FLUE GAS TEMPERATURE - C	89.4	(193 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NONE	
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	188.76	(400000 ACFM)
FLUE GAS TEMPERATURE - C	132.2	(270 F)
PRESSURE DROP - KPA	6.2	(20.5 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	
MODULATION	OPEN/CLOSED	
SEAL AIR FLOW - CU. M/S	.24	(500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE	
MODULATION	OPEN/CLOSED	
SEAL AIR FLOW - CU. M/S	.24	(500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	HIGH ALLOY	
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

MODULATION	OPEN/CLOSED	
SEAL AIR FLOW - CU. M/S	.24	(500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	HIGH ALLOY	
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
** DUCTWORK		
LOCATION	ABSORBER INLET	
CONFIGURATION	RECTANGULAR	
DIMENSIONS	12.0 X 14.0	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	ABSORBER OUTLET	
CONFIGURATION	RECTANGULAR	
DIMENSIONS	12.0 X 14.0	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	FLUOROELASTOMER	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	WET BALL MILL	
DEVICE	COMPARTMENTED	
DEVICE TYPE	NR	
MANUFACTURER	KENNEDY VAN SAUN	
NUMBER	1	
NUMBER OF SPARES	0	
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	4.5	(5 TPH)
PRODUCT QUALITY - % SOLIDS	45.0	
** TANKS		
SERVICE	NUMBER	
-----	-----	
ABSORBER FEED	1	
REAGENT FEED	1	
MILL SLURRY SUMP	1	
WASTE SLURRY SUMP	1	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
ABSORBER	3	
QUENCHER	4	
MILL SLURRY RECYCLE	2	
ADDITIVE FEED	2	
WASTE SLURRY TRANSFER	1	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE	NONE	
*** SLUDGE		
MOISTURE CONTENT - % TOTAL FREE WATER	70.0	
% CASO4 DRY	80.0	
** TREATMENT		
METHOD	NONE	
DEVICE	N/A	
PROPRIETARY PROCESS	N/A	
** DISPOSAL		
NATURE	FINAL	
TYPE	POND	
LOCATION	OFF-SITE	
SITE TRANSPORTATION METHOD	PIPELINE	

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

SITE TREATMENT	NONE
SITE DIMENSIONS	25 TO 30 ACRES BY 18 FT DEEP
SITE CAPACITY - CU.M	611500 (500.0 ACRE-FT)
SITE SERVICE LIFE - YRS	30

** PROCESS CONTROL AND INSTRUMENTATION

PROCESS STREAM	QUENCHER RECYCLE LINE
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	PERCENT SOLIDS
CONTROL LEVELS	5.0 PH
PROCESS CONTROL MANNER	MANUAL
PROCESS CHEMISTRY MODE	FEEDBACK

** WATER BALANCE

WATER LOOP TYPE	OPEN
MAKEUP WATER ADDITION - LITERS/S	115.9 (1840 GPM)
SOURCE OF MAKEUP WATER	WELL WATER

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	>93% CaCO ₃
SOURCE/SUPPLIER	PAUL LIME
UTILIZATION - %	99.0
POINT OF ADDITION	BALL MILL

** FGD SPARE CAPACITY INDICES

ABSORBER %	100.0
MIST ELIMINATOR - %	.0
FAN - %	.0
BALL MILL - %	.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP - %	50.0

** FGD SPARE COMPONENT INDICES

ABSORBER	1.0
MIST ELIMINATOR	.0
FAN	.0
BALL MILL	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂ PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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8/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS BEGAN IN AUGUST WITH THE BOILER AND SCRUBBER SYSTEM FOR TESTING PURPOSES.

9/78 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

SCRUBBER AND BOILER TESTING CONTINUED THROUGH SEPTEMBER. FINAL FACILITY CONSTRUCTION SHOULD BE COMPLETE BY OCTOBER.

10/78 SYSTEM

744

303

59.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUTDOWN IN EARLY OCTOBER TO MAKE ADDITIONAL BOILER MODIFICATIONS. NO PROBLEMS WERE REPORTED FOR THE FGD SYSTEM. COMPLIANCE TESTING IS SCHEDULED FOR EARLY NOVEMBER. THE UTILITY HAS DECIDED THAT IN APPROXIMATELY A YEAR THE SCRUBBER INLET DUCTWORK WILL BE CHANGED FROM CARBON

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

STEEL TO STAINLESS STEEL.

11/78	A	24.8	16.8				
	B	43.7	29.6				
	SYSTEM	68.5	46.4	720	488	334	82.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE SO2 STACK MONITORS HAVE NEVER BEEN OPERABLE. THE MONITORS HAVE BEEN SENT BACK TO THE FACTORY AND ARE NOT EXPECTED BACK ON SITE UNTIL LATE DECEMBER.

THE LIMESTONE CRUSHER HAS BEEN UNABLE TO OPERATE AT DESIGN CAPACITY.

A COMPLIANCE TEST WAS COMPLETED BUT THE RESULTS ARE NOT YET AVAILABLE. THE ACCEPTANCE IS SCHEDULED FOR THE BEGINNING OF 1979.

12/78	SYSTEM	.0	.0	744	512	0
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** PROBLEMS/SOLUTIONS/COMMENTS

RESULTS OF THE RECENT COMPLIANCE TEST INDICATED THAT SO2 EMISSIONS WERE BETWEEN 1.2 LB/MM BTU, THE FEDERAL APPLICABLE STANDARD; AND 0.8 LB/MM BTU, THE STATE STANDARD, WITHOUT THE FGD SYSTEM. THE UTILITY IS CURRENTLY BURNING LOW SULFUR COAL (0.6% S). IT IS BELIEVED THAT THE STATE STANDARD COULD BE MET WITHOUT FGD SYSTEM OPERATION WHEN THE FURNACE IS "FINE TUNED".

A 30 HOUR OUTAGE OCCURRED DUE TO A RUPTURE IN THE REAGENT FEED LINE.

1/79	SYSTEM	.0	.0	744	662	0
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** PROBLEMS/SOLUTIONS/COMMENTS

SHAKEDOWN/DEBUGGING OPERATION CONTINUED THROUGH JANUARY.

COMMERCIAL OPERATIONS BEGAN ON JANUARY 15.

2/79	SYSTEM	.0	.0	672	504	0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS NOT IN SERVICE DURING DECEMBER, JANUARY, OR FEBRUARY DUE TO VARIOUS SHAKEDOWN/DEBUGGING PROBLEMS ESPECIALLY IN MAINTAINING RECYCLE PUMP OPERATION.

3/79	SYSTEM	.0	.0	744	372	0
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** PROBLEMS/SOLUTIONS/COMMENTS

A BOILER EXPLOSION AT THE BURNER FACE CAUSED THE UNIT TO BE DOWN FROM THE LAST WEEK IN FEBRUARY THROUGH THE MIDDLE OF MARCH.

4/79	SYSTEM			720	720	
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** PROBLEMS/SOLUTIONS/COMMENTS

COMPLIANCE TESTS WERE RUN ON THIS UNIT LAST NOVEMBER AND THE UNIT WAS DECLARED COMMERCIAL IN FEBRUARY. THE FGD SYSTEM OPERATES ONLY ABOUT 50 % OF THE BOILER HOURS BECAUSE THE UNIT OPERATES AT SUCH A LOW RATING 50% OF THE TIME THAT THE FGD SYSTEM IS NOT NEEDED.

5/79	SYSTEM			744		
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6/79	SYSTEM			720		
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ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

IN GENERAL THE FGD SYSTEM AND BOILER OPERATED WELL THROUGH MAY AND JUNE.

THE FRP REAGENT FEED PIPING HAS BEEN A CONTINUAL PROBLEM AREA. THE FRP HAS BEEN RUPTURING PARTICULARLY AT PIPING CONNECTIONS. THE UTILITY IS IN THE PROCESS OF REPLACING THE FRP PIPING WITH CARBON STEEL PIPING.

THE BALL MILL APPEARS TO HAVE BEEN UNDERDESIGNED. THE MILL PRODUCES 4 TONS/HOUR OF GROUND LIMESTONE AT BEST ALTHOUGH IT WAS RATED AT 5 TON/HOUR CAPACITY.

7/79	SYSTEM					744			
8/79	SYSTEM					744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED HAVING EXTENSIVE PROBLEMS WITH THE REAGENT HANDLING SYSTEM PARTICULARLY WITH RESPECT TO FEED LINE FAILURES, PIPING PLUGGING AND GRINDING OPERATIONS. THE REAGENT HANDLING SYSTEM ACCOMODATES BOTH UNITS 2 AND 3.

9/79	SYSTEM					720			
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE THIRD QUARTER OF 1979 THE BOILER AND FGD SYSTEM ONLY OPERATED ABOUT 25% OF THE TIME BECAUSE OF CONTINUING PROBLEMS WITH THE REAGENT FEED LINE. THE FRP SECTION FROM THE GRINDER TO THE SCRUBBERS FAILED. THE LINE WAS REPAIRED AT THE END OF SEPTEMBER.

ON NOVEMBER 3 THE UNIT WILL BE SHUT DOWN FOR A FOUR TO SIX WEEK SCHEDULED OUTAGE.

10/79	SYSTEM	.0	.0		.0	744		0	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY IS IN THE PROCESS OF REPLACING THE REAGENT HANDLING SYSTEM; THEREFORE, THE FGD SYSTEM DID NOT OPERATE DURING OCTOBER.

11/79	SYSTEM	100.0	100.0	100.0	6.3	720	41	41	2.9
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OUT OF SERVICE FOR MOST OF NOVEMBER FOR AN ANNUAL INSPECTION.

12/79	SYSTEM	100.0	.0	.0	.0	744	130	0	5.7
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** PROBLEMS/SOLUTIONS/COMMENTS

THE EXTENSIVE PROBLEMS ENCOUNTERED EARLIER WITH THE REAGENT HANDLING SYSTEM HAVE BEEN RESOLVED. THE SYSTEM REPLACEMENT WAS COMPLETED IN DECEMBER.

DURING DECEMBER THE BOILER OPERATED 130 HOURS FOR WHICH THE SCRUBBER WAS AVAILABLE 100% OF THE TIME.

THE BOILER ENCOUNTERED DAMPER PROBLEMS THAT ACCOUNTED FOR MOST OF THE DECEMBER DOWN TIME.

1/80	SYSTEM	91.0	58.3	88.8	57.3	744	731	426	56.1
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-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

OUTAGE TIME WAS ALSO CAUSED BY A BROKEN FEED BELT TO THE LIMESTONE BALL MILL.

2/80	SYSTEM	92.8	96.7	92.8	92.8	696	668	646	87.4
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FORCED OUTAGE TIME WAS ALSO CAUSED BY A PUMP MALFUNCTION.

3/80	SYSTEM	99.1	99.1	99.0	99.1	744	744	738	74.1
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OUTAGE TIME RESULTED FROM STICKING VALVES AND LIMESTONE FEED-BELT PROBLEMS.

4/80	SYSTEM	67.2	65.2	65.2	61.4	720	678	442
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DURING APRIL THE FGD SYSTEM WAS FORCED DOWN DUE TO PUMP FAILURES AND A RUPTURE IN THE SLURRY RECIRCULATION LINE.

5/80	SYSTEM	90.5	90.5	90.5	90.5	744	744	673
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DURING MAY THE UNIT WAS FORCED OFF LINE WHEN THE LIMESTONE CRUSHER MALEFUNCTIONED.

THE UNIT WAS ALSO FORCED OUT DUE TO PUMP AND VALVE FAILURES.

6/80 SYSTEM 720

THE UTILITY REPORTED THAT THE DATA FOR THE MONTH OF JUNE HAS BEEN MISPLACED.

7/80	202	100.0	.0	.0					
	203	85.0	85.7	85.7	85.0				
	SYSTEM	100.0	85.7	85.7	85.0	744	738	633	77.8

FAILURE OF BOTH THE BYPASS DAMPER AND THE PACKING PUMP ALSO CAUSED OUTAGE TIME DURING THE MONTH.

8/80	202	.0	.0	.0				
	203	96.8	66.0	95.2	63.3			
	SYSTEM	96.8	66.0	95.2	63.3	744	714	471 61.0

[illegible]

TOWER 202 WAS UNAVAILABLE IN AUGUST BECAUSE OF THE LINER BEING REPLACED.
A SAMPLE LINE FAILURE CAUSED TOWER 203 TO GO DOWN FOR 24 HOURS.
THE OPERATION OF THE FGD SYSTEM WAS REDUCED BECAUSE OF LOW LOAD CAPACITY.

720

NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.

PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER FORCED OUTAGES OCCURRED AS A RESULT OF PH INSTABILITY IN THE SYSTEM.

** PROBLEMS/SOLUTIONS/COMMENTS

** PROBLEMS/SOLUTIONS/COMMENTS

** PROBLEMS/SOLUTIONS/COMMENTS

13-35

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE OPERATION OF THE FGD SYSTEM WAS REDUCED DUE TO THE LOW SULFUR CONTENT OF THE COAL.

REPAIRS WERE MADE ON TOWER 203 DURING FEBRUARY.

3/81	202	.0	.0	.0				
	203	100.0	53.7	100.0	43.7			
	SYSTEM	100.0	53.6	100.0	43.7	744	605	325 70.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULE 202 WAS NOT AVAILABLE DUE TO EROSION PROBLEMS.

THE SYSTEM WAS BY-PASSED DURING PART OF THE MONTH BECAUSE THE UNIT WAS FIRING LOW SULFUR COAL.

4/81	202	.0	.0	.0				
	203	100.0	100.0	100.0	100.0			
	SYSTEM	100.0	100.0	100.0	100.0	720	720	720 98.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL MODULE 202 WAS NOT AVAILABLE FOR OPERATION DUE TO EROSION OF THE BOWL AREA OF THE MODULE. THIS HAS BEEN A CONTINUAL PROBLEM AND THE UTILITY IS PRESENTLY CONDUCTING STUDIES TO ALLEVIATE THE PROBLEM.

5/81	202	100.0	.0	.0				
	203	100.0	100.0	100.0	100.0			
	SYSTEM	100.0	100.0	100.0	100.0	744	744	744 87.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

MODULE 202 WAS AVAILABLE THE ENTIRE MONTH, BUT WAS NOT OPERATED.

6/81	202	100.0	.0	.0				
	203	100.0	100.0	100.0	100.0			
	SYSTEM	100.0	100.0	100.0	100.0	720	716	720 91.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE EXPERIENCED DURING THE MONTH OF JUNE.

7/81	202	100.0	45.2	100.0	45.2			
	203	46.2	46.2	100.0	46.2			
	SYSTEM	100.0	91.4	100.0	91.4	744	744	680 91.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 203 WAS TAKEN OUT OF SERVICE ON JULY 15 FOR PREVENTIVE MAINTENANCE AND REPAIRS, AT WHICH TIME MODULE 202 WAS PUT INTO SERVICE.

8/81	202	100.0	39.9	100.0	35.5			
	203	.0	.0	.0	.0			
	SYSTEM	100.0	39.9	100.0	35.5	744	661	264 75.2

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 202 WAS REMOVED FROM SERVICE ON AUGUST 8 AS A RESULT OF PROBLEMS
 ENCOUNTERED WITH THE ELECTROSTATIC PRECIPITATOR. THE MODULE WAS PLACED
 BACK IN SERVICE ON AUGUST 21.

9/81	202	100.0	99.3	100.0	99.0				
	203	.0	.0		.0				
	SYSTEM	100.0	99.3	100.0	99.0	720	718	713	85.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE ONLY PROBLEMS ENCOUNTERED DURING THE MONTH WERE BOILER RELATED.

10/81	202	100.0	100.0	100.0	41.5				
	203	.0	.0		.0				
	SYSTEM	100.0	100.0	100.0	41.5	744	303	309	29.2

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 2 WAS DOWN FROM OCTOBER 3 UNTIL OCTOBER 20 FOR ANNUAL MAINTENANCE AND
 REPAIRS.

11/81	202	65.4	63.6	64.8	63.6				
	203	.0	.0		.0				
	SYSTEM	65.4	63.6	64.8	63.6	720	720	458	74.2

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 202 WAS TAKEN OUT OF SERVICE TWICE DURING NOVEMBER BECAUSE OF LOW
 SLURRY DENSITY.

ON NOVEMBER 22 THE SYSTEM WAS TAKEN OUT OF SERVICE FOR THE REMAINDER OF
 THE MONTH FOR REPAIRS ON THE DAMPER SEALS.

ADDITIONAL OUTAGE TIME DURING THE MONTH WAS DUE TO BOILER-RELATED PROBLEMS.

12/81	SYSTEM					744			
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** PROBLEMS/SOLUTIONS/COMMENTS

THE ORIGINAL COPY OF THE DECEMBER UPDATE INFORMATION WAS LOST IN THE MAIL.

1/82	202	80.5	90.5	80.5	80.5				
	203		.0		.0				
	SYSTEM	80.5	90.5	80.5	80.5	744	662	599	70.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY MODULE 202 WAS DOWN APPROXIMATELY 145 DUE TO RESTRICTIONS
 IN A FEED LINE.

2/82	202		.0		.0				
	203	98.6	96.2	99.0	96.2				
	SYSTEM	98.6	96.2	99.0	96.2	672	672	646	81.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY MODULE 202 WAS DOWN FOR REPAIRS AND MAINTENANCE.

MODULE 203 WAS OUT OF SERVICE FOR APPROXIMATELY SIX HOURS DUE TO A
 QUENCHER PUMP FAILURE.

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/82	202		.0		.0					
	203	100.0	99.0	100.0	87.3					
	SYSTEM	100.0	99.0	100.0	87.3		744	656	649	50.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MARCH MODULE 203 WAS OUT OF SERVICE PART OF THE TIME DUE TO A UNIT 2 WATER WALL RUPTURE.										
4/82	202	100.0	.0		.0					
	203	87.2	87.2	87.2	87.2					
	SYSTEM	87.2	87.2	87.2	87.2		720	720	627	70.1
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING APRIL OUTAGE TIME FOR MODULE 203 WAS DUE TO PUMP PROBLEMS.										
5/82	202	3.9	5.3	100.0	3.9					
	203	.0	.0		.0					
	SYSTEM	3.9	5.3	100.0	3.9		744	541	29	48.6
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE 203 WAS UNAVAILABLE DURING MAY DUE TO SOME MAJOR REPAIRS AND RECONSTRUCTION.										
6/82	202	100.0	97.0	100.0	97.0					
	203	100.0	.0		.0					
	SYSTEM	100.0	97.0	100.0	97.0		720	720	698	82.3
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.										
7/82	202	100.0	99.9	100.0	99.9					
	203	100.0	.0		.0					
	SYSTEM	100.0	99.9	100.0	99.9		744	744	743	85.1
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED BY THE UTILITY DURING JULY.										
8/82	202	100.0	98.4	100.0	87.3					
	203	100.0	.0		.0					
	SYSTEM	100.0	98.4	100.0	87.3		744	660	650	79.3
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.										
9/82	202	100.0	87.7	100.0	87.7					
	203	100.0	.0		.0					
	SYSTEM	100.0	87.7	100.0	87.7		720	720	631	73.2
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING SEPTEMBER.										
10/82	202	100.0	100.0	100.0	2.9					

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	203	100.0	.0		.0						
	SYSTEM	100.0	100.0	100.0	2.9			744	22	22	2.0

** PROBLEMS/SOLUTIONS/COMMENTS

ON OCTOBER 1 THE UNIT WAS DOWN FOR ANNUAL MAINTENANCE AND REPAIR OUTAGES.

11/82	202	100.0	.0		.0						
	203	19.4	31.1	94.4	9.4						
	SYSTEM	19.4	31.1	94.4	9.4			720	217	68	15.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS PUT ON LINE NOVEMBER 21 AFTER THE COMPLETION OF ANNUAL MAINTENANCE AND REPAIR OUTAGE.

MODULE 203 WAS PLACED BACK IN SERVICE ON NOVEMBER 24.

12/82	202	100.0	.0		.0						
	203	90.2	68.8	87.6	68.8						
	SYSTEM	90.2	68.8	87.6	68.8			744	744	512	65.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER.

1/83	202	100.0	.0		.0						
	203	100.0	68.7	100.0	64.2						
	SYSTEM	100.0	68.7	100.0	64.2			744	696	478	57.2

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JANUARY.

2/83	202	100.0	.0		.0						
	203	99.9	61.8	99.8	61.8						
	SYSTEM	99.9	61.8	99.8	61.8			672	672	415	62.4

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED BY THE UTILITY DURING FEBRUARY.

3/83	202	100.0	.0		.0						
	203	98.8	56.1	95.1	23.4						
	SYSTEM	98.8	56.1	95.1	23.4			744	311	174	25.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OFF LINE FROM MARCH 1 TO MARCH 17 DUE TO LOW DEMAND.

4/83	202	100.0	.0		.0						
	203	99.2	54.4	98.5	54.4						
	SYSTEM	99.2	54.4	98.5	54.4			720	720	392	54.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING APRIL.

5/83	202	100.0	.0		.0						
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-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	203	99.7	42.3	99.4	42.3					
	SYSTEM	99.7	42.3	99.4	42.3		744	744	315	50.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MAY.

6/83	202	100.0	.0		.0					
	203	100.0	26.9	100.0	8.5					
	SYSTEM	100.0	26.9	100.0	8.5		720	229	62	13.7

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 2 WAS TAKEN OFF LINE ON JUNE 10 AS A RESULT OF LOW DEMAND.

7/83	202	90.3	2.4	100.0	1.4					
	203	100.0	49.2	100.0	29.4					
	SYSTEM	100.0	51.5	100.0	30.8		744	445	229	35.9

8/83	202	100.0	.0		.0					
	203	100.0	75.6	100.0	13.6					
	SYSTEM	100.0	75.6	100.0	13.6		744	134	101	12.3

9/83	202	100.0	7.9	100.0	7.9					
	203	99.9	42.2	99.7	42.0					
	SYSTEM	100.0	50.1	100.0	49.9		720	718	360	59.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED FOR THE PERIOD OF JULY THROUGH SEPTEMBER, 1983.

10/83	202	100.0	.0		.0					
	203	100.0	.0		.0					
	SYSTEM	100.0	.0		.0		744	47	0	1.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT UNIT 2 WAS DOWN THE ENTIRE MONTH OF OCTOBER EXCEPT FOR OCTOBER 1 TO OCTOBER 3. ANNUAL MAINTENANCE AND REPAIR BEGAN ON OCTOBER 15.

11/83	202	100.0			.0					
	203	100.0			.0					
	SYSTEM	100.0			.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 2 WAS DOWN THE ENTIRE MONTH OF NOVEMBER FOR ANNUAL MAINTENANCE AND REPAIR.

12/83	202	100.0			.0					
	203	100.0			.0					
	SYSTEM	100.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

ANNUAL MAINTENANCE AND REPAIRS WERE COMPLETED ON DECEMBER 14. THE UNIT WAS DOWN FOR THE REMAINDER OF THE MONTH DUE TO LOW POWER DEMAND.

1/84	202	100.0			.0					
	203	100.0			.0					
	SYSTEM	100.0			.0		744	0	0	.0

ARIZONA ELECTRIC POWER: APACHE 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

ANNUAL MAINTENANCE AND REPAIRS WERE COMPLETED ON DECEMBER 14. THE UNIT WAS

2/84	202	100.0			.0				
	203	100.0			.0				
	SYSTEM	100.0			.0	696	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 2 WAS OFF LINE DURING JANUARY AND FEBRUARY DUE TO LOW POWER DEMAND.

3/84	202	100.0	.0		.0				
	203	99.3	27.1	89.5	5.8				
	SYSTEM	100.0	27.1	89.5	5.8	744	158	43	8.3

4/84	202	100.0	40.9	100.0	33.3				
	203	35.5	43.6	100.0	35.5				
	SYSTEM	100.0	84.5	100.0	68.8	720	587	496	40.4

5/84	202	100.0	39.9	100.0	39.9				
	203	98.8	60.1	98.0	60.1				
	SYSTEM	100.0	100.0	100.0	100.0	744	744	744	73.0

6/84	202	99.6	6.5	100.0	5.0				
	203	98.8	98.1	100.0	74.6				
	SYSTEM	100.0	100.0	100.0	79.6	720	548	573	46.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF MARCH THROUGH JUNE 1984.

7/84	202	88.2	87.3	87.6	79.9				
	203	.0	.0		.0				
	SYSTEM	44.1	43.6	87.6	40.0	744	682	297	60.2

** PROBLEMS/SOLUTIONS/COMMENTS

MAINTENANCE WAS COMPLETED ON MODULE 202 AND IT WAS PLACED BACK INTO SERVICE ON JULY 4, 1984.

MODULE 203 WAS OUT OF SERVICE DURING THE ENTIRE MONTH OF JULY.

8/84	SYSTEM					744			
9/84	SYSTEM					720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA ELECTRIC POWER	
PLANT NAME	APACHE	
UNIT NUMBER	3	
CITY	COCHISE	
STATE	ARIZONA	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	344.	(.800 LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	530	
GROSS UNIT GENERATING CAPACITY - MW	195	
NET UNIT GENERATING CAPACITY W/FGD - MW	175	
NET UNIT GENERATING CAPACITY WO/FGD - MW	183	
EQUIVALENT SCRUBBED CAPACITY - MW	98	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	520.98	(1104000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	376.7	(710 F)
STACK HEIGHT - M	122.	(400 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	4.9	(16.2 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		9500-10800
AVERAGE ASH CONTENT - %	15.00	
RANGE ASH CONTENT - %	15-20	
AVERAGE MOISTURE CONTENT - %	13.00	
RANGE MOISTURE CONTENT - %	9.0-15.0	
AVERAGE SULFUR CONTENT - %	.70	
RANGE SULFUR CONTENT - %	0.4-0.6	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	0.00-0.03	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1
NUMBER OF SPARES	0
TYPE	HOT SIDE
SUPPLIER	AIR CORRECTION DIVISION, UOP
INLET FLUE GAS CAPACITY - CU.M/S	521.0 (1104000 ACFM)
INLET FLUE GAS TEMPERATURE - C	376.7 (710 F)
PRESSURE DROP - KPA	.1 (1. IN-H ₂ O)
PARTICLE REMOVAL EFFICIENCY - %	99.6

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
A-E FIRM	BURNS & MCDONNELL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	4.1
CURRENT STATUS	1
COMMERCIAL START-UP	6/79
INITIAL START-UP	6/79
CONTRACT AWARDED	8/74

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFER CONTENT - %	1.00	
DESIGN COAL HEAT CONTENT - J/G	23260.0	(10000 BTU/LB)
DESIGN COAL ASH CONTENT - %	17.00	
DESIGN MOISTURE CONTENT - %	18.00	
DESIGN CHLORIDE CONTENT %	.00	
SPACE REQUIREMENTS - SQ M	4046.7	(43560 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	72.0	

** QUENCHER/PRESATURATOR

NUMBER	2	
TYPE	CYCLONIC SPRAY QUENCHER	
SUPPLIER	RESEARCH-COTTRELL	
INLET GAS FLOW - CU. M/S	188.76	(400000 ACFM)
INLET GAS TEMPERATURE - C	132.2	(270 F)
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	567.	(9000 GPM)
L/G RATIO L/CU. M	2.7	(20.0 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	1	
GENERIC TYPE	COMBINATION TOWER	
SPECIFIC TYPE	SPRAY/PACKED	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	RESEARCH-COTTRELL	
DIMENSIONS - FT	30.0 DIA X 110.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER	
LINER MATERIAL TRADE NAME/COMMON TYPE	FLAKELINE 103	
GAS CONTACTING DEVICE TYPE	SPRAY ZONE & VERTICAL CROSS CHANNEL FIXED GRID P	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE LITER/S	567.	(9000 GPM)
L/G RATIO - L/CU.M	5.3	(40.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP KPA	.6	(2.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	94.38	(200000 ACFM)
INLET GAS TEMPERATURE - C	68.3	(155 F)
SO2 REMOVAL EFFICIENCY - %	97.0	
PARTICLE REMOVAL EFFICIENCY - %	99.6	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	MUNTERS	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
FREEBOARD DISTANCE M	.61	(2.0 FT)
DISTANCE BETWEEN STAGES - CM	30.48	(12.0 IN)
DISTANCE BETWEEN VANES CM	10.2	(4.00 IN)
VANE ANGLES DEGREES	45	
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYVINYL CHLORIDE	
WASH WATER SOURCE	FRESH	
WASH FREQUENCY	INTERMITTENT [LOWER STAGE]; ONCE EVERY HOUR [UPP	
WASH RATE - L/S	12.6	(200 GAL/MIN)
** REHEATER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	50.0	
TEMPERATURE INCREASE - C	43.3	(78 F)
INLET FLUE GAS TEMPERATURE - C	46.1	(115 F)
OUTLET FLUE GAS TEMPERATURE - C	89.4	(193 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NONE	
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE CU.M/S	188.76	(400000 ACFM)
FLUE GAS TEMPERATURE C	132.2	(270 F)
PRESSURE DROP - KPA	6.2	(20.5 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	
MODULATION	OPEN/CLOSED	
SEAL AIR FLOW - CU. M/S	.24	(500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE	
MODULATION	OPEN/CLOSED	
SEAL AIR FLOW CU. M/S	.24	(500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	HIGH ALLOY	
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.24 (500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	HIGH ALLOY
LINER SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	12.0 X 14.0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER OUTLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	12.0 X 14.0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	FLUOROELASTOMER
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	4.5 (5 TPH)
PRODUCT QUALITY - % SOLIDS	45.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER FEED	1
REAGENT FEED	1
MILL SLURRY SUMP	1
WASTE SLURRY SUMP	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER	3
QUENCHER	4
MILL SLURRY RECYCLE	2
ADDITIVE FEED	2
WASTE SLURRY TRANSFER	1
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
MOISTURE CONTENT - % TOTAL FREE WATER	70.0
% CASO4 DRY	80.0
** TREATMENT	
METHOD	NONE
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	OFF-SITE
SITE TRANSPORTATION METHOD	PIPELINE

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

SITE TREATMENT	NONE
SITE DIMENSIONS	25 TO 30 ACRES BY 18 FT DEEP
SITE CAPACITY CU.M	611500 (500.0 ACRE-FT)
SITE SERVICE LIFE - YRS	30

** PROCESS CONTROL AND INSTRUMENTATION

PROCESS STREAM	QUENCHER RECYCLE LINE
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	PERCENT SOLIDS
CONTROL LEVELS	5.0 PH
PROCESS CONTROL MANNER	MANUAL
PROCESS CHEMISTRY MODE	FEEDBACK

** WATER BALANCE

WATER LOOP TYPE	OPEN
MAKEUP WATER ADDITION - LITERS/S	115.9 (1840 GPM)
SOURCE OF MAKEUP WATER	WELL WATER

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	>93% CaCO ₃
SOURCE/SUPPLIER	PAUL LIME
UTILIZATION %	99.0
POINT OF ADDITION	BALL MILL

** FGD SPARE CAPACITY INDICES

ABSORBER %	100.0
MIST ELIMINATOR - %	.0
FAN %	.0
BALL MILL %	.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP %	50.0

** FGD SPARE COMPONENT INDICES

ABSORBER	1.0
MIST ELIMINATOR	.0
FAN	.0
BALL MILL	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	1.0

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂ PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
6/79	SYSTEM				50.00	99.50	720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE APACHE 3 BOILER AND FGD SYSTEM BEGAN OPERATIONS DURING JUNE. THE UTILITY REPORTED THAT THE START-UP WAS TYPICAL WITH NUMEROUS MINOR SHAKEDOWN PROBLEMS.

7/79	SYSTEM						744		
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8/79	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT EXTENSIVE PROBLEMS WITH THE REAGENT HANDLING SYSTEM ARE CONTINUING PARTICULARLY WITH RESPECT TO FEED LINE FAILURES, PIPING PLUGGING AND GRINDING OPERATIONS. THE REAGENT HANDLING SYSTEM ACCOMMODATES BOTH UNITS 2 AND 3.

9/79	SYSTEM						720		
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ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE THIRD QUARTER OF 1979 THE BOILER AND FGD SYSTEM ONLY OPERATED ABOUT 25% OF THE TIME BECAUSE OF CONTINUING PROBLEMS WITH THE REAGENT FEED LINE. THE FRP SECTION FROM THE GRINDER TO THE SCRUBBERS FAILED. THE LINE WAS REPAIRED AT THE END OF SEPTEMBER.

COMMERCIAL OPERATIONS AT APACHE 3 BEGAN ON SEPTEMBER 1.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM	.0	.0	.0	.0	744			0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY IS IN THE PROCESS OF REPLACING THE REAGENT HANDLING SYSTEM; THEREFORE, THE FGD SYSTEM DID NOT OPERATE DURING OCTOBER.

11/79	302	89.4	39.8	39.4	39.4					
	303	89.4	50.5	50.0	50.0					
	SYSTEM	100.0	90.3	89.4	89.4	720	713	644	92.7	
12/79	SYSTEM	99.5	99.5	99.5	99.5	744	744	741	95.4	

** PROBLEMS/SOLUTIONS/COMMENTS

THE REAGENT HANDLING SYSTEM REPLACEMENT WAS COMPLETED IN DECEMBER.

THE OUTAGE TIME DURING DECEMBER WAS CAUSED BY A FAULTY BOILER FLUE DAMPER.

1/80	SYSTEM	91.7	91.7	91.7	91.7	744	744	682	89.7	
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY SOME OUTAGE TIME WAS DUE TO A PUMP MALFUNCTION.

OUTAGE TIME WAS ALSO CAUSED BY A BROKEN FEED BELT TO THE LIMESTONE BALL MILL.

2/80	SYSTEM	95.6	74.1	96.0	71.4	696	671	497	83.5	
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY OUTAGE TIME RESULTED FROM AN ESP FAILURE.

FORCED OUTAGE TIME WAS ALSO CAUSED BY A PUMP MALFUNCTION.

3/80	SYSTEM	90.9	90.9	90.9	90.9	744	744	677	91.1	
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** PROBLEMS/SOLUTIONS/COMMENTS

SOME OF THE OUTAGE TIME DURING MARCH OCCURRED BECAUSE OF PUMP FAILURES.

OUTAGE TIME RESULTED FROM STICKING VALVES AND LIMESTONE FEED-BELT PROBLEMS.

4/80	SYSTEM	99.0	96.9	96.9	30.6	720	227	220		
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE FGD SYSTEM WAS FORCED DOWN DUE TO PUMP FAILURES AND A RUPTURE IN THE SLURRY RECIRCULATION LINE.

5/80	SYSTEM	.0	.0	.0	.0	744	39	0		
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PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
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THE BOILER AND FGD SYSTEM WERE DOWN FOR A SCHEDULED OVERHAUL. THE LINERS IN THE ABSORBER QUENCHER HAD TO BE REPAIRED. THE BOILER RETURNED TO SERVICE BEFORE REPAIR WORK FOR THE FGD SYSTEM WAS COMPLETE. THE FGD SYSTEM WAS UNAVAILABLE IN MAY BECAUSE OF THIS OVERHAUL.

720

THE UTILITY REPORTED THAT THE DATA FOR THE MONTH OF JUNE HAS BEEN MISPLACED.

7/80	302	29.0	30.0	90.0	29.0				
	303	.0	.0		.0				
	SYSTEM	29.0	30.0	90.0	29.0	744	721	216	49.3

BOTH MODULES WERE UNAVAILABLE BECAUSE OF REPLACEMENT OF THE ABSORBER LINER. MODULE 302 WAS OUT OF SERVICE FOR 22 DAYS, WHILE MODULE 303 WAS OUT OF SERVICE DURING ALL OF JULY.

A PACKING PUMP FAILURE CAUSED THE FGD SYSTEM TO GO DOWN.

8/80	302	98.5	47.8	96.3	38.4				
	303	98.5	19.3	91.3	15.5				
	SYSTEM	98.5	67.1	94.8	54.0	744	599	402	41.5

TOWER 302 WAS UNAVAILABLE DURING PART OF AUGUST BECAUSE OF A QUENCHER PUMP FAILURE.

DUE TO A SAMPLING LINE FAILURE IN AUGUST, TOWER 303 WAS SHUT DOWN FOR PART OF THE MONTH.

THE REDUCED RATE OF FGD OPERATION IN AUGUST WAS A RESULT OF BOILER UNIT PROBLEMS AND REDUCED LOAD CAPACITY.

720

NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.

10/80	302	76.2	87.7	97.1	68.1				
	303	.0	.0		.0				
	SYSTEM	76.2	87.7	97.1	68.1	744	567	507	52.5

THE BOILER WAS OPERATED AT A REDUCED LOAD FOR 60 HOURS AND WAS TAKEN OFF LINE FOR SIX DAYS DURING OCTOBER.

UNAVAILABLE FGD SYSTEM TIME WAS DUE TO A QUENCHER PUMP FAILURE AND PH INSTABILITY.

11/80	302	78.4	78.1	95.4	77.8				
	303	100.0	17.8	100.0	17.8				
	SYSTEM	100.0	96.0	100.0	95.6	744	717	688	99.6

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE FGD SYSTEM WAS FORCED OUT OF SERVICE DUE TO FAILURE OF THE QUENCHER PUMPS, SAMPLE LINE AND TRANSFORMER.

THE BOILER UNIT TRIPPED CAUSING APPROXIMATELY FIVE HOURS OF OUTAGE TIME DURING THE MONTH.

12/80	302	.0	.0		.0				
	303	100.0	98.6	100.0	96.6				
	SYSTEM	100.0	98.6	100.0	96.6	744	729	719	86.2

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF DECEMBER.

1/81	302	.0	.0		.0				
	303	100.0	52.9	100.0	46.1				
	SYSTEM	100.0	52.9	100.0	46.1	744	649	343	80.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE APPROXIMATELY 123 HOURS DURING JANUARY.

MODULE 303 WAS TAKEN OUT OF SERVICE FOR APPROXIMATELY 272 HOURS DUE TO THE LOW SULFUR CONTENT OF THE COAL. MODULE 302 WAS NOT AVAILABLE FOR OPERATION DURING JANUARY.

2/81	302	.0	.0		.0				
	303	100.0	27.4	100.0	27.4				
	SYSTEM	100.0	27.4	100.0	27.4	672	672	184	95.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE OPERATION OF THE FGD SYSTEM WAS REDUCED DUE TO THE LOW SULFUR CONTENT OF THE COAL.

REPAIRS WERE MADE ON TOWER 302 DURING THE MONTH.

3/81	302	78.5	23.7	52.5	23.7				
	303	.0	.0		.0				
	SYSTEM	78.5	23.7	52.5	23.7	744	744	177	87.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH LOW OPERABILITY OF MODULE 302 WAS DUE TO THE FIRING OF LOW SULFUR COAL.

MODULE 303 WAS UNAVAILABLE DUE TO A MALFUNCTION OF THE LIMESTONE GRINDING CIRCUIT.

4/81	302	100.0	75.3	100.0	35.8				
	303	.0	.0		.0				
	SYSTEM	100.0	75.3	100.0	35.8	720	342	258	44.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE BOILER WAS UNAVAILABLE DUE TO A 2 WEEK SCHEDULED MAINTENANCE OUTAGE.

MODULE 303 WAS NOT AVAILABLE FOR OPERATION DUE TO EROSION PROBLEMS DISCOVERED IN THE MODULE BOWL AREA. THIS HAS BEEN A CONTINUAL PROBLEM AND THE UTILITY IS PRESENTLY CONDUCTING STUDIES TO ALLEVIATE THE PROBLEM.

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/81	302	100.0	87.1	100.0	87.1					
	303	100.0	.0		.0					
	SYSTEM	100.0	87.1	100.0	87.1		744	648	648	90.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MAY THE BOILER WAS TAKEN OUT OF SERVICE APPROXIMATELY 96 HOURS DUE TO MAINTENANCE.										
6/81	302	100.0	86.7	100.0	86.7					
	303	100.0	.0		.0					
	SYSTEM	100.0	86.7	100.0	86.7		720	720	624	87.1
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JUNE MODULE 303 WAS OUT OF SERVICE DUE TO REPAIRS ON THE ESP.										
7/81	302	45.2	11.9	100.0	10.8					
	303	100.0	57.3	100.0	51.6					
	SYSTEM	100.0	69.2	100.0	69.2		744	670	464	77.6
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE 302 WAS REMOVED FROM SERVICE ON JULY 1 AS A RESULT OF PROBLEMS WITH THE ELECTROSTATIC PRECIPITATOR. MODULE 303 WAS PLACED IN SERVICE ON JULY 17 SO THAT PREVENTIVE MAINTENANCE COULD BE PERFORMED ON MODULE 302.										
8/81	302	.0	.0		.0					
	303	100.0	100.0	100.0	100.0					
	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	89.1
9/81	302	.0	.0		.0					
	303	62.4	62.5	62.4	62.4					
	SYSTEM	62.4	62.5	62.4	62.4		720	718	449	80.8
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE 303 WAS OFF LINE FOR APPROXIMATELY ELEVEN DAYS DURING SEPTEMBER AS A RESULT OF A MALFUNCTION THAT CAUSED THE INLET AND OUTLET DAMPERS TO CLOSE.										
10/81	302	.0	.0		.0					
	303	96.2	98.2	96.2	96.2					
	SYSTEM	96.2	98.2	96.2	96.2		744	729	716	78.6
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING OCTOBER TOWER 303 WAS OUT OF SERVICE FOR THREE HOURS TO CHANGE THE QUENCHER PUMPS.										
ADDITIONAL FGD SYSTEM OUTAGE TIME RESULTED FROM UNIT TRIPS.										
11/81	302	.0	.0		88.1					
	303	100.0	100.0	88.1	88.1					
	SYSTEM	100.0	100.0	88.1	88.1		720	634	634	63.6
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE 303 WAS OUT OF SERVICE FROM NOVEMBER 3 THROUGH NOVEMBER 11 DUE TO ESP PROBLEMS.										
12/81	SYSTEM						744			

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE ORIGINAL COPY OF THE DECEMBER UPDATE INFORMATION WAS LOST IN THE MAIL.

1/82	302	95.1	84.0	93.7	73.2				
	303		.0		.0				
	SYSTEM	95.1	84.0	93.7	73.2	744	648	544	62.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY MODULE 302 WAS OUT OF SERVICE PART OF THE TIME DUE TO A LEAK IN THE COLLECTION BOWL BELOW THE ABSORBER PACKING.

2/82	302	95.5	93.9	95.5	93.6				
	303		.0		.0				
	SYSTEM	95.5	93.9	95.5	93.6	672	670	635	84.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY APPROXIMATELY 25 HOURS OF OUTAGE TIME WAS REQUIRED FOR MAINTENANCE ON THE COLLECTION BOWL.

3/82	302	21.9	24.6	20.6	20.3				
	303	.0	.0		.0				
	SYSTEM	21.9	24.6	20.6	20.3	744	615	151	47.2

** PROBLEMS/SOLUTIONS/COMMENTS

ON MARCH 6, BOTH MODULES WERE TAKEN OUT OF SERVICE FOR MAJOR REPAIR AND RECONSTRUCTION. THIS RESULTED IN SUSPENSION OF SCRUBBING OPERATIONS FOR THE REMAINDER OF THE MONTH.

4/82	302	.0	.0		.0				
	303	.0	.0		.0				
	SYSTEM	.0	.0		.0	720	53	0	3.8

** PROBLEMS/SOLUTIONS/COMMENTS

ON APRIL 1 AND APRIL 2, BOTH MODULES WERE OUT OF SERVICE FOR MAJOR REPAIR AND RECONSTRUCTION.

AS OF APRIL 3, THE UNIT WAS DOWN FOR ANNUAL MAINTENANCE AND REPAIR.

5/82	302	.0	.0		.0				
	303	.0	.0		.0				
	SYSTEM	.0	.0		.0	744	510	0	49.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OUT OF SERVICE FOR THE MONTH OF MAY FOR MAJOR REPAIR AND RECONSTRUCTION.

6/82	302		.0		.0				
	303	52.4	49.2	45.0	38.9				
	SYSTEM	52.4	49.2	45.0	38.9	720	569	280	66.9

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 303 WAS PLACED BACK IN SERVICE ON JUNE 11 AFTER COMPLETION OF MAJOR REPAIRS AND RECONSTRUCTION.

MODULE 303 WAS TAKEN OFF-LINE FOR APPROXIMATELY THREE DAYS DUE TO HIGH OPACITY AND A QUENCHER PUMP MALFUNCTION.

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

ESP REPAIRS SHUT THE SYSTEM DOWN FOR APPROXIMATELY THREE DAYS.

7/82	302	59.0	56.6	100.0	56.1				
	303	40.9	41.3	100.0	40.9				
	SYSTEM	99.9	97.9	100.0	97.0	744	738	722	87.8

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 303 WAS TAKEN OUT OF SERVICE ON JULY 13 TO REPAIR A LEAK IN THE PACKING RETURN LINE TO THE ABSORBER FEED TANK.

MODULE 302 WAS PLACED IN SERVICE ON JULY 13 AFTER COMPLETION OF MAJOR REPAIRS AND RECONSTRUCTION.

MODULE 302 WAS OUT OF SERVICE APPROXIMATELY 11 HOURS ON JULY 21 FOR TESTING PURPOSES.

MODULE 302 WAS OUT OF SERVICE 11 HOURS ON JULY 26 DUE TO A TRIP OF UNIT 3.

8/82	302	96.8	95.3	96.4	87.6				
	303	100.0	.0		.0				
	SYSTEM	96.8	95.3	96.4	87.6	744	685	652	85.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.

9/82	302	100.0	85.3	100.0	72.8				
	303	100.0	.0		.0				
	SYSTEM	100.0	85.3	100.0	72.8	720	615	524	60.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING SEPTEMBER.

10/82	302	100.0	91.0	100.0	90.9				
	303	100.0	.0		.0				
	SYSTEM	100.0	91.0	100.0	90.9	744	743	676	74.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING OCTOBER.

11/82	302	98.4	65.4	97.1	53.8				
	303	100.0	.0		.0				
	SYSTEM	98.4	65.4	97.1	53.8	720	592	387	55.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING NOVEMBER.

12/82	302	100.0	69.2	100.0	61.6				
	303	100.0	.0		.0				
	SYSTEM	100.0	69.2	100.0	61.6	744	662	458	46.2

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED BY THE UTILITY DURING DECEMBER.

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/83	302	8.1	5.8	100.0	4.8					
	303	78.6	34.8	68.1	28.5					
	SYSTEM	86.7	40.6	100.0	33.2					
							744	609	247	40.2
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE 302 WAS TAKEN OUT OF SERVICE ON JANUARY 3 DUE TO AN INDUCED DRAFT FAN MALFUNCTION.										
MODULE 303 WAS PLACED BACK IN SERVICE ON JANUARY 6.										
2/83	302	100.0	.0		.0					
	303	100.0	74.3	100.0	20.7					
	SYSTEM	100.0	74.3	100.0	20.7					
							672	187	139	17.5
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS TAKEN OFF LINE FEBRUARY 8 DUE TO LOW DEMAND.										
3/83	302	100.0	17.6	100.0	10.7					
	303	100.0	50.9	100.0	31.0					
	SYSTEM	100.0	68.5	100.0	41.8					
							744	454	311	43.4
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS OFF LINE FROM MARCH 18 TO MARCH 28 DUE TO LOW DEMAND.										
4/83	302				.0					
	303				.0					
	SYSTEM				.0					
							720	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
UNIT 3 WAS DOWN DURING THE MONTH OF APRIL FOR ANNUAL MAINTENANCE AND REPAIR.										
5/83	302				.0					
	303				.0					
	SYSTEM				.0					
							744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
UNIT 3 WAS DOWN DURING MAY FOR ANNUAL MAINTENANCE AND REPAIR.										
6/83	302	91.7	42.2	81.5	36.6					
	303	100.0	.0		.0					
	SYSTEM	91.7	42.2	81.5	36.6					
							720	624	263	50.8
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.										
7/83	302	99.4	56.0	97.7	25.3					
	303	100.0	.0		.0					
	SYSTEM	99.4	56.0	97.7	25.3					
							744	336	188	28.7
8/83	302	97.6	56.4	95.4	48.5					
	303	100.0	.0		.0					
	SYSTEM	97.6	56.4	95.4	48.5					
							744	641	361	56.8

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

ARIZONA ELECTRIC POWER: APACHE 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

ON JUNE 24, MODULE 302 WAS TAKEN OUT OF SERVICE FOR PACKING REPAIRS AND
 REMAINED OUT OF SERVICE FOR THE REST OF THE MONTH.

7/84	302	.0	.0		.0				
	303	88.0	87.9	88.0	87.9				
	SYSTEM	44.0	44.0	88.0	44.0	744	744	327	82.0

** PROBLEMS/SOLUTIONS/COMMENTS

MAINTENANCE WAS COMPLETED ON MODULE 303 AND IT WAS PLACED BACK INTO SERVICE
 ON JULY 4, 1984.

MODULE 302 WAS UNAVAILABLE FOR SERVICE DURING THE MONTH DUE TO ABSORBER
 PACKING REPAIRS.

8/84	SYSTEM					744			
9/84	SYSTEM					720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE	
PLANT NAME	CHOLLA	
UNIT NUMBER	1	
CITY	JOSEPH CITY	
STATE	ARIZONA	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	84.	(.196 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	430.	(1.000 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	344.	(.800 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	615	
GROSS UNIT GENERATING CAPACITY - MW	119	
NET UNIT GENERATING CAPACITY W/FGD - MW	115	
NET UNIT GENERATING CAPACITY WO/FGD - MW	119	
EQUIVALENT SCRUBBED CAPACITY MW	119	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	226.51	(480000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	135.6	(276 F)
STACK HEIGHT - M	76.	(250 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	3.7	(12.0 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT J/G	23609.	(10150 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		9650-10600
AVERAGE ASH CONTENT - %	13.50	
RANGE ASH CONTENT - %	9.7-22.5	
AVERAGE MOISTURE CONTENT - %	15.00	
RANGE MOISTURE CONTENT %	*****	
AVERAGE SULFUR CONTENT - %	.50	
RANGE SULFUR CONTENT - %	0.4-1.0	
AVERAGE CHLORIDE CONTENT - %	.02	
RANGE CHLORIDE CONTENT - %	0.01-0.04	
 *** PARTICLE CONTROL		
 ** MECHANICAL COLLECTOR		
NUMBER	1	
NUMBER OF SPARES	0	
TYPE	CYCLONE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY - CU.M/S	226.5	(480000 ACFM)
INLET FLUE GAS TEMPERATURE - C	135.6	(276 F)
PARTICLE REMOVAL EFFICIENCY -%	75.0	
 ** ESP		
NUMBER	0	
TYPE	NONE	
 ** PARTICLE SCRUBBER		
NUMBER	2	
INITIAL START-UP DATE	10/73	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/BOTTOM-ENTRY LIQUID DISTRIBUTION	
TRADE NAME/COMMON NAME	FLOODED DISC SCRUBBER	
SUPPLIER	RESEARCH-COTTRELL	
DIMENSIONS - FT	6.0 DIA X 45.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	MAT-REINFORCED EPOXY	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	336.4	(5340 GPM)

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

L/G RATIO - LITER/CU.M	2.9	(22.0 GAL/1000ACF)
PH CONTROL ADDITIVE	ABSORBER SLURRY	[TRAIN A ONLY]
PRESSURE DROP - KPA	3.7	(15.0 IN-H ₂ O)
INLET GAS FLOW RATE - CU.M/S	113.3	(240000 ACFM)
INLET GAS TEMPERATURE - C	136.7	(278 F)
PARTICLE REMOVAL EFFICIENCY - %	99.2	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO ₂ REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
A-E FIRM	EBASCO
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN SO ₂ REMOVAL EFFICIENCY - %	55.00
ENERGY CONSUMPTION - %	3.4
CURRENT STATUS	1
COMMERCIAL START-UP	12/73
INITIAL START-UP	10/73
CONTRACT AWARDED	7/71

** DESIGN AND OPERATING PARAMETERS

OPER. & MAINT. REQUIREMENT - MANHR/DAY	40.0
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** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	1	
GENERIC TYPE	COMBINATION TOWER	
SPECIFIC TYPE	SPRAY/PACKED	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	RESEARCH-COTTRELL	
DIMENSIONS - FT	22.0 DIA X 70.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	VERTICAL CROSS CHANNEL FIXED GRID PACKING	
NUMBER OF CONTACTING ZONES	1	
DISTANCE BETWEEN GAS CONTACTING ZONES - CM	61.0	(24.0IN)
LIQUID RECIRCULATION RATE - LITER/S	586.	(9300 GPM)
L/G RATIO - L/CU.M	6.0	(45.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.1	(.5 IN-H ₂ O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.1	(6.9 FT/S)
INLET GAS FLOW - CU. M/S	96.74	(205000 ACFM)
INLET GAS TEMPERATURE C	50.0	(122 F)
SO ₂ REMOVAL EFFICIENCY - %	92.0	
PARTICLE REMOVAL EFFICIENCY - %	99.7	

** ABSORBER

NUMBER	1
GENERIC TYPE	SPRAY TOWER
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY
TRADE NAME/COMMON TYPE	N/A
SUPPLIER	RESEARCH-COTTRELL
DIMENSIONS - FT	22.0 DIA X 70.0
SHELL GENERIC MATERIAL	STAINLESS STEEL
SHELL SPECIFIC MATERIAL	AUSTENITIC
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L
LINER GENERIC MATERIAL	NONE
LINER SPECIFIC MATERIAL	N/A
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	1

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

LIQUID RECIRCULATION RATE - LITER/S	586.	(9300 GPM)
L/G RATIO - L/CU.M	6.0	(45.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.1	(.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.1	(6.9 FT/S)
INLET GAS FLOW - CU. M/S	96.74	(205000 ACFM)
INLET GAS TEMPERATURE - C	50.0	(122 F)
SO2 REMOVAL EFFICIENCY - %	25.0	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	2	
NUMBER PER MODULE	1	
GENERIC TYPE	CYCLONIC	
SPECIFIC TYPE	CYCLONIC SEPARATOR	
TRADE NAME/COMMON TYPE	CYCLONIC TOWER	
CONFIGURATION	VERTICAL	
NUMBER OF STAGES	1	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
WASH WATER SOURCE	NONE	
WASH FREQUENCY	N/A	
** REHEATER		
NUMBER	2	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	STEAM	
TRADE NAME/COMMON TYPE	BARE TUBE	
LOCATION	SEPARATE VESSEL AFTER ABSORBER	
TEMPERATURE INCREASE C	22.2	(40 F)
INLET FLUE GAS FLOW RATE - CU. M/S	115.62	(245000 ACFM)
INLET FLUE GAS TEMPERATURE - C	48.9	(120 F)
OUTLET FLUE GAS TEMPERATURE - C	71.1	(160 F)
NUMBER OF BUNDLES PER BANK	3	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	113.26	(240000 ACFM)
FLUE GAS TEMPERATURE C	135.6	(276 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	113.26	(240000 ACFM)
FLUE GAS TEMPERATURE C	135.6	(276 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	SCRUBBER INLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	SCRUBBER OUTLET TO REHEATER
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	MICA FLAKE-FILLED POLYESTER
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	NONE
DEVICE	N/A
DEVICE TYPE	N/A
NUMBER	0

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

** TANKS	
SERVICE	NUMBER
-----	-----
SCRUBBER RECYCLE	1
WASTE SLURRY BLEED	2
ABSORBER RECYCLE	1
REAGENT PREP PRODUCT	2
** PUMPS	
SERVICE	NUMBER
-----	-----
SCRUBBER RECIRCULATION	3
ABSORBER RECIRCULATION	2
MIST ELIMINATOR WASH	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
MOISTURE CONTENT - % TOTAL FREE WATER	87.0
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	70-100 ACRES X 6 FT DEEP
SITE CAPACITY - CU.M	623730 (510.0 ACRE-FT)
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	SCRUBBER AND ABSORBER HOLD TANK
CHEMICAL PARAMETERS	PH
CONTROL LEVELS	PH 5.2 IN SCRUBBER HOLD TANK, 6.5 IN ABSORBER HO
PROCESS CONTROL MANNER	MANUAL
** WATER BALANCE	
WATER LOOP TYPE	OPEN
MAKEUP WATER ADDITION - LITERS/S	7.6 (120 GPM)
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
SOURCE/SUPPLIER	SUPERIOR CO.
POINT OF ADDITION	ABSORBER RECYCLE TANK
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2	PART. HOURS	HOURS	HOURS FACTOR

10/73 SYSTEM

744

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL TESTING OF THE FGD SYSTEM BEGAN ON OCTOBER 2, 1973. THE SYSTEM OPERATED UNTIL THE SCHEDULED SHUTDOWN DATE OF OCTOBER 21. DURING THE THREE WEEK TEST PERIOD, PARTICULATE MATTER AND SO2 REMOVAL EFFICIENCIES, MIST CARRYOVER FROM THE TOWERS, MAXIMUM PROCESS GAS FLOW RATES, AND BYPASS GAS LEAKAGE RATES WERE DETERMINED.

THE DATA COLLECTED INCLUDED THE FOLLOWING:

FLOODED DISC SCRUBBER SO2 REMOVAL EFFICIENCY (MODULE A): 92%

SPRAY TOWER SCRUBBER SO2 REMOVAL EFFICIENCY (MODULE B): 25%

UNIT OVERALL SO2 REMOVAL EFFICIENCY: 58.5%

MIST CARRYOVER FROM MODULES A AND B: 0%

SOLIDS CARRYOVER FROM MODULE A: 0.005 GR/SCF

AIR LEAKAGE INTO SYSTEM DOWNSTREAM OF SCRUBBERS: 18,400 ACFM

CHLORIDE ION CONCENTRATION IN FLOODED DISC SCRUBBER RECIRCULATION:
1600 PPM

CHLORIDE ION CONCENTRATION IN SPRAY TOWER RECIRCULATION: 575 PPM

CHLORIDE ION CONCENTRATION IN SCRUBBER MAKEUP WATER (COOLING TOWER
BLOWDOWN): 933 PPM

CHLORIDE LEVELS ARE SUFFICIENT TO CAUSE PITTING CORROSION IN LOCALIZED
AREAS WHEN TEMPERATURES ARE GREATER THAN 140F AND PH IS LESS THAN
3.0.

11/73	SYSTEM	720
12/73	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

THE CONSTRUCTION AND INITIAL TESTING OF THE SYSTEM WERE COMPLETED ON DECEMBER 3. COMMERCIAL OPERATIONS BEGAN ON DECEMBER 14.

BECAUSE OF A DIFFERENCE IN THE SIZE OF THE MAIN DUCT AND REHEATED TRANSITION DUCT, THE GAS FLOW PRODUCES HARMONIC VIBRATIONS IN THE REHEATER. THE VIBRATIONS WERE PARTIALLY DAMPENED BY INSTALLATION OF BAFFLES.

ONE OF THE REHEATER BUNDLES WAS BADLY CORRODED BY ACID THAT CONDENSED IN THE UNINSULATED DUCT UPSTREAM OF THE REHEATERS. THE TUBE BUNDLE WAS REPLACED AND A BAFFLE WAS INSTALLED TO DIVERT CONDENSED ACID FROM REHEATER TUBES.

THE DUCT UPSTREAM OF THE REHEATER WAS INSULATED. THE ACID CONDENSATION OCCURRED ONLY IN THE B-MODULE WHICH CONTAINS NO INTERNAL PACKING AND CONSEQUENTLY HAS A LOWER DEGREE OF SULFUR DIOXIDE REMOVAL (25%).

SOME LINES PLUGGED, PARTICULARLY WHEN THE SYSTEM OPERATED AT LOW FLOW RATES.

SOLIDS SETTLED OUT IN STANDBY PUMPS, AND EXCESSIVE FAN VIBRATIONS OCCURRED BECAUSE OF ACCUMULATION OF SCALE BUILDUP WHEN THE UNIT WAS IDLE. TO SOLVE THESE PROBLEMS THE PACKING GLAND POSITION WAS REVERSED (INSTALLED UPSIDE DOWN). THE FAN WAS SANDBLASTED. THE PIPING WAS MODIFIED TO ELIMINATE STAGNANT POCKETS, AND PUMPS WERE FLUSHED IMMEDIATELY AFTER REMOVAL FROM SERVICE.

THE UTILITY EXPERIENCED SOLIDS BUILDUP IN THE FDS STUFFING GLAND BOX AND ON TOP OF THE SPRAY DOME.

1/74	A	97.0	
	B	90.0	
	SYSTEM	93.5	744
2/74	A	100.0	

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

	B			94.0							
	SYSTEM			97.0				672			
3/74	A			100.0							
	B			66.0							
	SYSTEM			83.0				744			
4/74	A			66.0							
	B			57.0							
	SYSTEM			61.5				720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM PERFORMED SATISFACTORILY FROM DECEMBER 15, 1973 TO APRIL 15, 1974. ALTHOUGH SEVERAL UPSETS CAUSED SHUTDOWN OF ONE OR BOTH MODULES FOR SHORT PERIODS SYSTEM AVAILABILITY AVERAGED 92.6% DURING THAT PERIOD.

THE SCRUBBER MODULES WERE SHUTDOWN FOR SHORT PERIODS IN APRIL TO REPLACE CORRODED COR-TEN STEEL EXPANSION JOINTS ON THE REHEATER BUNDLES. MODULE A WAS DOWN APRIL 17 THROUGH 27. MODULE B WAS DOWN APRIL 15 THROUGH 28.

5/74	A			98.0						
	B			99.0						
	SYSTEM			98.5			744	744		
6/74	A			100.0						
	B			100.0						
	SYSTEM			100.0			720			
7/74	A		97.5	97.0	97.5					
	B		98.5	92.0	98.5					
	SYSTEM		98.0	94.5	98.0		744	744	729	
8/74	A		94.5	97.0	94.5					
	B	100.0	100.0	100.0	100.0					
	SYSTEM		97.3	98.5	97.3		744	744	724	

** PROBLEMS/SOLUTIONS/COMMENTS

EACH MODULE WAS OUT OF SERVICE ONE DAY OVER THE MONTH FOR THE INSTALLATION OF BAFFLE PLATES IN THE INLET DUCT OF EACH REHEATER. THE BAFFLE INSTALLATIONS WERE PARTLY SUCCESSFUL IN STOPPING REHEATER VIBRATION PROBLEMS.

9/74	A			95.0						
	B			99.0						
	SYSTEM			97.0			720			
10/74	A			83.0						
	B			68.0						
	SYSTEM			75.5			744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS SHUT DOWN IN LATE OCTOBER FOR AN ANNUAL BOILER AND FGD SYSTEM OVERHAUL.

DURING THE OUTAGE SEVERAL INSTANCES OF PITTING CORROSION WERE DISCOVERED IN THE 316L SS FLOODED DICS SCRUBBER WALLS.

REHEATER TUBE LEAKS WERE DISCOVERED IN THE B-SIDE REHEATER DURING THE OUTAGE.

11/74	A			100.0						
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ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
	B			98.0					
	SYSTEM			99.0			720		
12/74	A			100.0					
	B			100.0					
	SYSTEM			100.0			744		
1/75	A	97.7		97.7	97.7				
	B	98.7		98.7	98.7				
	SYSTEM	98.2		98.2	98.2		744	744	730

** PROBLEMS/SOLUTIONS/COMMENTS

OPERATION OF THE SYSTEM THROUGHOUT 1975 AND 1976 WAS ACCOMPANIED BY A NUMBER OF MINOR PROBLEM AREAS INCLUDING: SIGNIFICANT CORROSION ATTACK IN THE VESSEL WALLS OF THE VENTURI FLOODED-DISC PARTICULATE SCRUBBER MODULE; ACID CORROSION IN THE B-SIDE REHEATER HOUSING; SCALE BUILDUP IN THE PIPE OUTLET AT THE SLUDGE/FLYASH EVAPORATION POND; PLUGGING IN THE SCRUBBER TOWER PACKING AND MIST ELIMINATOR; EROSION IN THE PUMPS; CORROSION IN THE BOILER EXHAUST ELBOW OF THE DUCTWORK LEADING FROM THE SCRUBBERS TO THE STACK.

DURING JANUARY THE BYPASS SYSTEM EXPERIENCED CONTROL PROBLEMS. NO SOLUTION HAS YET BEEN FOUND.

A LEAK IN THE B-SIDE ABSORBER TOWER WAS WELDED IN JANUARY.

SOME LEAKS WERE DISCOVERED OVER THE MOUTH ON THE A-SIDE VENTURI THROATS. THE LEAKS WERE ATTRIBUTED TO NORMAL WEAR.

LEAKS WERE DISCOVERED IN THE B-SIDE REHEATER DUCTS IN JANUARY.

2/75	A	95.5		95.5	95.5				
	B	91.4		91.4	91.4				
	SYSTEM	93.5		93.5	93.5		672	672	628

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT PROBLEMS WITH VESSEL LEAKS CONTINUED THROUGH FEBRUARY.

SOME OUTAGE TIME WAS REQUIRED FOR RECYCLE PUMP REPAIRS OVER THE MONTH.

THE UTILITY DISCOVERED SOME ADDITIONAL EROSION/CORROSION PROBLEMS IN THE FGD SYSTEM IN FEBRUARY.

3/75	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT BUILDUP OF SEDIMENT HAS OCCURRED SEVERAL TIMES SINCE STARTUP IN DEAD SPACES, IN PIPE LINES, AND VALVES OF IDLE PUMPS AS WELL AS IN PROCESS LINES DURING PERIODS OF REDUCED OPERATING RATE.

SOME PIPE LINERS HAVE EXPERIENCED EROSION SINCE STARTUP. THE EROSION WAS DUE IN SOME CASES TO UNSATISFACTORY LINER MATERIALS AND IN OTHER CASES TO HIGH VELOCITIES THROUGH PIPES AND FITTINGS. PIPING MODIFICATIONS HELPED TO REDUCE THE EROSION PROBLEM. CRACKING OF THE RUBBER LINING IN SOME PIPES WAS DUE TO DEFECTS IN FABRICATION.

SOME FLOODED DISC SCRUBBER PACKING PLUGGING HAS OCCURRED. IT APPEARS THAT THIS IS A RESULT OF THE GRADE OF COAL BURNED. THE "WETTED FILM CONTACTOR" PACKING LIFE HAS BEEN REDUCED.

4/75	A	88.5		88.5	82.4				
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-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B		65.2	65.2	60.7					
	SYSTEM		76.9	76.9	71.6		720	670	515	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT THERE ARE STILL PROBLEMS WITH THE BYPASS SYSTEM CONTROLS.										
SOME DOWN TIME WAS REQUIRED TO REPAIR VALVES AND PIPING AND TO UNPLUG SECTIONS OF THE A MODULE TOWER PACKING (MUNTERS).										
THE REHEATER SECTION WAS AGAIN PATCHED WITH CEILCOTE DURING APRIL.										
5/75	A		47.5	47.5	47.5					
	B		39.9	39.9	39.9					
	SYSTEM		43.7	43.7	43.7		744	744	325	
** PROBLEMS/SOLUTIONS/COMMENTS										
BOTH MODULES WERE OUT OF SERVICE FOR MOST OF THE MONTH SO THAT SCHEDULED REPAIRS AND CLEANING COULD BE UNDERTAKEN.										
6/75	A	100.0	100.0	100.0	100.0					
	B	100.0	100.0	100.0	100.0					
	SYSTEM	100.0	100.0	100.0	100.0		720	720	720	
** PROBLEMS/SOLUTIONS/COMMENTS										
A SUBSTANTIAL AMOUNT OF PLUGGING WAS OBSERVED IN THE MODULE A ABSORBER TOWER PACKING.										
PLUGGING OCCURRED IN MIST ELIMINATORS.										
NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THE PERIOD.										
7/75	A		97.5	97.5	97.5					
	B		98.5	98.5	98.5					
	SYSTEM		98.0	98.0	98.0		744	744	729	
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULES WERE SHUT DOWN TO CLEAN FLOW RESTRICTIONS IN FLOODED-DISC RECIRCULATION LINES.										
8/75	A		94.5	94.5	94.5					
	B	100.0	100.0	100.0	100.0					
	SYSTEM		97.3	97.3	97.3		744	744	724	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE A-SIDE WAS SHUT DOWN FOR INSPECTION.										
9/75	A		64.5	97.6	64.5					
	B		93.0	97.4	93.0					
	SYSTEM		78.8	97.5	78.8		720	720	567	
** PROBLEMS/SOLUTIONS/COMMENTS										
MINOR OUTAGE RESULTED FROM PLUGGED FLOODED DISC SCRUBBER RECIRCULATION LINES.										
10/75	A		78.0	84.0	56.4					
	B		24.6	54.8	17.8					
	SYSTEM		51.3	69.4	37.1		744	538	276	

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGES RESULTED FROM SCHEDULED EQUIPMENT OVERHAULS AND RECOATING OF VES-
 SELS.

11/75	A	100.0	100.0	100.0			
	B	71.4	80.0	71.4			
	SYSTEM	85.7	90.0	85.7	720	720	617

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR OUTAGES OR PROBLEMS OCCURRED DURING THE REPORT PERIOD.

12/75	A	100.0	100.0	100.0			
	B	100.0	100.0	100.0			
	SYSTEM	100.0	100.0	100.0	744	744	744

** PROBLEMS/SOLUTIONS/COMMENTS

MINOR PROBLEMS ENCOUNTERED REQUIRED RECYCLE PUMP REBUILDING.

THE B-SIDE REHEATER COIL MALFUNCTIONED BUT NO OUTAGE TIME WAS REQUIRED.

1/76	A	96.0	98.9	96.0			
	B	87.9	98.6	89.9			
	SYSTEM	92.0	98.8	92.0	744	744	684

** PROBLEMS/SOLUTIONS/COMMENTS

MINOR VALVE PLUGGING OCCURRED.

MINOR RECIRCULATION LINE PLUGGING OCCURRED.

MODULE B OPERATING HOURS WERE LOWER BECAUSE OF REDUCED SYSTEM REQUIREMENTS

2/76	SYSTEM				696		
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3/76	SYSTEM				744		
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE MONTHS OF FEBRUARY AND MARCH.

4/76	A		99.0				
	B		97.4				
	SYSTEM		98.2		720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM IS CURRENTLY EXPERIENCEING COATING FAILURES IN THE ELBOW OF
 THE SCRUBBER EXHAUST DUCT LEADING TO THE STACK.

THE UTILITY PERFORMED SOME MINOR REPAIRS TO THE HOUSING OF THE B-SIDE
 REHEATER.

5/76	A		76.4				
	B		99.6				
	SYSTEM		88.0		744		

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

CORROSION AND PLUGGING PROBLEMS OCCURRED ON THE A-SIDE REHEATER TUBES.

THE UTILITY REPORTED THAT PLUGGING OCCURRED IN THE FLOODED DISC SCRUBBER RECIRCULATION LINES.

PLUGGING OCCURRED IN THE FLOODED DISC SCRUBBER PACKING.

PLUGGING OCCURRED IN THE MIST ELIMINATORS.

HEAVY PUMP MAINTENANCE WAS REQUIRED IN MAY. THE UTILITY NOW CONSIDERS HEAVY PUMP MAINTENANCE NORMAL FOR THE CHOLLA 1 SCRUBBER.

6/76	A			64.1						
	B			39.4						
	SYSTEM			51.8			720			

** PROBLEMS/SOLUTIONS/COMMENTS

LOW RELIABILITY FACTORS FOR THE MONTH OF JUNE RESULTED FROM A SCHEDULED MID-YEAR SCRUBBER SHUTDOWN FOR MAINTENANCE, INSPECTION AND REPAIRS.

SOME SCALING AND CORROSION PROBLEMS WERE UNCOVERED IN THE SCRUBBING SYSTEM RECYCLE TANKS.

7/76	A			100.0						
	B			97.5						
	SYSTEM			98.8			744			

8/76	A			100.0						
	B			100.0						
	SYSTEM			100.0			744			

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS TO THE COATING IN THE ELBOW OF THE SCRUBBER EXHAUST DUCT WERE COMPLETED OVER THE JULY-AUGUST PERIOD.

A MALFUNCTIONING SOLENOID VALVE IN THE B-SIDE MIST ELIMINATOR WASH SYSTEM PREVENTING ADEQUATE WASHING, RESULTED IN A MINOR SCRUBBER OUTAGE DURING THE JULY-AUGUST PERIOD.

9/76	A	100.0	100.0	100.0	100.0					
	B		93.9	100.0	93.9					
	SYSTEM		97.0	100.0	97.0	720	720	698		

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS IN SERVICE THE ENTIRE MONTH. NO SIGNIFICANT SCRUBBER PROBLEMS WERE REPORTED.

10/76	A		99.5	56.0	55.8					
	B		66.4	56.0	37.2					
	SYSTEM		83.0	56.0	46.5	744	417	346		

11/76	A		94.8	95.8	94.8					
	B		77.2	97.6	77.2					
	SYSTEM		86.1	96.7	86.1	720	720	619		

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

TWO MINOR FORCED SCRUBBER OUTAGES OCCURRED DURING THE PERIOD.

A REHEATER STEAM LEAK CAUSED A MINOR FORCED OUTAGE.

AN INLET GAS DAMPER ADJUSTMENT PROBLEM IN BOTH THE A-SIDE AND B-SIDE SCRUBBING TRAINS CAUSED A MINOR OUTAGE.

12/76	A	99.8	99.7	99.8			
	B	67.0	100.0	67.0			
	SYSTEM	99.9	99.0	83.4	744	744	620

** PROBLEMS/SOLUTIONS/COMMENTS

ONE OUTAGE WAS REPORTED. THE OUTAGE WAS THE RESULT OF AN ADDITIONAL ADJUSTMENT TO THE A-SIDE GAS INLET DAMPER.

1/77	A	71.6	72.3	71.6			
	B	91.9	93.4	91.9			
	SYSTEM	81.8	82.9	81.8	744	744	608

** PROBLEMS/SOLUTIONS/COMMENTS

THE PERFORMANCE INDEX VALUES CONTAINED IN THESE TABLES ARE BASED UPON THE MODULE ACTUAL SERVICE TIME FOR THE PERIOD VERSUS THE NUMBER OF HOURS THE MODULES ARE CALLED UPON TO OPERATE FOR THE SAME PERIOD. THE MODULES OPERATE ON A DEMAND-ONLY BASIS. FLUE GAS IS BYPASSED AROUND THE MODULES WHEN THEY ARE NOT REQUIRED FOR SERVICE.

THE MUNTERS PACKING IN THE A-SIDE TOWER WAS REPLACED IN JANUARY.

BAD C3471 ****

MINOR CORROSION OCCURRED IN THE SYSTEM.

MINOR PLUGGING OF SCRUBBER INTERNALS OCCURRED. THE TOWERS WERE CLEANED.

SOME PROBLEMS OCCURRED WITH THE LIQUID PIPING.

AVERAGE SO2 INLET AND OUTLET CONCENTRATIONS DURING JANUARY WERE 350 PPM AND 175 PPM RESPECTIVELY.

2/77	A	96.5	98.8	96.5			
	B	88.0	99.6	88.0			
	SYSTEM	92.2	99.2	92.2	672	672	620

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE MECHANICAL DIFFICULTIES WITH THE BY-PASS DAMPERS.

AVERAGE SO2 INLET AND OUTLET VALUES DURING FEBRUARY WERE 350 PPM AND 175 PPM RESPECTIVELY.

3/77	A	71.6	72.3	71.6			
	B	91.9	93.4	91.9			
	SYSTEM	81.8	82.9	81.8	744	744	608

** PROBLEMS/SOLUTIONS/COMMENTS

THE A-SIDE TOWER PACKING WAS REPLACED DURING MARCH.

BOTH MODULES WERE OUT OF SERVICE FOR CLEANING OF AREAS OF PLUGGING IN THE SCRUBBER INTERNALS DURING THE MONTH.

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
4/77	A		99.6	100.0	88.2				
	B		98.6	100.0	87.3				
	SYSTEM		99.1	100.0	87.8		720	638	632
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED NO MAJOR PROBLEMS OCCURRED DURING APRIL.									
5/77	A		100.0	87.0	86.7				
	B		100.0	87.0	86.7				
	SYSTEM		100.0	87.0	86.7		744	645	645
** PROBLEMS/SOLUTIONS/COMMENTS									
OUTAGE TIME FOR THE BOILER AND FGD SYSTEM WAS A RESULT OF THE SCHEDULED MID-YEAR SCRUBBER CLEANOUT.									
DURING MAY RESEARCH-COTTRELL PERSONNEL CONDUCTED FORCED OXIDATION TESTS BY BLOWING AIR INTO THE FLOODED DISC SCRUBBER AND CONVERTING ALL CASO3 TO CASO4 YIELDING SUPERIOR SLUDGE DEWATERING HANDLING AND SCALE-FREE OPERATION.									
6/77	A	100.0	100.0	100.0	100.0				
	B	100.0	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	100.0		720	720	720
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED NO MAJOR PROBLEMS FOR THE MONTH OF JUNE.									
7/77	A			97.0					
	B			99.0					
	SYSTEM			98.0			744	744	
** PROBLEMS/SOLUTIONS/COMMENTS									
A MINOR LEAK OCCURRED IN THE LIMESTONE SLURRY TANK.									
A MINOR LEAK OCCURRED IN THE B-SIDE RETURN LINE FROM THE FLOODED DISC SCRUBBER TO THE SCRUBBER TANK.									
RESEARCH-COTTRELL PERSONNEL ARE STILL ON THE PLANT SITE CONTINUING FORCED OXIDATION STUDIES.									
8/77	A		97.2	97.2	97.2				
	B		98.6	98.6	98.6				
	SYSTEM		97.9	97.9	97.9		744	744	729
** PROBLEMS/SOLUTIONS/COMMENTS									
DOWN TIME WAS REQUIRED TO REPAIR LEAKS IN THE SLURRY DISPOSAL TANK AND THE FLOODED DISC SCRUBBER RETURN LINE BETWEEN THE TOWER AND THE SCRUBBER RECYCLE TANK.									
9/77	A	100.0	99.7	100.0	99.7				
	B	100.0	99.7	100.0	99.7				
	SYSTEM	100.0	99.7	100.0	99.7		720	720	718
** PROBLEMS/SOLUTIONS/COMMENTS									
ONLY ROUTINE MAINTENANCE WAS REQUIRED FOR THE SCRUBBING SYSTEM DURING SEPTEMBER.									

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
10/77	A	100.0	99.9	100.0	99.9				
	B	100.0	99.9	100.0	99.9				
	SYSTEM	100.0	92.1	98.7	99.9		744	744	743

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO MAJOR PROBLEMS FOR OCTOBER.

11/77	A	100.0	99.7	100.0	23.3				
	B	97.4	84.5	97.4	19.7				
	SYSTEM	98.7	92.0	99.0	21.5		720	169	155

** PROBLEMS/SOLUTIONS/COMMENTS

THE B-SIDE OUTAGE WAS DUE TO LEAKS IN THE VENTURI SECTION OF THE SCRUBBER AND AN EXPANSION JOINT FAILURE IN A RECYCLE PUMP.

THE BOILER OPERATED ONLY 168.5 HOURS BECAUSE OF A SHUTDOWN FOR OVERHAUL IN THE LAST HALF OF NOVEMBER. THE UNIT IS SCHEDULED TO START UP IN MID-DECEMBER.

12/77	SYSTEM	.0			.0		744		0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND SCRUBBING SYSTEM WERE OUT OF SERVICE THROUGH DECEMBER AS THE OVERHAUL PERIOD CONTINUED.

OVER THE PAST YEAR EVIDENCE OF CHLORIDE ATTACK WAS NOTED IN THE LIQUID-GAS CENTRIFUGAL SEPARATOR SHELL BELOW THE ABSORBER. THE INTERIOR OF THE VESSEL WAS COATED WITH AN EPOXY MATERIAL BY THE SYSTEM SUPPLIER AS A REMEDY BUT THIS ERODED IN SPOTS AND HAD TO BE REPAIRED. THE EPOXY MATERIAL ALSO ERODED AND DISBONDED BELOW THE SCRUBBER DISC.

DURING 1977 EVIDENCE OF ADDITIONAL CHLORIDE ATTACK WAS NOTED ON THE MODULE B REHEATER TUBES. THE SPRAY DISTRIBUTION DEFLECTOR ABOVE THE FLOODED DISC FAILED BECAUSE OF STRESS-CORROSION CRACKING. THE DEFLECTOR WAS REDESIGNED BY THE SYSTEM SUPPLIER.

EXTENSIVE CORROSION WAS RECENTLY DISCOVERED IN THE DUCTWORK LEADING FROM THE MODULE B ABSORBER TOWER EXHAUST ELBOW TO THE REHEAT TUBE BUNDLE. THE UTILITY HAS RECOATED THE ELBOW SEVERAL TIMES WITH A CEILCOTE LINER. AN APPLICATION PROBLEM CAUSED REPEATED FAILURE OF THE LINER. THIS PROBLEM HAS NOT BEEN FULLY RESOLVED.

1/78	A		97.0	97.0	17.6				
	B		90.9	96.9	16.5				
	SYSTEM		94.0	97.0	17.1		744	135	127

** PROBLEMS/SOLUTIONS/COMMENTS

THE FLOODED DISC SCRUBBER TANK HEADER FOR THE LIMESTONE SLURRY WAS REPAIRED AFTER BEING DAMAGED DURING THE OVERHAUL.

THE BOILER AND SCRUBBER WERE OUT OF SERVICE MOST OF JANUARY AS THE SCHEDULED OVERHAUL CONTINUED.

2/78	A		99.1	100.0	94.7				
	B		87.9	100.0	84.0				
	SYSTEM		93.5	100.0	89.4		672	642	600

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

SOME MINOR LEAK REPAIRS WERE REQUIRED DURING FEBRUARY AFTER THE TWO MONTH OVERHAUL/CLEANING WAS COMPLETED IN JANUARY.

3/78	A		100.0	74.4	100.0			
	B		98.8	74.4	98.8			
	SYSTEM		99.4	74.4	99.4	744	744	739

** PROBLEMS/SOLUTIONS/COMMENTS

ONE FORCED SHUTDOWN OCCURRED ON THE A-SIDE SCRUBBING TRAIN.

4/78	A		92.7	99.9	92.7			
	B	100.0	100.0	100.0	100.0			
	SYSTEM		96.4	100.0	96.4	720	720	694

** PROBLEMS/SOLUTIONS/COMMENTS

A MINOR LEAK REPAIR WAS NECESSARY AGAIN AFTER THE NOVEMBER-JANUARY OVERHAUL/CLEANING.

5/78	A		86.7	86.7	86.7			
	B		96.2	98.1	96.2			
	SYSTEM		91.5	92.4	91.5	744	744	680

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO SIGNIFICANT PROBLEMS REPORTED. ONLY GENERAL MAINTENANCE WAS PERFORMED ON THE SYSTEM DURING MAY.

6/78	A	100.0	100.0	100.0	100.0			
	B		99.2	100.0	99.2			
	SYSTEM		99.6	100.0	99.6	720	720	717

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO MAJOR PROBLEMS FOR THE MONTH OF JUNE.

7/78	A		99.4	99.4	99.4			
	B	100.0	100.0	100.0	100.0			
	SYSTEM		99.7	99.7	99.7	744	744	742

** PROBLEMS/SOLUTIONS/COMMENTS

ONLY ROUTINE MAINTENANCE WAS REQUIRED ON THE SCRUBBER FOR JULY.

8/78	A	100.0	100.0	100.0	100.0			
	B		95.1	95.1	95.1			
	SYSTEM		97.6	97.6	97.6	744	744	726

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS WERE NECESSARY TO PLUGGED B-SIDE REHEAT COILS. THE COILS WERE REPLACED.

9/78	A	100.0	100.0	100.0	100.0			
	B		97.8	100.0	97.8			
	SYSTEM		98.9	100.0	98.9	720	720	712

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO MAJOR PROBLEMS FOR THE MONTH OF SEPTEMBER.

10/78	A		100.0	100.0	58.4			
	B		95.9	100.0	56.0			
	SYSTEM		98.0	100.0	57.2	744	434	425

** PROBLEMS/SOLUTIONS/COMMENTS

ONLY ROUTINE MAINTENANCE WAS REQUIRED ON THE SCRUBBER IN OCTOBER.

11/78	A	100.0	100.0	100.0	100.0			
	B		91.3	100.0	91.3			
	SYSTEM		95.7	100.0	95.7	720	720	688

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO MAJOR PROBLEMS FOR THE MONTH OF NOVEMBER.

12/78	A		88.1	88.1	88.1			
	B		85.6	88.3	85.6			
	SYSTEM		86.9	88.2	86.9	744	744	646

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS REPORTED THAT THE FGD SYSTEM EXPERIENCED CONTROL PROBLEMS DURING DECEMBER.

1/79	A		99.1	99.1	99.1			
	B	100.0	100.0	100.0	100.0			
	SYSTEM		99.6	99.6	99.6	744	744	741

2/79	A	100.0	100.0	100.0	100.0			
	B	100.0	100.0	100.0	100.0			
	SYSTEM	100.0	100.0	100.0	100.0	672	672	672

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO MAJOR PROBLEMS FOR THE MONTH OF FEBRUARY.

3/79	A		95.2	95.0	95.2			
	B	100.0	100.0	100.0	100.0			
	SYSTEM		97.6	97.5	97.6	744	744	726

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS EXPERIENCED PLUGGED REHEAT TUBES. THE OLD TUBES, IN UN-SECTIONALIZED BUNDLES, WERE REPLACED WITH NEW TUBES OF SPLIT COIL CONSTRUCTION AND MADE OF 316L SS. THE NEW TYPE OF TUBES ALONG WITH BETTER MAINTENANCE PROCEDURES HAS ADDED TO THE REHEAT TUBE LIFE AND REHEATER AVAILABILITY.

4/79	A	100.0	100.0	100.0	100.0			
	B	100.0	100.0	100.0	100.0			
	SYSTEM	100.0	100.0	100.0	100.0	720	720	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO PROBLEMS FOR THE MONTH OF APRIL.

5/79	A		99.1	99.4	99.1			
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ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
	B		44.1	44.1	44.1				
	SYSTEM		71.6	71.8	71.6		744	744	533

** PROBLEMS/SOLUTIONS/COMMENTS

CORRODED DUCTWORK ON MODULE B FROM THE TOWER TO THE STACK WAS REPLACED DURING MAY.

REPAIRS WERE MADE TO THE MODULE B SCRUBBER LINING.

6/79	A		78.2	78.0	78.2				
	B	100.0	100.0	100.0	100.0				
	SYSTEM		89.1	89.0	89.1		720	720	642

** PROBLEMS/SOLUTIONS/COMMENTS

THE MODULE A ABSORBER TOWER MUNTERS PACKING WAS REPLACED DURING JUNE.

EMERGENCY MAINTENANCE WAS PERFORMED JUNE 23 ON THE MODULE A COMMON DIS-CHARGE HEADER.

7/79	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE MONTH OF JULY.

8/79	A		95.7	95.6	95.7				
	B		95.7	95.7	95.7				
	SYSTEM		95.7	95.7	95.7		744	744	712

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST GENERAL MAINTENANCE WAS PERFORMED ON THE FLOODED DISC SCRUBBER.

9/79	SYSTEM						720		
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF SEPTEMBER.

10/79	A		97.8	100.0	45.0				
	B		94.3	98.0	43.3				
	SYSTEM		96.1	99.0	44.2		744	342	328

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER ROUTINE MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.

11/79	A		77.0		77.0				
	B		98.5		98.5				
	SYSTEM		87.8		87.8		720	720	632
12/79	A		94.0		94.0				
	B		86.7		86.7				
	SYSTEM		90.4		90.4		744	744	672
1/80	A		95.5		95.5				
	B		99.1		99.1				
	SYSTEM		97.3		97.3		744	744	724 91.7
2/80	A	100.0	100.0	100.0	100.0				

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B		99.4		99.4						
	SYSTEM		99.7		99.7			696	696	694	92.1
3/80	A		99.1		99.1						
	B		93.1		93.1						
	SYSTEM		96.1		96.1			744	744	715	88.6
** PROBLEMS/SOLUTIONS/COMMENTS											
NO FORCED OUTAGES WERE REPORTED BY THE UTILITY FOR THE FIVE MONTH PERIOD OF NOVEMBER 1979 THROUGH MARCH 1980. SOME SCHEDULED OUTAGE TIME WAS REQUIRED FOR REPAIR OF THE REHEATER DUCTWORK.											
4/80	A	100.0	100.0	100.0	100.0						
	B	100.0	100.0	100.0	100.0						
	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	82.8
** PROBLEMS/SOLUTIONS/COMMENTS											
NO FGD-RELATED PROBLEMS WERE REPORTED FOR THE MONTH OF APRIL.											
5/80	A	100.0	100.0	100.0	100.0						
	B	99.2	99.2	99.2	99.2						
	SYSTEM	99.6	99.6	99.6	99.6			744	744	741	87.6
** PROBLEMS/SOLUTIONS/COMMENTS											
THE B-MODULE OUTAGE TIME IN MAY WAS CAUSED BY PROBLEMS WITH THE BOOSTER FAN.											
6/80	A	100.0	80.7	100.0	68.7						
	B	99.3	87.7	99.1	74.6						
	SYSTEM	99.7	84.2	99.6	71.7			720	613	516	67.5
** PROBLEMS/SOLUTIONS/COMMENTS											
DURING JUNE SCHEDULED MAINTENANCE WAS PERFORMED ON THE BOILER. THE SCHEDULED OUTAGE TIME WAS NECESSARY TO ACID WASH THE CONDENSERS.											
THE ONLY FGD-RELATED OUTAGE OCCURRED WHEN A BLOCK VALVE MALFUNCTIONED. THE B-MODULE WAS OUT OF SERVICE FOR FIVE HOURS.											
7/80	A	100.0	100.0	100.0	100.0						
	B	100.0	98.6	100.0	98.6						
	SYSTEM	100.0	99.3	100.0	99.3			744	744	739	95.8
** PROBLEMS/SOLUTIONS/COMMENTS											
THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME IN JULY. MODULE B WAS NOT UTILIZED FOR PART OF THE MONTH DUE TO LOW BOILER LOAD.											
8/80	SYSTEM							744			
9/80	SYSTEM							720			
** PROBLEMS/SOLUTIONS/COMMENTS											
DATA FOR THE AUGUST AND SEPTEMBER MONTHS WERE NOT AVAILABLE DUE TO PERSONNEL CHANGES.											
10/80	SYSTEM							744			
11/80	SYSTEM							720			
12/80	SYSTEM							744			

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS REPORTED THAT THE AVAILABILITY FIGURES FOR AUGUST THROUGH DECEMBER ARE NOT AVAILABLE AT THIS TIME.

DURING THE FOURTH QUARTER THE DUCTWORK DOWNSTREAM OF THE B TRAIN SCRUBBERS HAD TO BE REPLACED.

1/81	SYSTEM	744
2/81	SYSTEM	672
3/81	SYSTEM	744
4/81	SYSTEM	720
5/81	SYSTEM	744
6/81	SYSTEM	720
7/81	SYSTEM	744
8/81	SYSTEM	744
9/81	SYSTEM	720
10/81	SYSTEM	744
11/81	SYSTEM	720
12/81	SYSTEM	744
1/82	SYSTEM	744
2/82	SYSTEM	672
3/82	SYSTEM	744
4/82	SYSTEM	720
5/82	SYSTEM	744
6/82	SYSTEM	720
7/82	SYSTEM	744
8/82	SYSTEM	744
9/82	SYSTEM	720
10/82	SYSTEM	744
11/82	SYSTEM	720
12/82	SYSTEM	744
1/83	SYSTEM	744
2/83	SYSTEM	672
3/83	SYSTEM	744

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JANUARY 1981 TO MARCH 1983.

4/83	SYSTEM							720		
5/83	SYSTEM							744		
6/83	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JANUARY 1981 TO JUNE 1983.

7/83	SYSTEM							744		
8/83	SYSTEM							744		
9/83	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.

10/83	SYSTEM							744		
11/83	SYSTEM							720		
12/83	SYSTEM							744		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM							744		
2/84	SYSTEM							696		
3/84	SYSTEM							744		
4/84	SYSTEM							720		
5/84	SYSTEM							744		
6/84	SYSTEM							720		
7/84	SYSTEM							744		
8/84	SYSTEM							744		
9/84	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE	
PLANT NAME	CHOLLA	
UNIT NUMBER	2	
CITY	JOSEPH CITY	
STATE	ARIZONA	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	72.	(.167 LB/MMBTU)
SO2 EMISSION LIMITATION NG/J	430.	(1.000 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	344.	(.800 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	615	
GROSS UNIT GENERATING CAPACITY - MW	285	
NET UNIT GENERATING CAPACITY W/FGD - MW	235	
NET UNIT GENERATING CAPACITY WO/FGD - MW	250	
EQUIVALENT SCRUBBED CAPACITY - MW	285	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	519.09	(1100000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	142.2	(288 F)
STACK HEIGHT M	168.	(550 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	4.5	(14.7 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23609.	(10150 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		9650-10600
AVERAGE ASH CONTENT - %	13.50	
RANGE ASH CONTENT - %	9.7-22.5	
AVERAGE MOISTURE CONTENT %	15.00	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	.50	
RANGE SULFUR CONTENT - %	0.4-1.0	
AVERAGE CHLORIDE CONTENT - %	.02	
RANGE CHLORIDE CONTENT - %	0.01-0.04	
 *** PARTICLE CONTROL		
 ** MECHANICAL COLLECTOR		
NUMBER	2	
NUMBER OF SPARES	0	
TYPE	CYCLONE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY CU.M/S	259.5	(550000 ACFM)
INLET FLUE GAS TEMPERATURE - C	137.8	(280 F)
PARTICLE REMOVAL EFFICIENCY -%	70.0	
 ** ESP		
NUMBER	0	
TYPE	NONE	
 ** PARTICLE SCRUBBER		
NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/BOTTOM-ENTRY LIQUID DISTRIBUTION	
TRADE NAME/COMMON NAME	FLOODED DISC SCRUBBER	
SUPPLIER	RESEARCH-COTTRELL	
DIMENSIONS - FT	6.0 DIA X 45.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	MAT-REINFORCED EPOXY	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	617.4	(9800 GPM)

ARIZONA PUBLIC SERVICE: CHOLLA 2 (CONT.)

L/G RATIO	LITER/CU.M	3.3	(25.0 GAL/1000ACF)
PH CONTROL ADDITIVE		ABSORBER SLURRY	
PRESSURE DROP - KPA		5.7	(23.0 IN-H2O)
INLET GAS FLOW RATE - CU.M/S		185.0	(392000 ACFM)
INLET GAS TEMPERATURE - C		137.8	(280 F)
PARTICLE REMOVAL EFFICIENCY - %		99.0	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
A-E FIRM	EBASCO
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.70
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	75.00
ENERGY CONSUMPTION - %	5.3
CURRENT STATUS	1
COMMERCIAL START-UP	6/78
INITIAL START-UP	4/78
CONTRACT AWARDED	12/74

** DESIGN AND OPERATING PARAMETERS

OPER. & MAINT. REQUIREMENT - MANHR/DAY	40.0
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** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	4
NUMBER OF SPARES	1
GENERIC TYPE	COMBINATION TOWER
SPECIFIC TYPE	SPRAY/PACKED
TRADE NAME/COMMON TYPE	N/A
SUPPLIER	RESEARCH-COTTRELL
DIMENSIONS FT	22.0 DIA X 70.0
SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A
LINER GENERIC MATERIAL	ORGANIC
LINER SPECIFIC MATERIAL	MAT-REINFORCED EPOXY; GLASS FLAKE-FILLED POLYEST
LINER MATERIAL TRADE NAME/COMMON TYPE	COROLINE 505AR; FLAKELINE 103
GAS CONTACTING DEVICE TYPE	VERTICAL CROSS CHANNEL FIXED GRID PACKING
NUMBER OF CONTACTING ZONES	2
LIQUID RECIRCULATION RATE - LITER/S	1210. (19200 GPM)
L/G RATIO - L/CU.M	6.5 (48.9 GAL/1000 ACF)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0 (10.0 FT/S)
INLET GAS FLOW CU. M/S	184.98 (392000 ACFM)
INLET GAS TEMPERATURE - C	50.0 (122 F)
SO2 REMOVAL EFFICIENCY - %	98.0
PARTICLE REMOVAL EFFICIENCY - %	99.0

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	CYCLONIC
SPECIFIC TYPE	CYCLONIC SEPARATOR
TRADE NAME/COMMON TYPE	CYCLONIC TOWER
CONFIGURATION	VERTICAL
NUMBER OF STAGES	1
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
WASH WATER SOURCE	NONE
WASH FREQUENCY	N/A

ARIZONA PUBLIC SERVICE: CHOLLA 2 (CONT.)

** REHEATER	
NUMBER	4
NUMBER OF SPARES	1
NUMBER PER MODULE	1
GENERIC TYPE	IN-LINE
SPECIFIC TYPE	STEAM
TRADE NAME/COMMON TYPE	BARE TUBE
LOCATION	TOP OF THE ABSORBER
TEMPERATURE INCREASE - C	22.2 (40 F)
INLET FLUE GAS TEMPERATURE - C	49.4 (121 F)
OUTLET FLUE GAS TEMPERATURE - C	71.1 (160 F)
NUMBER OF HEAT EXCHANGER BANKS	3
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM
** FANS	
NUMBER	2
DESIGN	CENTRIFUGAL
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS TEMPERATURE - C	137.8 (280 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
** FANS	
NUMBER	2
DESIGN	CENTRIFUGAL
FUNCTION	BOOSTER
APPLICATION	INDUCED DRAFT
SERVICE	DRY
FLUE GAS TEMPERATURE C	71.1 (160 F)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC; CARBON STEEL (HOUSING); STAINLESS STEEL
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	MOSSER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
LINER GENERIC MATERIAL TYPE	STAINLESS STEEL
LINER SPECIFIC MATERIAL TYPE	AUSTENITIC
** DAMPERS	
NUMBER	4
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	NR
MANUFACTURER	MOSSER
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
MANUFACTURER	MOSSER
** DAMPERS	
NUMBER	4
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
MANUFACTURER	MOSSER
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER

ARIZONA PUBLIC SERVICE: CHOLLA 2 (CONT.)

MANUFACTURER	MOSSER
** DUCTWORK	
LOCATION	INLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC; ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER; INERT FLAKE-FILLED
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	6.4 (7 TPH)
PRODUCT QUALITY - % SOLIDS	25.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER FEED	2
REAGENT FEED	****
MILL SLURRY SUMP	****
SCRUBBER RECYCLE	4
SLUDGE STORAGE	****
** PUMPS	
SERVICE	NUMBER
-----	-----
SCRUBBER RECIRCULATION	12
ABSORBER RECIRCULATION	8
MILL SLURRY SUMP	****
REAGENT FEED	****
MIST ELIMINATOR WASH	****
*** SLUDGE	
MOISTURE CONTENT - % TOTAL FREE WATER	35.0
** TREATMENT	
METHOD	STABILIZATION
DEVICE	NR
PROPRIETARY PROCESS	NONE
INLET QUALITY - %	15.0
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	SCRUBBER AND ABSORBER HOLD TANK
CHEMICAL PARAMETERS	PH

ARIZONA PUBLIC SERVICE: CHOLLA 2 (CONT.)

CONTROL LEVELS

PH 4.8-5.2 IN SCRUBBER HOLD TANK; 5.9-6.2 IN ABS

** WATER BALANCE
 WATER LOOP TYPE
 MAKEUP WATER ADDITION - LITERS/S

OPEN
 7.6 (120 GPM)

** CHEMICALS AND CONSUMPTION
 FUNCTION
 NAME
 POINT OF ADDITION

ABSORBENT
 LIMESTONE
 BALL MILL

** FGD SPARE CAPACITY INDICES

SCRUBBER - % 33.3
 ABSORBER - % 33.3

** FGD SPARE COMPONENT INDICES

SCRUBBER 1.0
 ABSORBER 1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
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4/78 SYSTEM

720

5/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL SCRUBBING OPERATIONS BEGAN IN APRIL 1978. THE SCRUBBER REPORTEDLY OPERATES MOST OF THE TIME, HOWEVER, SOME PROBLEMS HAVE OCCURRED WITH VIBRATIONS THROUGHOUT THE SYSTEM.

THE EPA HAS RECENTLY GRANTED THE UTILITY AN EXTENSION FOR COMPLIANCE. FULL COMMERCIAL OPERATIONS ARE EXPECTED TO BEGIN SOMETIME AFTER MID-AUGUST. THE COMPLIANCE TEST WILL BE COMPLETED BY AUGUST 15. THE UTILITY EXPECTS TO HAVE THE FGD SYSTEM SHAKEDOWN PROBLEMS CLEARED UP BY THEN.

6/78 SYSTEM

720

7/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

SHAKEDOWN/DEBUGGING OPERATIONS ARE CONTINUING.

THE SLURRY RECYCLE PIPING HAS EXPERIENCED CONTINUAL VIBRATION PROBLEMS. THE CONTRACTOR HAS BEEN INJECTING NITROGEN GAS INTO THE LINES TO DAMPEN THE VIBRATIONS (AIR WAS NOT USED BECAUSE THE SULFITE WOULD BE OXIDIZED TO SULFATE AND RESULT IN SCALE FORMATION).

THE CORROSION RESISTANT COATING IN THE DOWNCOMER AREA IN ONE OF THE ABSORBER MODULES HAS BEEN PEELING AWAY.

8/78 SYSTEM

744

9/78 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE SLURRY RECYCLE SYSTEM COMPONENTS ARE STILL EXPERIENCING RESONANT VIBRATIONS.

THE COMPLIANCE TEST WAS PERFORMED THE WEEK OF AUGUST 7. ALTHOUGH OFFICIAL WORD HAS NOT BEEN RECEIVED BY THE UTILITY IT APPEARS THAT THE UNIT IS IN COMPLIANCE WITH RESPECT TO SO2, PARTICULATE MATTER, OPACITY AND NOX.

SHAKEDOWN/DEBUGGING OPERATIONS ARE CONTINUING.

ARIZONA PUBLIC SERVICE: CHOLLA 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
10/78	SYSTEM						744		
11/78	SYSTEM						720		
** PROBLEMS/SOLUTIONS/COMMENTS									
SHAKEDOWN DEBUGGING OPERATIONS ARE CONTINUING. SOME SCRUBBER COMPONENTS ARE STILL MANNED BY BECHTEL STAFF, ARIZONA PUBLIC SERVICE PERSONNEL ARE OPERATING MOST OF THE SYSTEM AT THIS TIME.									
12/78	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
DECEMBER-JANUARY INFORMATION IS UNAVAILABLE AT THIS TIME FOR CHOLLA 2. THE UTILITY REPORTED THAT IT WOULD SOON BE KEEPING PERFORMANCE RECORDS.									
1/79	SYSTEM						744		
2/79	SYSTEM						672		
3/79	SYSTEM						744		
4/79	SYSTEM						720		
5/79	SYSTEM						744		
6/79	SYSTEM						720		
7/79	SYSTEM						744		
8/79	SYSTEM						744		
9/79	SYSTEM						720		
10/79	SYSTEM						744		
11/79	SYSTEM						720		
12/79	SYSTEM						744		
1/80	SYSTEM						744		
2/80	SYSTEM						696		
3/80	SYSTEM						744		
4/80	SYSTEM						720		
5/80	SYSTEM						744		
6/80	SYSTEM						720		
7/80	SYSTEM						744		
8/80	SYSTEM						744		
9/80	SYSTEM						720		
10/80	SYSTEM						744		
11/80	SYSTEM						720		
12/80	SYSTEM						744		

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/81	SYSTEM							744			
2/81	SYSTEM							672			
3/81	SYSTEM							744			
4/81	SYSTEM							720			
5/81	SYSTEM							744			
6/81	SYSTEM							720			
7/81	SYSTEM							744			
8/81	SYSTEM							744			
9/81	SYSTEM							720			
10/81	SYSTEM							744			
11/81	SYSTEM							720			
12/81	SYSTEM							744			
1/82	SYSTEM							744			
2/82	SYSTEM							672			
3/82	SYSTEM							744			
4/82	SYSTEM							720			
5/82	SYSTEM							720			
6/82	SYSTEM							720			
7/82	SYSTEM							744			
8/82	SYSTEM							744			
9/82	SYSTEM							720			
10/82	SYSTEM							744			
11/82	SYSTEM							720			
12/82	SYSTEM							744			
1/83	SYSTEM							744			
2/83	SYSTEM							672			
3/83	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JANUARY 1979 TO MARCH 1983.

4/83	SYSTEM	720
5/83	SYSTEM	744
6/83	SYSTEM	720

ARIZONA PUBLIC SERVICE: CHOLLA 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JANUARY 1979 TO JUNE 1983.

7/83	SYSTEM								744	
8/83	SYSTEM								744	
9/83	SYSTEM								720	

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.

10/83	SYSTEM								744	
11/83	SYSTEM								720	
12/83	SYSTEM								744	

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM								744	
2/84	SYSTEM								696	
3/84	SYSTEM								744	
4/84	SYSTEM								720	
5/84	SYSTEM								744	
6/84	SYSTEM								720	
7/84	SYSTEM								744	
8/84	SYSTEM								744	
9/84	SYSTEM								720	

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE
PLANT NAME	CHOLLA
UNIT NUMBER	4
CITY	JOSEPH CITY
STATE	ARIZONA
REGULATORY CLASSIFICATION	A
PARTICULATE EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
SO2 EMISSION LIMITATION NG/J	***** (***** LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	965
GROSS UNIT GENERATING CAPACITY - MW	375
NET UNIT GENERATING CAPACITY W/FGD - MW	350
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	126
** UNIT DATA BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	***** (***** ACFM)
BOILER FLUE GAS TEMPERATURE C	***** (**** F)
STACK HEIGHT M	***** (**** FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	***** (***** FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	*****
AVERAGE HEAT CONTENT - J/G	23609. (10150 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****
AVERAGE ASH CONTENT - %	13.50
RANGE ASH CONTENT %	*****
AVERAGE MOISTURE CONTENT - %	15.00
RANGE MOISTURE CONTENT %	*****
AVERAGE SULFUR CONTENT - %	.50
RANGE SULFUR CONTENT - %	0.4-1.0
AVERAGE CHLORIDE CONTENT %	.02
RANGE CHLORIDE CONTENT %	0.01-0.04
*** PARTICLE CONTROL	
** ESP	
NUMBER	1
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	NONE
*** FGD SYSTEM	
** GENERAL DATA	
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
A-E FIRM	EBASCO
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	95.00
CURRENT STATUS	1
COMMERCIAL START-UP	6/81
INITIAL START-UP	3/81

ARIZONA PUBLIC SERVICE: CHOLLA 4 (CONT.)

CONTRACT AWARDED

10/77

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE
CONSTRUCTION MATERIAL SPECIFIC TYPENR
NR

** ABSORBER

NUMBER
GENERIC TYPE
SPECIFIC TYPE
TRADE NAME/COMMON TYPE
SHELL GENERIC MATERIAL
SHELL SPECIFIC MATERIAL
SHELL MATERIAL TRADE NAME/COMMON TYPE
LINER GENERIC MATERIAL
LINER SPECIFIC MATERIAL
LINER MATERIAL TRADE NAME/COMMON TYPE
SO2 REMOVAL EFFICIENCY - %1
COMBINATION TOWER
SPRAY/PACKED
N/A
NR
NR
NR
NR
NR
NR
95.0

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR
GENERIC TYPE
SPECIFIC TYPE
TRADE NAME/COMMON TYPE
CONSTRUCTION MATERIAL GENERIC TYPE
CONSTRUCTION MATERIAL SPECIFIC TYPEPRIMARY COLLECTOR
IMPINGEMENT
BAFFLE
CLOSED VANE
NR
NR

** REHEATER

GENERIC TYPE
SPECIFIC TYPE
TRADE NAME/COMMON TYPE
CONSTRUCTION MATERIAL GENERIC TYPE
CONSTRUCTION MATERIAL SPECIFIC TYPENR
NR
NR
NR
NR

** FANS

DESIGN
FUNCTION
APPLICATION
SERVICE
CONSTRUCTION MATERIAL GENERIC TYPECENTRIFUGAL
NR
FORCED DRAFT
DRY
CARBON STEEL

** DAMPERS

FUNCTION
GENERIC TYPE
SPECIFIC TYPE
CONSTRUCTION MATERIAL GENERIC TYPE
CONSTRUCTION MATERIAL SPECIFIC TYPE
LINER GENERIC MATERIAL TYPE
LINER SPECIFIC MATERIAL TYPENR
NR
NR
NR
NR
NR
NR

** DUCTWORK

SHELL GENERIC MATERIAL TYPE
SHELL SPECIFIC MATERIAL TYPE
LINER GENERIC MATERIAL TYPE
LINER SPECIFIC MATERIAL TYPENR
NR
NR
NR

** REAGENT PREPARATION EQUIPMENT

FUNCTION
DEVICE
DEVICE TYPEWET BALL MILL
COMPARTMENTED
NR

** TANKS

SERVICE

NRNUMBER

ARIZONA PUBLIC SERVICE: CHOLLA 4 (CONT.)

```

** PUMPS
   SERVICE                      NUMBER
   -----                      -
   NR                          ****

** SOLIDS CONCENTRATING/DEWATERING
   DEVICE                      NA

*** SLUDGE

** TREATMENT
   METHOD                      NA
   DEVICE                     NA
   PROPRIETARY PROCESS        NA

** DISPOSAL
   NATURE                     FINAL
   TYPE                       POND
   LOCATION                   ON-SITE
   SITE TREATMENT             NONE

** FGD SPARE CAPACITY INDICES
   ABSORBER   %               .0

** FGD SPARE COMPONENT INDICES
   ABSORBER               .0

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-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
                SO2 PART. HOURS HOURS HOURS FACTOR
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3/81  SYSTEM                      ,                      744

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** PROBLEMS/SOLUTIONS/COMMENTS

IN MARCH 1981 THE FGD SYSTEM COMMENCED OPERATIONS. THE SYSTEM OPERATED FOR APPROXIMATELY ONE WEEK BEFORE BEING TAKEN OFF LINE FOR A BEARING INSPECTION.

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4/81  SYSTEM                      720
5/81  SYSTEM                      744
6/81  SYSTEM                      720
7/81  SYSTEM                      744
8/81  SYSTEM                      744
9/81  SYSTEM                      720
10/81 SYSTEM                      744
11/81 SYSTEM                      720
12/81 SYSTEM                      744
1/82  SYSTEM                      744
2/82  SYSTEM                      672
3/82  SYSTEM                      744
4/82  SYSTEM                      720
5/82  SYSTEM                      720

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ARIZONA PUBLIC SERVICE: CHOLLA 4 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR

6/82	SYSTEM							720	
7/82	SYSTEM							744	
8/82	SYSTEM							744	
9/82	SYSTEM							720	
10/82	SYSTEM							744	
11/82	SYSTEM							720	
12/82	SYSTEM							744	
1/83	SYSTEM							744	
2/83	SYSTEM							672	
3/83	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF APRIL 1981 TO MARCH 1983.									
4/83	SYSTEM							720	
5/83	SYSTEM							744	
6/83	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF APRIL 1981 TO JUNE 1983.									
7/83	SYSTEM							744	
8/83	SYSTEM							744	
9/83	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.									
10/83	SYSTEM							744	
11/83	SYSTEM							720	
12/83	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.									
1/84	SYSTEM							744	
2/84	SYSTEM							696	
3/84	SYSTEM							744	
4/84	SYSTEM							720	
5/84	SYSTEM							744	

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
6/84	SYSTEM							720	
7/84	SYSTEM							744	
8/84	SYSTEM							744	
9/84	SYSTEM							720	

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE	
PLANT NAME	FOUR CORNERS	
UNIT NUMBER	1	
CITY	FRUITLAND	
STATE	NEW MEXICO	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	21.	(.050 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	365.	(.850 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	2085	
GROSS UNIT GENERATING CAPACITY - MW	195	
NET UNIT GENERATING CAPACITY W/FGD - MW	170	
NET UNIT GENERATING CAPACITY WO/FGD - MW	175	
EQUIVALENT SCRUBBED CAPACITY - MW	195	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	384.13	(814000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	171.1	(340 F)
STACK HEIGHT - M	76.	(250 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.3	(17.5 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	20004.	(8600 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		8500-9100
AVERAGE ASH CONTENT - %	22.00	
RANGE ASH CONTENT - %	19-25	
AVERAGE MOISTURE CONTENT %	10.80	
RANGE MOISTURE CONTENT - %	8.5-13.4	
AVERAGE SULFUR CONTENT - %	.75	
RANGE SULFUR CONTENT - %	.5-1.3	
AVERAGE CHLORIDE CONTENT - %	.03	
RANGE CHLORIDE CONTENT - %	.01-.06	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	0
TYPE	NONE

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	GE ENVIRONMENTAL SERVICES
A-E FIRM	IN-HOUSE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY %	50.00
ENERGY CONSUMPTION - %	2.6
CURRENT STATUS	1
COMMERCIAL START-UP	11/79
INITIAL START-UP	11/79
CONTRACT AWARDED	0/78

ARIZONA PUBLIC SERVICE: FOUR CORNERS 1 (CONT.)

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	1.30	
DESIGN COAL HEAT CONTENT - J/G	19771.0	(8500 BTU/LB)
DESIGN COAL ASH CONTENT - %	25.00	
DESIGN MOISTURE CONTENT - %	13.40	
DESIGN CHLORIDE CONTENT - %	.06	
SPACE REQUIREMENTS - SQ M	520.2	(5600 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	200.0	

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/TOP-ENTRY PLUMB BOB	
TRADE NAME/COMMON TYPE	N/A	
DIMENSIONS - FT	25 DIA	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER	
LINER MATERIAL TRADE NAME/COMMON TYPE	FLAKELINE 103	
GAS CONTACTING DEVICE TYPE	VENTURI THROAT [TANGENTIAL NOZZLES AT TOP & AT S	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE LITER/S	630.	(10000 GPM)
L/G RATIO L/CU.M	3.2	(24.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.5	(10.0 IN-H2O)
INLET GAS FLOW - CU. M/S	192.06	(407000 ACFM)
INLET GAS TEMPERATURE - C	171.1	(340 F)
SO2 REMOVAL EFFICIENCY - %	67.5	
PARTICLE REMOVAL EFFICIENCY %	99.5	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	6
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	FRESH [FROM LAKE]
WASH FREQUENCY	ONCE PER SHIFT

** REHEATER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON TYPE	N/A
CONSTRUCTION MATERIAL GENERIC TYPE	NONE
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A

** FANS

NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	AMERICAN STANDARD	
FUNCTION	UNIT	
APPLICATION	INDUCED DRAFT	
SERVICE	WET	
FLUE GAS FLOW RATE CU.M/S	259.54	(550000 ACFM)
FLUE GAS TEMPERATURE - C	51.7	(125 F)

ARIZONA PUBLIC SERVICE: FOUR CORNERS 1 (CONT.)

CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
** DAMPERS	
NUMBER	2
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN STANDARD
SERVICE CONDITIONS	120-130 F
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	NR
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
CONFIGURATION	CIRCULAR
DIMENSIONS	14 DIA X 90 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-283
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET [ME TO STACK]
CONFIGURATION	RECTANGULAR
DIMENSIONS	12 X 12 X 50 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-283
LINER GENERIC MATERIAL TYPE	STAINLESS STEEL
LINER SPECIFIC MATERIAL TYPE	AUSTENITIC
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	JOY
NUMBER	1
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	13.6 (15 TPH)
PRODUCT QUALITY - % SOLIDS	30.0
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
NUMBER OF SPARES	0
** TANKS	
SERVICE	NUMBER
-----	-----
BLEED STREAM	1
RECYCLE	2
MAKEUP WATER	1
RETURN TRANSFER	1
LIME SLURRY	4

ARIZONA PUBLIC SERVICE: FOUR CORNERS 1 (CONT.)

** PUMPS	
SERVICE	NUMBER
-----	-----
RECYCLE	2
RECYCLE (STANDBY)	4
BLEED STREAM TANK	****
THICKENER UNDERFLOW	4
LIME SLURRY TRANSFER	2
RETURN WATER	2
SERVICE WATER	****
ME WATER	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS FT	100
CAPACITY	1000000
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
FEED STREAM SOURCE	ABSORBER BLEED
OUTLET STREAM CHARACTERISTICS	40.0%
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	25.4 (28.0 TPH)
MOISTURE CONTENT % TOTAL FREE WATER	60.0
% CASO3 DRY	18.0
% CASO4 - DRY	5.0
% CAOH2 - DRY	1.0
% CACO3 - DRY	1.0
% ASH - DRY	75.0
% OTHER COMPOUNDS - DRY	1.0
** TREATMENT	
METHOD	NONE
DEVICE	NR
PROPRIETARY PROCESS	NR
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	70 ACRES/55 FT
SITE CAPACITY - CU.M	4708550 (3850.0 ACRE-FT)
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	SLURRY STREAM
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	% SOLIDS, FLOW, TEMPERATURE
CONTROL LEVELS	PH 6.2-7.2, 12% SOLIDS
MONITOR TYPE	PH- APS FLOW THROUGH; DENSITY- TEXAS NUCLEAR
MONITOR LOCATION	RECYCLE LOOP ON TANGENTIAL NOZZLE HEADER
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	OPEN
EVAPORATION WATER LOSS - LITER/S	6.3 (100 GPM)
SOURCE OF MAKEUP WATER	LAKE WATER

ARIZONA PUBLIC SERVICE: FOUR CORNERS 1 (CONT.)

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIME
PRINCIPAL CONSTITUENT	CAO
SOURCE/SUPPLIER	CAN AM, PAUL LIME CO.
CONSUMPTION	20 TPD
UTILIZATION - %	83.0
POINT OF ADDITION	SLAKER, ABSORBER BOTTOM

** FGD SPARE CAPACITY INDICES

ABSORBER - %	.0
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** FGD SPARE COMPONENT INDICES

ABSORBER	.0
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-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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11/79	SYSTEM						720		
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12/79	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

1/80	SYSTEM						744		
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2/80	SYSTEM						696		
------	--------	--	--	--	--	--	-----	--	--

3/80	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

4/80	SYSTEM						720		
------	--------	--	--	--	--	--	-----	--	--

5/80	SYSTEM						744		
------	--------	--	--	--	--	--	-----	--	--

6/80	SYSTEM						720		
------	--------	--	--	--	--	--	-----	--	--

** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA ARE BEING LOGGED, THE UTILITY REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.

7/80	SYSTEM						744		
------	--------	--	--	--	--	--	-----	--	--

8/80	SYSTEM						744		
------	--------	--	--	--	--	--	-----	--	--

9/80	SYSTEM						720		
------	--------	--	--	--	--	--	-----	--	--

10/80	SYSTEM						744		
-------	--------	--	--	--	--	--	-----	--	--

11/80	SYSTEM						720		
-------	--------	--	--	--	--	--	-----	--	--

12/80	SYSTEM						744		
-------	--------	--	--	--	--	--	-----	--	--

1/81	SYSTEM						744		
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2/81	SYSTEM						672		
------	--------	--	--	--	--	--	-----	--	--

3/81	SYSTEM						744		
------	--------	--	--	--	--	--	-----	--	--

4/81	SYSTEM						720		
------	--------	--	--	--	--	--	-----	--	--

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

5/81	SYSTEM							744		
6/81	SYSTEM							720		
7/81	SYSTEM							744		
8/81	SYSTEM							744		
9/81	SYSTEM							720		
10/81	SYSTEM							744		
11/81	SYSTEM							720		
12/81	SYSTEM							744		
1/82	SYSTEM							744		
2/82	SYSTEM							672		
3/82	SYSTEM							744		
4/82	SYSTEM							720		
5/82	SYSTEM							744		
6/82	SYSTEM							720		
7/82	SYSTEM							744		
8/82	SYSTEM							744		
9/82	SYSTEM							720		
10/82	SYSTEM							744		
11/82	SYSTEM							720		
12/82	SYSTEM							744		
1/83	SYSTEM							744		
2/83	SYSTEM							672		
3/83	SYSTEM							744		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1980 THROUGH MARCH 1983.

4/83	SYSTEM							720		
5/83	SYSTEM							744		
6/83	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1980 THROUGH JUNE 1983.

7/83	SYSTEM							744		
8/83	SYSTEM							744		

ARIZONA PUBLIC SERVICE: FOUR CORNERS 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 ----- SO2 PART. HOURS HOURS HOURS FACTOR -----

9/83 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.

10/83 SYSTEM 744

11/83 SYSTEM 720

12/83 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.

1/84 SYSTEM 744

2/84 SYSTEM 696

3/84 SYSTEM 744

4/84 SYSTEM 720

5/84 SYSTEM 744

6/84 SYSTEM 720

7/84 SYSTEM 744

8/84 SYSTEM 744

9/84 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE
PLANT NAME	FOUR CORNERS
UNIT NUMBER	2
CITY	FRUITLAND
STATE	NEW MEXICO
REGULATORY CLASSIFICATION	C
PARTICULATE EMISSION LIMITATION - NG/J	21. (.050 LB/MMBTU)
SO2 EMISSION LIMITATION NG/J	365. (.850 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	2085
GROSS UNIT GENERATING CAPACITY - MW	195
NET UNIT GENERATING CAPACITY W/FGD - MW	170
NET UNIT GENERATING CAPACITY WO/FGD - MW	175
EQUIVALENT SCRUBBED CAPACITY - MW	195
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	RILEY STOKER
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	384.13 (814000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	171.1 (340 F)
STACK HEIGHT M	76. (250 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	5.3 (17.5 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20004. (8600 BTU/LB)
RANGE HEAT CONTENT BTU/LB	8500-9100
AVERAGE ASH CONTENT - %	22.00
RANGE ASH CONTENT - %	19-25
AVERAGE MOISTURE CONTENT - %	10.80
RANGE MOISTURE CONTENT - %	8.5-13.4
AVERAGE SULFUR CONTENT - %	.75
RANGE SULFUR CONTENT %	.5-1.3
AVERAGE CHLORIDE CONTENT %	.03
RANGE CHLORIDE CONTENT %	.01-.06
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	0
TYPE	NONE
*** FGD SYSTEM	
** GENERAL DATA	
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	GE ENVIRONMENTAL SERVICES
A-E FIRM	IN-HOUSE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	50.00
ENERGY CONSUMPTION - %	2.6
CURRENT STATUS	1
COMMERCIAL START-UP	11/79
INITIAL START-UP	11/79
CONTRACT AWARDED	0/78

ARIZONA PUBLIC SERVICE: FOUR CORNERS 2 (CONT.)

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFER CONTENT %	1.30	
DESIGN COAL HEAT CONTENT - J/G	19771.0	(8500 BTU/LB)
DESIGN COAL ASH CONTENT - %	25.00	
DESIGN MOISTURE CONTENT - %	13.40	
DESIGN CHLORIDE CONTENT - %	.06	
SPACE REQUIREMENTS - SQ M	520.2	(5600 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	200.0	

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/TOP-ENTRY PLUMB BOB	
TRADE NAME/COMMON TYPE	N/A	
DIMENSIONS - FT	25 DIA	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER	
LINER MATERIAL TRADE NAME/COMMON TYPE	FLAKELINE 103	
GAS CONTACTING DEVICE TYPE	VENTURI THROAT [TANGENTIAL NOZZLES AT TOP & AT S	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	630.	(10000 GPM)
L/G RATIO - L/CU.M	3.2	(24.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.5	(10.0 IN-H2O)
INLET GAS FLOW - CU. M/S	192.06	(407000 ACFM)
INLET GAS TEMPERATURE - C	171.1	(340 F)
SO2 REMOVAL EFFICIENCY - %	67.5	
PARTICLE REMOVAL EFFICIENCY - %	99.5	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	6
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	FRESH [FROM LAKE]
WASH FREQUENCY	ONCE PER SHIFT

** REHEATER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON TYPE	N/A
CONSTRUCTION MATERIAL GENERIC TYPE	NONE
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A

** FANS

NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	AMERICAN STANDARD	
FUNCTION	UNIT	
APPLICATION	INDUCED DRAFT	
SERVICE	WET	
FLUE GAS FLOW RATE CU.M/S	259.54	(550000 ACFM)
FLUE GAS TEMPERATURE C	51.7	(125 F)

ARIZONA PUBLIC SERVICE: FOUR CORNERS 2 (CONT.)

CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
** DAMPERS	
NUMBER	2
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN STANDARD
SERVICE CONDITIONS	120-130 F
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	NR
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
CONFIGURATION	CIRCULAR
DIMENSIONS	14 DIA X 90 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-283
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET (ME TO STACK)
CONFIGURATION	RECTANGULAR
DIMENSIONS	12 X 12 X 50 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-283
LINER GENERIC MATERIAL TYPE	STAINLESS STEEL
LINER SPECIFIC MATERIAL TYPE	AUSTENITIC
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	JOY
NUMBER	1
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	13.6 (15 TPH)
PRODUCT QUALITY - % SOLIDS	30.0
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
NUMBER OF SPARES	0
** TANKS	
SERVICE	NUMBER
-----	-----
BLEED STREAM	1
RECYCLE	2
MAKEUP WATER	1
RETURN TRANSFER	1
LIME SLURRY	4

ARIZONA PUBLIC SERVICE: FOUR CORNERS 2 (CONT.)

** PUMPS	
SERVICE	NUMBER
-----	-----
RECYCLE	2
RECYCLE [STANDBY]	4
BLEED STREAM TANK	****
THICKENER UNDERFLOW	4
LIME SLURRY TRANSFER	2
RETURN WATER	2
SERVICE WATER	****
ME WATER	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	100
CAPACITY	1000000
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
FEED STREAM SOURCE	ABSORBER BLEED
OUTLET STREAM CHARACTERISTICS	40.0%
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	25.4 (28.0 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	60.0
% CASO3 - DRY	18.0
% CASO4 - DRY	5.0
% CAOH2 - DRY	1.0
% CACO3 - DRY	1.0
% ASH - DRY	75.0
% OTHER COMPOUNDS - DRY	1.0
** TREATMENT	
METHOD	NONE
DEVICE	NR
PROPRIETARY PROCESS	NR
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	70 ACRES/55 FT
SITE CAPACITY - CU.M	4708550 (3850.0 ACRE-FT)
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	SLURRY STREAM
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	% SOLIDS, FLOW, TEMPERATURE
CONTROL LEVELS	PH 6.2-7.2, 12% SOLIDS
MONITOR TYPE	PH- APS FLOW THROUGH; DENSITY- TEXAS NUCLEAR
MONITOR LOCATION	RECYCLE LOOP ON TANGENTIAL NOZZLE HEADER
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	OPEN
EVAPORATION WATER LOSS - LITER/S	6.3 (100 GPM)
SOURCE OF MAKEUP WATER	LAKE WATER

ARIZONA PUBLIC SERVICE: FOUR CORNERS 2 (CONT.)

** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIME
PRINCIPAL CONSTITUENT	CAO
SOURCE/SUPPLIER	CAN AM, PAUL LIME CO.
CONSUMPTION	20 TPD
UTILIZATION %	83.0
POINT OF ADDITION	SLAKER, ABSORBER BOTTOM

** FGD SPARE CAPACITY INDICES	
ABSORBER - %	.0

** FGD SPARE COMPONENT INDICES	
ABSORBER	.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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11/79	SYSTEM						720		
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12/79	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

1/80	SYSTEM						744		
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2/80	SYSTEM						696		
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3/80	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

4/80	SYSTEM						720		
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5/80	SYSTEM						744		
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6/80	SYSTEM						720		
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** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA ARE BEING LOGGED, THE UTILITY REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.

7/80	SYSTEM						744		
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8/80	SYSTEM						744		
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9/80	SYSTEM						720		
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10/80	SYSTEM						744		
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11/80	SYSTEM						720		
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12/80	SYSTEM						744		
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1/81	SYSTEM						744		
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2/81	SYSTEM						672		
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3/81	SYSTEM						744		
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4/81	SYSTEM						720		
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ARIZONA PUBLIC SERVICE: FOUR CORNERS 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/81	SYSTEM							744		
6/81	SYSTEM							720		
7/81	SYSTEM							744		
8/81	SYSTEM							744		
9/81	SYSTEM							720		
10/81	SYSTEM							744		
11/81	SYSTEM							720		
12/81	SYSTEM							744		
1/82	SYSTEM							744		
2/82	SYSTEM							672		
3/82	SYSTEM							744		
4/82	SYSTEM							720		
5/82	SYSTEM							744		
6/82	SYSTEM							720		
7/82	SYSTEM							744		
8/82	SYSTEM							744		
9/82	SYSTEM							720		
10/82	SYSTEM							744		
11/82	SYSTEM							720		
12/82	SYSTEM							744		
1/83	SYSTEM							744		
2/83	SYSTEM							672		
3/83	SYSTEM							744		
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1980 THROUGH MARCH 1983.										
4/83	SYSTEM							720		
5/83	SYSTEM							744		
6/83	SYSTEM							720		
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1980 THROUGH JUNE 1983.										
7/83	SYSTEM							744		
8/83	SYSTEM							744		

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

9/83	SYSTEM								720	
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*** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.

10/83	SYSTEM								744	
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11/83	SYSTEM								720	
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12/83	SYSTEM								744	
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*** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM								744	
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2/84	SYSTEM								696	
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3/84	SYSTEM								744	
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4/84	SYSTEM								720	
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5/84	SYSTEM								744	
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6/84	SYSTEM								720	
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7/84	SYSTEM								744	
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8/84	SYSTEM								744	
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9/84	SYSTEM								720	
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*** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

<p>COMPANY NAME PLANT NAME UNIT NUMBER CITY STATE REGULATORY CLASSIFICATION PARTICULATE EMISSION LIMITATION - NG/J SO₂ EMISSION LIMITATION - NG/J NO_x EMISSION LIMITATION - NG/J NET PLANT GENERATING CAPACITY - MW GROSS UNIT GENERATING CAPACITY - MW NET UNIT GENERATING CAPACITY W/FGD - MW NET UNIT GENERATING CAPACITY WO/FGD - MW EQUIVALENT SCRUBBED CAPACITY - MW</p> <p>** UNIT DATA - BOILER AND STACK BOILER SUPPLIER BOILER TYPE BOILER SERVICE LOAD DESIGN BOILER FLUE GAS FLOW - CU.M/S BOILER FLUE GAS TEMPERATURE - C STACK HEIGHT - M STACK SHELL STACK TOP DIAMETER - M</p> <p>** FUEL DATA FUEL TYPE FUEL GRADE AVERAGE HEAT CONTENT - J/G RANGE HEAT CONTENT - BTU/LB AVERAGE ASH CONTENT - % RANGE ASH CONTENT - % AVERAGE MOISTURE CONTENT - % RANGE MOISTURE CONTENT - % AVERAGE SULFUR CONTENT - % RANGE SULFUR CONTENT - % AVERAGE CHLORIDE CONTENT - % RANGE CHLORIDE CONTENT - %</p> <p>*** PARTICLE CONTROL</p> <p>** MECHANICAL COLLECTOR NUMBER TYPE</p> <p>** ESP NUMBER TYPE</p> <p>*** FGD SYSTEM</p> <p>** GENERAL DATA SALEABLE PRODUCT/THROWAWAY PRODUCT SO₂ REMOVAL MODE PROCESS TYPE PROCESS ADDITIVES SYSTEM SUPPLIER A-E FIRM DEVELOPMENT LEVEL NEW/RETROFIT UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - % UNIT DESIGN SO₂ REMOVAL EFFICIENCY - % CURRENT STATUS COMMERCIAL START-UP INITIAL START-UP CONTRACT AWARDED</p>	<p>ARIZONA PUBLIC SERVICE FOUR CORNERS 3 FRUITLAND NEW MEXICO C</p> <p>21. (.050 LB/MMBTU) 365. (.850 LB/MMBTU) 301. (.700 LB/MMBTU) 2085 225 196 495 225</p> <p>RILEY STOKER PULVERIZED COAL BASE 486.06 (1030000 ACFM) 171.1 (340 F) 76. (250 FT) CONCRETE ***** (***** FT)</p> <p>COAL SUBBITUMINOUS 20004. (8600 BTU/LB) 8500-9100</p> <p>22.00 19-25 10.80 8.5-13.4 .75 .5-1.3 .03 .01-.06</p> <p>0 NONE</p> <p>0 NONE</p> <p>THROWAWAY PRODUCT WET SCRUBBING LIME/ALKALINE FLYASH NONE GE ENVIRONMENTAL SERVICES IN-HOUSE FULL SCALE RETROFIT 99.50 50.00 1 11/79 11/79 0/78</p>
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ARIZONA PUBLIC SERVICE: FOUR CORNERS 3 (CONT.)

** DESIGN AND OPERATING PARAMETERS		
DESIGN COAL SULFUR CONTENT - %	1.30	
DESIGN COAL HEAT CONTENT - J/G	19771.0	(8500 BTU/LB)
DESIGN COAL ASH CONTENT - %	25.00	
DESIGN MOISTURE CONTENT - %	13.40	
DESIGN CHLORIDE CONTENT - %	.06	
SPACE REQUIREMENTS SQ M	520.2	(5600 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	200.0	
** QUENCHER/PRESATURATOR		
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** ABSORBER		
NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/TOP-ENTRY PLUMB BOB	
TRADE NAME/COMMON TYPE	N/A	
DIMENSIONS - FT	25 DIA	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER	
LINER MATERIAL TRADE NAME/COMMON TYPE	FLAKELINE 103	
GAS CONTACTING DEVICE TYPE	VENTURI THROAT [TANGENTIAL NOZZLES AT TOP & AT S	
NUMBER OF CONTACTING ZONES	1	
L/G RATIO - L/CU.M	3.2	(24.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.5	(10.0 IN-H2O)
INLET GAS TEMPERATURE - C	171.1	(340 F)
SO2 REMOVAL EFFICIENCY - %	67.5	
PARTICLE REMOVAL EFFICIENCY - %	99.5	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	2	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	6	
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	FRESH [FROM LAKE]	
WASH FREQUENCY	ONCE PER SHIFT	
** REHEATER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
CONSTRUCTION MATERIAL GENERIC TYPE	NONE	
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	AMERICAN STANDARD	
FUNCTION	NR	
APPLICATION	INDUCED DRAFT	
SERVICE	WET	
FLUE GAS TEMPERATURE - C	51.7	(125 F)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	

ARIZONA PUBLIC SERVICE: FOUR CORNERS 3 (CONT.)

** DAMPERS

NUMBER	2
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN STANDARD
SERVICE CONDITIONS	120-130 F
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

** DAMPERS

NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	NR
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

** DUCTWORK

LOCATION	INLET
CONFIGURATION	CIRCULAR
DIMENSIONS	NR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-283
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

** DUCTWORK

LOCATION	OUTLET (ME TO STACK)
CONFIGURATION	RECTANGULAR
DIMENSIONS	NR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-283
LINER GENERIC MATERIAL TYPE	STAINLESS STEEL
LINER SPECIFIC MATERIAL TYPE	AUSTENITIC

** REAGENT PREPARATION EQUIPMENT

FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	JOY
NUMBER	1
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	13.6 (15 TPH)
PRODUCT QUALITY % SOLIDS	30.0

** REAGENT PREPARATION EQUIPMENT

FUNCTION	WET BALL MILL
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
NUMBER OF SPARES	0

** TANKS

SERVICE	NUMBER
-----	-----
BLEED STREAM	1
RECYCLE	2
MAKEUP WATER	1
RETURN TRANSFER	1
LIME SLURRY	4

ARIZONA PUBLIC SERVICE: FOUR CORNERS 3 (CONT.)

** PUMPS

SERVICE	NUMBER
RECYCLE	2
RECYCLE [STANDBY]	4
BLEED STREAM TANK	****
THICKENER UNDERFLOW	4
LIME SLURRY TRANSFER	2
RETURN WATER	2
SERVICE WATER	****
ME WATER	****

** SOLIDS CONCENTRATING/DEWATERING

DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	100
CAPACITY	1000000
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
FEED STREAM SOURCE	ABSORBER BLEED
OUTLET STREAM CHARACTERISTICS	40.0%

*** SLUDGE

FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	25.4	(28.0 TPH)
MOISTURE CONTENT % TOTAL FREE WATER	60.0	
% CASO3 - DRY	18.0	
% CASO4 - DRY	5.0	
% CAOH2 - DRY	1.0	
% CACO3 - DRY	1.0	
% ASH - DRY	75.0	
% OTHER COMPOUNDS - DRY	1.0	

** TREATMENT

METHOD	NONE
DEVICE	NR
PROPRIETARY PROCESS	NR

** DISPOSAL

NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	70 ACRES/55 FT
SITE CAPACITY - CU.M	4708550 (3850.0 ACRE-FT)
SITE SERVICE LIFE - YRS	10

** PROCESS CONTROL AND INSTRUMENTATION

PROCESS STREAM	SLURRY STREAM
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	% SOLIDS, FLOW, TEMPERATURE
CONTROL LEVELS	PH 6.2-7.2, 12% SOLIDS
MONITOR TYPE	PH- APS FLOW THROUGH; DENSITY- TEXAS NUCLEAR
MONITOR LOCATION	RECYCLE LOOP ON TANGENTIAL NOZZLE HEADER
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK

** WATER BALANCE

WATER LOOP TYPE	OPEN
EVAPORATION WATER LOSS - LITER/S	6.3 (100 GPM)
SOURCE OF MAKEUP WATER	LAKE WATER

ARIZONA PUBLIC SERVICE: FOUR CORNERS 3 (CONT.)

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIME
PRINCIPAL CONSTITUENT	CAO
SOURCE/SUPPLIER	CAN AM, PAUL LIME CO.
CONSUMPTION	20 TPD
UTILIZATION - %	83.0
POINT OF ADDITION	SLAKER, ABSORBER BOTTOM

** FGD SPARE CAPACITY INDICES

ABSORBER - %	.0
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** FGD SPARE COMPONENT INDICES

ABSORBER	.0
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-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
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11/79	SYSTEM						720			
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12/79	SYSTEM						744			
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** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

1/80	SYSTEM						744			
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2/80	SYSTEM						696			
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3/80	SYSTEM						744			
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

4/80	SYSTEM						720			
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5/80	SYSTEM						744			
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6/80	SYSTEM						720			
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** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA ARE BEING LOGGED, THE UTILITY REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.

7/80	SYSTEM						744			
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8/80	SYSTEM						744			
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9/80	SYSTEM						720			
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10/80	SYSTEM						744			
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11/80	SYSTEM						720			
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12/80	SYSTEM						744			
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1/81	SYSTEM						744			
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2/81	SYSTEM						672			
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3/81	SYSTEM						744			
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4/81	SYSTEM						720			
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-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/81	SYSTEM						744			
6/81	SYSTEM						720			
7/81	SYSTEM						744			
8/81	SYSTEM						744			
9/81	SYSTEM						720			
10/81	SYSTEM						744			
11/81	SYSTEM						720			
12/81	SYSTEM						744			
1/82	SYSTEM						744			
2/82	SYSTEM						672			
3/82	SYSTEM						744			
4/82	SYSTEM						720			
5/82	SYSTEM						744			
6/82	SYSTEM						720			
7/82	SYSTEM						744			
8/82	SYSTEM						744			
9/82	SYSTEM						720			
10/82	SYSTEM						744			
11/82	SYSTEM						720			
12/82	SYSTEM						744			
1/83	SYSTEM						744			
2/83	SYSTEM						672			
3/83	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1980 THROUGH MARCH 1983.										
4/83	SYSTEM						720			
5/83	SYSTEM						744			
6/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1980 THROUGH JUNE 1983.										
7/83	SYSTEM						744			
8/83	SYSTEM						744			

ARIZONA PUBLIC SERVICE: FOUR CORNERS 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/83	SYSTEM									720
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.										
10/83	SYSTEM									744
11/83	SYSTEM									720
12/83	SYSTEM									744
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.										
1/84	SYSTEM									744
2/84	SYSTEM									696
3/84	SYSTEM									744
4/84	SYSTEM									720
5/84	SYSTEM									744
6/84	SYSTEM									720
7/84	SYSTEM									744
8/84	SYSTEM									744
9/84	SYSTEM									720
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS NOT AVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.										

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ASSOCIATED ELECTRIC
PLANT NAME	THOMAS HILL
UNIT NUMBER	3
CITY	MOBERLY
STATE	MISSOURI
REGULATORY CLASSIFICATION	B
PARTICULATE EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1150
GROSS UNIT GENERATING CAPACITY - MW	730
NET UNIT GENERATING CAPACITY W/FGD - MW	667
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	670
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	***** (***** ACFM)
BOILER FLUE GAS TEMPERATURE - C	***** (**** F)
STACK HEIGHT - M	198. (650 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	***** (***** FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	*****
AVERAGE HEAT CONTENT J/G	24423. (10500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	9600-9800
AVERAGE ASH CONTENT - %	11.20
RANGE ASH CONTENT - %	*****
AVERAGE MOISTURE CONTENT - %	14.00
RANGE MOISTURE CONTENT - %	*****
AVERAGE SULFUR CONTENT - %	4.80
RANGE SULFUR CONTENT - %	3.8-4.5
AVERAGE CHLORIDE CONTENT - %	*****
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** ESP	
NUMBER	2
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	PEABODY INTERNATIONAL
INLET FLUE GAS CAPACITY - CU.M/S	1349.6 (2860000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9 (300 F)
PARTICLE REMOVAL EFFICIENCY - %	99.7
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
*** FGD SYSTEM	
** GENERAL DATA	
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	MAG
SYSTEM SUPPLIER	M.W. KELLOGG

ASSOCIATED ELECTRIC: THOMAS HILL 3 (CONT.)

A-E FIRM	BURNS & MCDONNELL	
DEVELOPMENT LEVEL	FULL SCALE	
NEW/RETROFIT	NEW	
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00	
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	91.50	
CURRENT STATUS	1	
COMMERCIAL START-UP	12/82	
INITIAL START-UP	10/82	
CONTRACT AWARDED	2/78	
** DESIGN AND OPERATING PARAMETERS		
SPACE REQUIREMENTS - SQ M	1858.0	(20000 SQ FT)
** QUENCHER/PRESATURATOR		
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** ABSORBER		
NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN CROSSCURRENT SPRAY	
TRADE NAME/COMMON TYPE	HORIZONTAL SPRAY CHAMBER	
SUPPLIER	PULLMAN KELLOGG	
DIMENSIONS - FT	26.0 X 18.0 X 80.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	INORGANIC	
LINER SPECIFIC MATERIAL	PREFIRED BRICK/SHAPES	
LINER MATERIAL TRADE NAME/COMMON TYPE	ACID-RESISTANT BRICK [LOW H2O ABSORPTION]	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	4	
LIQUID RECIRCULATION RATE - LITER/S	2646.	(42000 GPM)
L/G RATIO L/CU.M	2.3	(17.4 GAL/1000 ACF)
GAS-SIDE PRESSURE DRDP - KPA	.4	(1.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	6.7	(22.0 FT/S)
INLET GAS FLOW - CU. M/S	1142.00	(2420000 ACFM)
INLET GAS TEMPERATURE - C	137.8	(280 F)
SO2 REMOVAL EFFICIENCY - %	92.0	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	4	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	VERTICAL	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
WASH FREQUENCY	INTERMITTENT	
** REHEATER		
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	AXIAL	
SUPPLIER	TLT-BABCOCK	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	1349.63	(2860000 ACFM)
FLUE GAS TEMPERATURE - C	148.9	(300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	

ASSOCIATED ELECTRIC: THOMAS HILL 3 (CONT.)

** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	AXIAL
SUPPLIER	WESTINGHOUSE
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	2
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	74.4 (82 TPH)
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	NR
** TANKS	
SERVICE	NUMBER
-----	-----
LIMESTONE-SLURRY STORAGE	2
MIST ELIMINATOR WASH	****
FLOCCULANT	****
THICKENER OVERFLOW	****
ABSORBER RECYCLE	****
FORCED OXIDATION	2
MILL-PRODUCT	2
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	16
WASH WATER	****
FLOCCULANT FEED	****
THICKENER UNDERFLOW	****
THICKENER OVERFLOW	****
LIMESTONE SLURRY TRANSFER	4
MILL-PRODUCT	4
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	CENTRIFUGE
NUMBER	7
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
DIMENSIONS FT	180.0 DIA

ASSOCIATED ELECTRIC: THOMAS HILL 3 (CONT.)

OUTLET STREAM CHARACTERISTICS

30% SOLIDS

*** SLUDGE

** TREATMENT

METHOD
DEVICE
PROPRIETARY PROCESS

FORCED OXIDATION
N/A
N/A

** DISPOSAL

NATURE
TYPE
SITE TRANSPORTATION METHOD
SITE TREATMENT

FINAL
LANDFILL
TRUCK
NR

** PROCESS CONTROL AND INSTRUMENTATION
MONITOR TYPE

KVB

** WATER BALANCE

WATER LOOP TYPE
MAKEUP WATER ADDITION - LITERS/S

CLOSED
48.6 (772 GPM)

** CHEMICALS AND CONSUMPTION

FUNCTION
NAME
PRINCIPAL CONSTITUENT
POINT OF ADDITION

ABSORBENT
DOLOMITIC LIME
60% CAO, 40% MGO
SLAKER

** FGD SPARE CAPACITY INDICES

ABSORBER - %

33.3

** FGD SPARE COMPONENT INDICES

ABSORBER

1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
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10/82 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT INITIAL START-UP OF THE FGD SYSTEM OCCURRED
DURING OCTOBER, 1982.

11/82 SYSTEM

720

12/82 SYSTEM

744

1/83 SYSTEM

744

2/83 SYSTEM

672

3/83 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED PROBLEMS WITH A CENTRIFUGE IN THE SLUDGE DEWATERING
PROCESS SECTION. THE INABILITY TO REDUCE THE SLUDGE SOLIDS CONTENT HAS
FORCED THE UTILITY TO OPERATE BELOW THE FULL LOAD DEMAND.

4/83 SYSTEM

720

5/83 SYSTEM

744

6/83 SYSTEM

720

ASSOCIATED ELECTRIC: THOMAS HILL 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF APRIL THROUGH JUNE 1983.

7/83	3A1	35.6	35.2		32.5				
	3A2	63.8	61.5		56.9				
	3B1	13.8	14.9		13.8				
	3B2	80.8	79.9		73.9				
	SYSTEM	64.7	63.8	63.8	59.0	744	688	439	80.6
8/83	3A1	36.7	36.8		36.7				
	3A2	51.3	51.4		51.3				
	3B1	59.3	59.4		59.3				
	3B2	50.0	50.1		50.0				
	SYSTEM	65.7	65.9	65.9	65.7	744	742	489	93.5
9/83	3A1	23.9	24.0		23.9				
	3A2	60.1	60.4		60.1				
	3B1	40.0	39.5		39.3				
	3B2	72.6	68.9		68.5				
	SYSTEM	65.5	64.2	64.2	63.9	720	717	460	91.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY ENCOUNTERED MAJOR PROBLEMS IN ATTEMPTING TO OPERATE THE DEWATERING PLANT AT REQUIRED CAPACITY FOR FULL FLUE GAS SCRUBBING. THESE PROBLEMS CENTERED AROUND THE CENTRIFUGE AND OXIDATION SYSTEM.

THE UTILITY EXPERIENCED CENTRIFUGE FAILURE WHILE DEWATERING UNDERFLOW TO THE REQUIRED SOLIDS CONCENTRATION. IN ATTEMPTS TO DUPLICATE CONDITIONS PRESENTED AT A TEST CENTRIFUGE, IT WAS DISCOVERED THAT OXIDIZED SLUDGE BELOW THE DESIGN SOLIDS CONCENTRATION TRIPS THE MACHINE ON TORQUE AND UNOXIDIZED SLUDGE BELOW THE DESIGN SOLIDS CONCENTRATION TRIPS THE MACHINE ON VIBRATION. THE UTILITY IS CONTINUING TO ADDRESS THE PROBLEM.

THE OXIDATION SYSTEM IS NOT UP TO REQUIRED CAPACITY. DURING THIS PERIOD WORK ON 2 OF 3 COMPRESSORS HAS BROUGHT UP THEIR CAPACITY, BUT PLUGGING OF THE SPARGER RINGS AND BUILD UP OF SOLIDS IN THE OXIDATION TANK CONTINUE TO ADVERSELY EFFECT THE OXIDATION CAPABILITIES. DESIGN FAILURE OF THE MIXING PADDLES HAS ALSO OCCURRED AND A TEMPORARY FIX WAS MADE. VENTING OF SOLIDS AT FULL OXIDATION RATES WITH SLURRY FLOW NEAR CAPACITY HAS ALSO BECOME A PROBLEM. VARIOUS DESIGN CHANGES ARE PROJECTED FOR THE SYSTEM DURING THE UNIT 3 FALL OUTAGE IN OCTOBER.

THE CONTINUOUS EMISSIONS MONITOR SAMPLE LINE REPLACEMENT IS NEARING COMPLETION AND SHOULD BE READY FOR TESTING IN MID-OCTOBER.

DURING THIS REPORTING PERIOD, TESTS WERE RUN ON ONE ISOLATED SCRUBBER MODULE RUNNING AT DESIGN FLOW TO DETERMINE OPERATING EFFICIENCY. RESULTS OF THESE TESTS SHOWED SOX REMOVAL RATES WITHIN DESIGN BUT ONLY WHEN LIMESTONE WAS ADDED AT A LEVEL OF OVER TWICE THE THEORETICAL STOICHIOMETRY.

10/83	3A1	22.3	39.8		21.6				
	3A2	25.9	47.5		25.9				
	3B1	53.9	97.8		53.2				
	3B2	13.4	24.6		13.4				
	SYSTEM	38.5	69.9	69.9	38.0	744	405	283	45.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OFF-LINE FROM OCTOBER 17 THROUGH THE END OF THE MONTH. PROBLEMS WITH THE DEWATERING PLANT DURING THE THIRD QUARTER WERE STILL PRESENT INTO THE FOURTH QUARTER.

ASSOCIATED ELECTRIC: THOMAS HILL 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

CARRYOVER OF SOLIDS THROUGH THE MIST ELIMINATORS CONTINUED TO BE A PROBLEM DURING OCTOBER. SLUDGE WAS BUILDING UP IN THE DUCTS AND ON THE BOTTOM OF THE STACK.

VELOCITY TESTS CONDUCTED DURING THE MONTH INDICATED ABOVE DESIGN VELOCITIES THROUGH THE MODULES. OPERATIONAL PARAMETERS WERE SET TO REDUCE VELOCITY.

DURING THE OCTOBER OUTAGE, WATER NOZZLES AND DRAINS WERE INSTALLED IN THE BREECHING DOWNSTREAM OF THE MIST ELIMINATORS AND IN THE STACK TO REDUCE SOLIDS BUILD UP.

STACK LINER DAMAGE WAS DISCOVERED TO BE THE RESULT OF CARRYOVER FROM THE FGD SYSTEM DURING THIS PERIOD. THE EXTENT OF DAMAGE IS BEING EVALUATED.

11/83	3A1	61.7	85.7		58.4				
	3A2	48.5	66.6		45.4				
	3B1	44.8	61.8		42.2				
	3B2	47.8	65.3		44.5				
	SYSTEM	67.6	93.1	93.1	63.5	720	491	457	56.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT OUTAGE CONTINUED THROUGH NOVEMBER 10, 1983.

FGD SYSTEM OUTAGE TIME DURING NOVEMBER WAS DUE PRIMARILY TO MIST ELIMINATOR CLEANING.

12/83	3A1	14.3	11.1		11.1				
	3A2	95.7	85.8		85.4				
	3B1	91.9	75.0		74.6				
	3B2	84.4	67.6		67.3				
	SYSTEM	95.4	79.8	79.8	79.5	744	741	591	81.4

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM OUTAGE TIME DURING DECEMBER WAS DUE IN PART TO MIST ELIMINATOR CLEANING.

SEVERE COLD WEATHER CONTRIBUTED TO FGD SYSTEM DOWN TIME DURING DECEMBER.

CENTRIFUGE FAILURE TO DEWATER THE SLUDGE UNDERFLOW AT THE REQUIRED SOLIDS CONCENTRATION IS STILL A PROBLEM. NEGOTIATIONS ARE UNDERWAY WITH THE CENTRIFUGE MANUFACTURER TO PLAN PERFORMANCE GUARANTEE TESTS.

MODIFICATIONS TO THE FORCED OXIDATION SYSTEM WERE MADE DURING THE FOURTH QUARTER AND HAVE IMPROVED THE ABILITY OF THE SYSTEM TO OXIDIZE SCRUBBER SLUDGE. A NUMBER OF DESIGN AND OPERATIONAL PROBLEMS ARE CONTINUOUSLY BEING ADDRESSED.

1/84	3A1	99.9	57.0		47.4				
	3A2	97.2	73.9		61.5				
	3B1	77.4	37.6		31.3				
	3B2	74.2	21.2		17.7				
	SYSTEM	100.0	63.3	63.3	52.6	744	619	392	53.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE EXTREME COLD WEATHER ADVERSELY EFFECTED BOTH BOILER AND SCRUBBER OPERATIONS.

2/84	3A1	95.1	48.0		25.5				
	3A2	66.5	53.5		28.4				

ASSOCIATED ELECTRIC: THOMAS HILL 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	3B1	67.7	60.6		32.2					
	3B2	65.0	62.3		33.1					
	SYSTEM	98.1	74.8	88.4	39.7		696	370	276	35.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OFF LINE FOR 13 DAYS DURING FEBRUARY.

3/84	3A1	73.5	68.1		65.7					
	3A2	69.2	67.8		65.4					
	3B1	81.0	50.5		48.7					
	3B2	53.4	50.3		48.6					
	SYSTEM	92.3	78.9	78.9	76.2		744	718	567	76.5
4/84	3A1	23.9	64.7		23.3					
	3A2	16.8	36.9		13.3					
	3B1	29.2	77.7		28.0					
	3B2	23.4	65.0		23.4					
	SYSTEM	31.1	81.4	81.4	29.4		720	260	212	28.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OFF LINE 19 DAYS DURING APRIL.

THE ABSORBER AND DEWATERING FACILITIES UNDERWENT REPAIRS DURING THE MONTH.

THE UTILITY IS CONTINUING TO HAVE PROBLEMS IN THEIR ATTEMPT TO OPERATE THE DEWATERING PLANT AT REQUIRED CAPACITY FOR FULL FLUE GAS SCRUBBING. THESE PROBLEMS ARE PRIMARILY DUE TO CENTRIFUGE FAILURE AND OXIDATION SYSTEM PROBLEMS.

DURING MARCH OF THIS PERIOD, M.W. KELLOGG, THE SYSTEM SUPPLIER, CONDUCTED EXTENSIVE TESTING ON THE FGD SYSTEM. THIS TESTING WAS AN ATTEMPT TO GET THE SYSTEM OPERATING AT DESIGN SO2 REMOVAL EFFICIENCIES. AT THE END OF THE QUARTER, TESTING WAS NOT COMPLETE, BUT IT WAS FOUND THAT OVER FEEDING LIMESTONE BY 2 TO 3 TIMES WOULD RAISE THE SYSTEM PH TO LEVELS THAT WOULD GIVE REMOVAL EFFICIENCIES ABOVE 90%. OPERATION AT THIS LEVEL OF UNREACTED LIMESTONE IN THE WASTE SLURRY ONLY ADDS TO DEWATERING PROBLEMS. THROUGH THE MIDDLE OF APRIL, M.W. KELLOGG CONTINUED ITS TESTING AND WILL ASSIST THE UTILITY IN A SOLUTION TO ITS PROBLEMS WITH REACTOR CHEMISTRY.

5/84	3A1	.0			.0					
	3A2	.0			.0					
	3B1	.0			.0					
	3B2	.0			.0					
	SYSTEM	.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OFF LINE ALL MONTH FOR A SCHEDULED OUTAGE.

THE MODULES WERE UNAVAILABLE DUE TO REPAIR WORK IN THE ABSORBER AND DEWATERING FACILITIES.

6/84	3A1	40.0	88.0		36.9					
	3A2	40.0	88.8		37.3					
	3B1	26.3	49.5		20.8					
	3B2	20.3	42.3		17.8					
	SYSTEM	42.2	89.5	89.5	37.6		720	302	271	33.2

ASSOCIATED ELECTRIC: THOMAS HILL 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OFF LINE UNTIL JUNE 19 FOR A SCHEDULED OUTAGE.

THE ABSORBER AND DEWATERING FACILITIES WERE BEING REPAIRED DURING JUNE.

7/84	3A1	66.3	67.1	66.3				
	3A2	73.4	74.3	73.4				
	3B1	70.4	71.2	70.4				
	3B2	67.2	68.1	67.2				
	SYSTEM	92.4	93.6	92.4	744	735	688	89.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY IS CONTINUING TO EXPERIENCE PROBLEMS IN THEIR ATTEMPT TO OPERATE THE DEWATERING PLANT AT REQUIRED CAPACITY FOR FULL FLUE GAS SCRUBBING. THOSE PROBLEMS ARE PRIMARILY DUE TO CENTRIFUGE FAILURE AND OXIDATION SYSTEM PROBLEMS.

WITH THE COMPLETION OF TESTS IN APRIL THE FGD SYSTEM SUPPLIER, M.W. KELLOGG, HAS RECOMMENDED AND WILL MAKE THE FOLLOWING MODIFICATIONS IN ATTEMPTS TO BRING THE SYSTEM UP TO DESIGN PERFORMANCE

- (1) REPLACEMENT OF REACTOR BAFFLER.
- (2) REPLACEMENT OF ALL NOZZLES WITH BETE DESIGN.
- (3) MODIFICATION OF THE RECYCLE PUMPS FOR HIGHER FLOW RATES.
- (4) INSTALL A ROUGHING DEMISTER.

THE DESCRIBED WORK IS SCHEDULED TO BEGIN AUGUST 6TH.

8/84	3A1	83.4	82.4	79.3				
	3A2	67.4	61.1	58.8				
	3B1	11.0	6.6	6.3				
	3B2	82.2	83.0	79.9				
	SYSTEM	81.3	77.7	74.8	744	716	556	86.3

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM OUTAGE TIME DURING AUGUST WAS DUE IN PART TO MODULE CLEANING.

MODULE 3B1 UNDERWENT MAJOR DESIGN MODIFICATIONS DURING AUGUST.

THE UNIT WAS DOWN DURING PART OF AUGUST DUE TO BOILER LEAKS.

FGD SYSTEM OUTAGE TIME DURING AUGUST WAS DUE IN PART TO MODULE CLEANING.

MODULE 3B1 UNDERWENT MAJOR DESIGN MODIFICATIONS DURING AUGUST.

THE UNIT WAS DOWN DURING PART OF AUGUST DUE TO BOILER TUBE LEAKS.

9/84	SYSTEM				720			
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BASIN ELECTRIC POWER
PLANT NAME	ANTELOPE VALLEY
UNIT NUMBER	1
CITY	BEULAH
STATE	NORTH DAKOTA
REGULATORY CLASSIFICATION	C
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	335. (.780 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	770
GROSS UNIT GENERATING CAPACITY - MW	440
NET UNIT GENERATING CAPACITY W/FGD - MW	385
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	440
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	969.75 (2055000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	154.4 (310 F)
STACK HEIGHT M	183. (600 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	7.0 (23.0 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	LIGNITE
AVERAGE HEAT CONTENT - J/G	15352. (6600 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	6093-7350
AVERAGE ASH CONTENT - %	7.76
RANGE ASH CONTENT - %	5.2-13.8
AVERAGE MOISTURE CONTENT %	37.00
RANGE MOISTURE CONTENT - %	30.0-42.4
AVERAGE SULFUR CONTENT - %	.68
RANGE SULFUR CONTENT - %	0.4-1.2
AVERAGE CHLORIDE CONTENT - %	.01
RANGE CHLORIDE CONTENT %	0.00-0.02
*** PARTICLE CONTROL	
** FABRIC FILTER	
NUMBER	1
SUPPLIER	WESTERN PREC. DIVISION, JOY
INLET FLUE GAS CAPACITY CU.M/S	969.8 (2055000 ACFM)
INLET FLUE GAS TEMPERATURE - C	85.0 (185 F)
PRESSURE DROP - KPA	1.0 (4.0 IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.8
TYPICAL GAS/CLOTH RATIO - M/MIN	.7 (2.2 FT/MIN)
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
*** FGD SYSTEM	
** GENERAL DATA	
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	SPRAY DRYING
PROCESS TYPE	LIME/SPRAY DRYING
SYSTEM SUPPLIER	JOY MFG/NIRO ATOMIZER
A-E FIRM	STEARNS-ROGER

BASIN ELECTRIC POWER: ANTELOPE VALLEY 1 (CONT.)

DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.80
UNIT DESIGN SO ₂ REMOVAL EFFICIENCY - %	60.00
CURRENT STATUS	1
COMMERCIAL START-UP	7/84
INITIAL START-UP	5/83
CONTRACT AWARDED	8/78

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	5	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY DRYER	
SPECIFIC TYPE	CROSSFLOW	
TRADE NAME/COMMON TYPE	ROTARY ATOMIZER	
SUPPLIER	JOY MFG/NIRO ATOMIZER	
DIMENSIONS - FT	46.0 X 36.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	ASTM A-283	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	6.	(100 GPM)
L/G RATIO - L/CU.M	.0	(.2 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	3.3	(13.3 IN-H ₂ O)
SUPERFICIAL GAS VELOCITY - M/SEC	20.4	(67.0 FT/S)
INLET GAS FLOW - CU. M/S	242.56	(514000 ACFM)
INLET GAS TEMPERATURE - C	152.8	(307 F)
SO ₂ REMOVAL EFFICIENCY %	62.0	
PARTICLE REMOVAL EFFICIENCY - %	99.8	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	NONE
GENERIC TYPE	N/A
SPECIFIC TYPE	N/A
TRADE NAME/COMMON TYPE	N/A
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** REHEATER

GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	3.2	
INLET FLUE GAS FLOW RATE - CU. M/S	31.62	(67000 ACFM)
INLET FLUE GAS TEMPERATURE - C	446.1	(835 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	

** FANS

NUMBER	4	
DESIGN	CENTRIFUGAL	
SUPPLIER	COMBUSTION ENGINEERING; CEMAX	
FUNCTION	UNIT	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS TEMPERATURE - C	85.0	(185 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	

** DAMPERS

FUNCTION	NR
GENERIC TYPE	NR

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

BASIN ELECTRIC POWER: ANTELOPE VALLEY 1 (CONT.)

SPECIFIC TYPE	NR		
CONSTRUCTION MATERIAL GENERIC TYPE	NR		
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR		
LINER GENERIC MATERIAL TYPE	NR		
LINER SPECIFIC MATERIAL TYPE	NR		
** DUCTWORK			
SHELL GENERIC MATERIAL TYPE	NR		
SHELL SPECIFIC MATERIAL TYPE	NR		
LINER GENERIC MATERIAL TYPE	NR		
LINER SPECIFIC MATERIAL TYPE	NR		
** REAGENT PREPARATION EQUIPMENT			
FUNCTION	SLAKER		
DEVICE	BALL MILL		
DEVICE TYPE	N/A		
NUMBER	1		
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	22.7	(25 TPH)	
PRODUCT QUALITY - % SOLIDS	38.0		
** REAGENT PREPARATION EQUIPMENT			
FUNCTION	SLAKER		
DEVICE	NR		
DEVICE TYPE	NR		
NUMBER	1		
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	22.7	(25 TPH)	
** TANKS			
SERVICE	NUMBER		
-----	-----		
NR	****		
** PUMPS			
SERVICE	NUMBER		
-----	-----		
NR	****		
** SOLIDS CONCENTRATING/DEWATERING			
DEVICE	NONE		
*** SLUDGE			
** TREATMENT			
METHOD	N/A		
DEVICE	N/A		
PROPRIETARY PROCESS	N/A		
** DISPOSAL			
NATURE	FINAL		
TYPE	LANDFILL		
LOCATION	OFF-SITE		
SITE TRANSPORTATION METHOD	TRUCKED		
SITE TREATMENT	NONE		
** WATER BALANCE			
WATER LOOP TYPE	OPEN		
EVAPORATION WATER LOSS - LITER/S	23.1	(366 GPM)	
MAKEUP WATER ADDITION - LITERS/S	1.4	(22 GPM)	

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR

5/83	SYSTEM							744	
6/83	SYSTEM							720	

BASIN ELECTRIC POWER: ANTELOPE VALLEY 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT INITIAL OPERATIONS COMMENCED IN MAY 1983. THE UNIT OPERATED IN A STARTUP PHASE DURING THE MONTHS OF MAY AND JUNE.

7/83	SYSTEM						744		
8/83	SYSTEM						744		
9/83	SYSTEM						720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY CONTINUED PERFORMANCE TESTING ON THE FGD SYSTEM DURING THE THIRD QUARTER OF 1983.

10/83	SYSTEM						744		
11/83	SYSTEM						720		
12/83	SYSTEM						744		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT ANTELOPE VALLEY 1 WAS STILL IN THE START-UP PHASE OF OPERATION DURING THE FOURTH QUARTER OF 1983.

1/84	SYSTEM						744		
2/84	SYSTEM						696		
3/84	SYSTEM						744		
4/84	SYSTEM						720		
5/84	SYSTEM						744		
6/84	SYSTEM						720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED TYPICAL PROBLEMS ASSOCIATED WITH START UP DURING THE PERIOD OF JANUARY THROUGH JUNE 1984.

7/84	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

COMMERCIAL OPERATION OF THE ANTELOPE VALLEY 1 FGD SYSTEM COMMENCED ON JULY 1, 1984.

8/84	SYSTEM						744		
9/84	SYSTEM						720		

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR AUGUST AND SEPTEMBER.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BASIN ELECTRIC POWER
PLANT NAME	LARAMIE RIVER
UNIT NUMBER	1
CITY	WHEATLAND
STATE	WYOMING
REGULATORY CLASSIFICATION	A
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	86. (.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1500
GROSS UNIT GENERATING CAPACITY - MW	570
NET UNIT GENERATING CAPACITY W/FGD - MW	545
NET UNIT GENERATING CAPACITY WO/FGD - MW	550
EQUIVALENT SCRUBBED CAPACITY - MW	570
 ** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1085.37 (2300000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	141.1 (286 F)
STACK HEIGHT M	183. (600 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	8.7 (28.5 FT)
 ** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	19538. (8400 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	8200-8400
AVERAGE ASH CONTENT - %	7.89
RANGE ASH CONTENT - %	5.5-6.5
AVERAGE MOISTURE CONTENT - %	28.92
RANGE MOISTURE CONTENT - %	27.0-30.0
AVERAGE SULFUR CONTENT - %	.54
RANGE SULFUR CONTENT - %	0.30-0.38
AVERAGE CHLORIDE CONTENT - %	.04
RANGE CHLORIDE CONTENT - %	0.01-0.02
 *** PARTICLE CONTROL	
 ** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
 ** ESP	
NUMBER	1
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	BABCOCK & WILCOX
INLET FLUE GAS CAPACITY - CU.M/S	1085.4 (2300000 ACFM)
INLET FLUE GAS TEMPERATURE - C	141.1 (286 F)
PRESSURE DROP - KPA	.8 (3. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.6
 ** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
 *** FGD SYSTEM	

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
A-E FIRM	BURNS & MCDONNELL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	.9
CURRENT STATUS	1
COMMERCIAL START-UP	7/80
INITIAL START-UP	7/80
CONTRACT AWARDED	1/77

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	.81	
DESIGN COAL HEAT CONTENT - J/G	18931.3	(8139 BTU/LB)
DESIGN COAL ASH CONTENT - %	7.89	
DESIGN MOISTURE CONTENT - %	28.92	
DESIGN CHLORIDE CONTENT - %	.04	
SPACE REQUIREMENTS - SQ M	2322.5	(25000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	80.0	

** QUENCHER/PRESATURATOR

NUMBER	5	
TYPE	SPRAY ZONE	
SUPPLIER	RESEARCH-COTTRELL	
INLET GAS FLOW - CU. M/S	271.34	(575000 ACFM)
INLET GAS TEMPERATURE - C	141.1	(286 F)
LIQUID RECIRCULATION RATE - LITERS/S	616.	(9770 GPM)
L/G RATIO - L/CU. M	2.3	(17.0 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	IRON BASE/NICKEL-CHROMIUM-COPPER-MOLYBDENUM	

** ABSORBER

NUMBER	5	
NUMBER OF SPARES	1	
GENERIC TYPE	COMBINATION TOWER	
SPECIFIC TYPE	SPRAY/PACKED	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	RESEARCH-COTTRELL	
DIMENSIONS FT	30.0 X 30.0 X 88.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL; HIGH ALLOY	
SHELL SPECIFIC MATERIAL	AUSTENITIC; IRON BASE/NICKEL-CHROMIUM-COPPER-MOL	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L; ALLOY 904L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	VERTICAL CROSS CHANNEL FIXED GRID PACKING	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1472.	(23372 GPM)
L/G RATIO - L/CU.M	5.3	(40.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.5	(6.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	271.34	(575000 ACFM)
INLET GAS TEMPERATURE - C	141.1	(286 F)
SO2 REMOVAL EFFICIENCY - %	95.0	
PARTICLE REMOVAL EFFICIENCY - %	60.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	5
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
PRESSURE DROP - KPA	.6	(2.6 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPROPYLENE	
WASH WATER SOURCE	COOLING TOWER BLOWDOWN	
WASH FREQUENCY	UNDER-ONCE/15 MIN; TOP-ONCE/8 HRS	
WASH RATE - L/S	18.4	(292 GAL/MIN)
** REHEATER		
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	15.0	
TEMPERATURE INCREASE - C	12.8	(23 F)
INLET FLUE GAS TEMPERATURE - C	52.8	(127 F)
OUTLET FLUE GAS TEMPERATURE - C	65.6	(150 F)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	AXIAL	
SUPPLIER	BABCOCK & WILCOX	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	542.68	(1150000 ACFM)
FLUE GAS TEMPERATURE - C	141.1	(286 F)
PRESSURE DROP KPA	7.6	(25.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	AXIAL	
SUPPLIER	BABCOCK & WILCOX	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	4	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER; LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVRE; OPPOSED BLADE MULTIL	
MANUFACTURER	FORNEY ENGINEERING	
CONSTRUCTION MATERIAL GENERIC TYPE	DRY SIDE-CARBON STEEL; WET SIDE-STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	1	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER; LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVRE; OPPOSED BLADE MULTIL	
MANUFACTURER	FORNEY ENGINEERING	
CONSTRUCTION MATERIAL GENERIC TYPE	DRY SIDE-CARBON STEEL; WET SIDE-STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER; LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVRE; OPPOSED BLADE MULTIL	

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

MANUFACTURER	FORNEY ENGINEERING
CONSTRUCTION MATERIAL GENERIC TYPE	DRY SIDE-CARBON STEEL; WET SIDE-STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	10
FUNCTION	5 CONTROL & 5 SHUT-OFF
GENERIC TYPE	LOUVER; LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVRE; OPPOSED BLADE MULTIL
MANUFACTURER	FORNEY [LOUVER]; ANDCO [GUILLotine]
CONSTRUCTION MATERIAL GENERIC TYPE	DRY SIDE-CARBON STEEL; WET SIDE-STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	5
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER; LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVRE; OPPOSED BLADE MULTIL
MANUFACTURER	FORNEY [LOUVER]; ANDCO [GUILLotine]
CONSTRUCTION MATERIAL GENERIC TYPE	DRY SIDE-CARBON STEEL; WET SIDE-STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	BYPASS
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	2
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	13.6 (15 TPH)
PRODUCT QUALITY - % SOLIDS	35.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER FEED	5
QUENCHER FEED	5
LIMESTONE SLURRY	1
RECLAIM WATER	1
CENTRATE	1
SEAL WATER	1

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER FEED	10
QUENCHER FEED	5
MILL PRODUCT	2
LIMESTONE SLURRY TRANSFER	2
MAKEUP WATER SUPPLY	1
RECLAIMED WATER	2
SEAL WATER	2
ABSORBER BLOWDOWN	2
THICKENER UNDERFLOW	9
CENTRATE	2
DEWATERING BUILDING SUMP PUMPS	4
 ** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	3
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	110.0 DIA X 10.0
CAPACITY	1000000
SHELL GENERIC MATERIAL TYPE	INORGANIC
SHELL SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED CONCRETE
FEED STREAM SOURCE	QUENCHER BLEED
FEED STREAM CHARACTERISTICS	650 GPM; 10% SOLIDS
OUTLET STREAM CHARACTERISTICS	100 GPM; 30% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	550 GPM; 0.5% SOLIDS
OUTLET STREAM DISPOSITION	TO CENTRIFUGE
OVERFLOW STREAM DISPOSITION	TO RECLAIMED WATER & THEN TO QUENCHER
 ** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	CENTRIFUGE
NUMBER	4
NUMBER OF SPARES	0
DIMENSIONS - FT	8
CAPACITY	110 GPM
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
BELT GENERIC MATERIAL TYPE	N/A
BELT SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	35% SOLIDS
OUTLET STREAM CHARACTERISTICS	70% SOLIDS
OUTLET STREAM DISPOSITION	TO PUG MILL
OVERFLOW STREAM DISPOSITION	TO CENTRATE TANK & THEN THICKENER
 *** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	.4 (.4 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	30.0
% CASO3 - DRY	8.0
% CASO4 - DRY	90.0
% CAOH2 - DRY	.0
% CACO3 - DRY	2.0
 ** TREATMENT	
METHOD	FORCED OXIDATION
DEVICE	SPARGER IN QUENCHER
PROPRIETARY PROCESS	NONE
INLET QUALITY %	10.0
 ** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	CONVEYED

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

SITE TREATMENT
 SITE DIMENSIONS
 SITE SERVICE LIFE - YRS

PVC LINING
 60-90 FT DEEP [160 ACRES TOTAL FOR DISPOSAL]
 35

** PROCESS CONTROL AND INSTRUMENTATION

PROCESS STREAM
 CHEMICAL PARAMETERS
 PHYSICAL VARIABLES
 CONTROL LEVELS
 MONITOR TYPE
 MONITOR LOCATION
 PROCESS CONTROL MANNER
 PROCESS CHEMISTRY MODE

ABSORBER FEED & QUENCHER FEED
 PH, SOLIDS, SO2 INLET, ACFM, SO2 OUTLET
 PERCENT SOLIDS; GAS FLOW
 PH 5.8-6.2 IN ABSORBER; PH 4.5-5.0 IN QUENCHER;
 GREAT LAKES [PH]; DYNASCIENCE FOR CONTROL [SO2];
 ABSORBER FEED TANK & QUENCHER; DENSITY ON PUMP
 AUTOMATIC
 FEED BACK [PH & DENSITY]

** WATER BALANCE

WATER LOOP TYPE
 EVAPORATION WATER LOSS - LITER/S
 POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S
 EFFLUENT WATER LOSS - LITERS/S
 RECEIVING WATER STREAM
 MAKEUP WATER ADDITION - LITERS/S
 SOURCE OF MAKEUP WATER

CLOSED
 23.3 (370 GPM)
 0
 .0 (0 GPM)
 N/A
 25.2 (400 GPM)
 COOLING TOWER BLOWDOWN, WELLS & GRAYROCKS RESERV

** CHEMICALS AND CONSUMPTION

FUNCTION
 NAME
 PRINCIPAL CONSTITUENT
 SOURCE/SUPPLIER
 CONSUMPTION
 UTILIZATION - %
 POINT OF ADDITION

ABSORBENT
 LIMESTONE
 95% CaCO3
 HOLLY SUGAR COMPANY
 2000 TONS/MONTH
 90.0
 BALL MILL

** FGD SPARE CAPACITY INDICES

ABSORBER - % 25.0
 MIST ELIMINATOR - % 25.0
 FAN % .0
 BALL MILL - % .0
 EFFLUENT HOLD TANK - % 25.0
 RECIRCULATION PUMP - % 25.0
 THICKENER - % 33.3
 CENTRIFUGE - % .0

** FGD SPARE COMPONENT INDICES

ABSORBER 1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
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7/80 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT BEGAN INITIAL AND COMMERCIAL OPERATIONS ON JULY 1, 1980. NO MAJOR PROBLEMS WERE REPORTED DURING STARTUP.

8/80 SYSTEM

744

9/80 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS STILL IN THE STARTUP PHASE OF OPERATIONS. NO PERFORMANCE DATA ARE CURRENTLY AVAILABLE.

10/80	A	100.0	99.7	100.0	95.0
	B	100.0	99.6	100.0	94.9

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
	C	100.0	99.7	100.0	95.0				
	D	21.5	22.6	100.0	21.5				
	E	100.0	81.4	100.0	77.5				
	SYSTEM	100.0	100.0	100.0	96.0		744	709	715 85.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MODULE D WAS DOWN FOR MAINTENANCE ON WELDS IN THE QUENCHER SECTION DUE TO CORROSION OF THE UDDEHOLM 904L. THE OUTAGE LASTED 584 HOURS.

11/80	A	100.0	57.8	100.0	46.4				
	B	100.0	96.2	100.0	77.2				
	C	100.0	72.5	100.0	58.2				
	D	1.9	2.3	100.0	1.9				
	E	100.0	98.3	100.0	78.9				
	SYSTEM	100.0	81.7	100.0	65.6		720	578	568 67.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE BOILER WAS OUT OF SERVICE APPROXIMATELY 120 HOURS DUE TO REPAIRS.

DURING THE MONTH MODULE D WAS OFF LINE 30 DAYS FOR REPAIRS.

12/80	A	19.6	21.1	100.0	19.6				
	B	100.0	94.4	100.0	87.9				
	C	100.0	96.7	100.0	90.0				
	D	75.7	81.2	100.0	75.7				
	E	100.0	100.0	100.0	93.0				
	SYSTEM	98.8	98.4	100.0	91.5		744	693	692 87.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER MODULES A AND D WERE OUT OF SERVICE FOR MAINTENANCE ON THE WELDS IN THE QUENCHER SECTION DUE TO CORROSION OF UDDEHOLM 904L.

1/81	A	.0	.0		.0				
	B	100.0	91.3	100.0	88.6				
	C	100.0	97.4	100.0	94.5				
	D	100.0	95.8	100.0	93.0				
	E	100.0	95.7	100.0	92.8				
	SYSTEM	100.0	95.0	100.0	92.2		744	722	686 97.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY MODULE A WAS UNAVAILABLE DUE TO MAINTENANCE ON WELDS IN THE QUENCHER SECTION THAT FAILED DUE TO CORROSION OF THE UDDEHOLM 904L.

2/81	A	.0	.0		.0				
	B	100.0	94.0	100.0	84.2				
	C	100.0	97.7	100.0	87.5				
	D	100.0	97.8	100.0	87.6				
	E	100.0	90.7	100.0	81.3				
	SYSTEM	100.0	95.1	100.0	85.1		672	602	572 81.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY MODULE A REMAINED OUT OF SERVICE DUE TO THE NECESSARY MAINTENANCE OF THE WELDS IN THE QUENCHER SECTION.

3/81	A	80.6	81.4	100.0	79.3				
	B	100.0	100.0	100.0	97.4				
	C	25.8	18.2	100.0	17.7				

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	D	100.0	99.7	100.0	97.2					
	E	100.0	94.5	100.0	96.0					
	SYSTEM	100.0	99.4	100.0	96.9		744	725	721	96.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULES A AND C EXPERIENCED OUTAGE TIME DUE TO MAINTENANCE ON THE WELDS IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

4/81	A	100.0	91.6	100.0	91.1					
	B	100.0	98.5	100.0	97.9					
	C	.0	.0		.0					
	D	100.0	99.9	100.0	99.3					
	E	100.0	99.4	100.0	98.9					
	SYSTEM	100.0	97.4	100.0	96.8		720	716	697	96.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL MODULE C WAS OUT OF SERVICE FOR MAINTENANCE ON THE WELDS IN THE QUENCHER SECTION DUE TO CORROSION OF THE UDDEHOLM 904L.

5/81	A	106.0	86.7	100.0	78.2					
	B	100.0	98.0	100.0	88.4					
	C	.0	.0		.0					
	D	100.0	98.3	100.0	88.7					
	E	100.0	99.3	100.0	89.6					
	SYSTEM	100.0	95.6	100.0	86.3		744	671	642	85.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY MODULE C WAS DOWN FOR MAINTENANCE ON WELDS ON THE QUENCHER SECTION DUE TO CORROSION OF THE UDDEHOLM 904L.

6/81	A	100.0	51.5	100.0	50.6					
	B	100.0	98.8	100.0	97.1					
	C	100.0	89.8	100.0	88.3					
	D	70.0	67.8	100.0	66.7					
	E	30.0	27.3	100.0	26.8					
	SYSTEM	100.0	83.8	100.0	82.4		720	708	593	63.5

** PROBLEMS/SOLUTIONS/COMMENTS

D AND E MODULES WERE TAKEN OUT OF SERVICE FOR MAINTENANCE ON THE WELDS IN THE QUENCHER SECTION. THE UDDEHOLM 904L IS CORRODING.

7/81	A	100.0	95.5	100.0	95.5					
	B	100.0	99.0	100.0	99.0					
	C	100.0	90.6	100.0	90.6					
	D	100.0	96.6	100.0	96.6					
	E	.0	.0		.0					
	SYSTEM	100.0	95.4	100.0	95.4		744	744	710	86.9

** PROBLEMS/SOLUTIONS/COMMENTS

E MODULE WAS TAKEN OUT OF SERVICE FOR MAINTENANCE ON WELDS IN THE QUENCHER SECTION. THE UDDEHOLM 904L IS CORRODING.

8/81	A	100.0	96.8	100.0	92.6					
	B	28.6	29.9	100.0	28.6					
	C	100.0	96.7	100.0	92.5					
	D	100.0	98.9	100.0	94.6					
	E	58.3	61.0	100.0	91.7					
	SYSTEM	96.7	95.8	100.0	91.7		744	711	682	83.7

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

B AND E MODULES WERE TAKEN OUT OF SERVICE FOR MAINTENANCE ON WELDS IN THE
 QUENCHER SECTION. THE UDDEHOLM 904L IS CORRODING.

9/81	A	100.0	96.2	100.0	25.7				
	B	.0	.0		.0				
	C	100.0	91.3	100.0	24.4				
	D	100.0	92.4	100.0	24.7				
	E	100.0	94.0	100.0	25.1				
	SYSTEM	100.0	94.0	100.0	25.1	720	192	181	25.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE B MODULE WAS TAKEN OUT OF SERVICE FOR MAINTENANCE ON WELDS IN THE
 QUENCHER SECTION. THE UDDEHOLM 904L IS CORRODING.

THE UNIT WAS TAKEN OUT OF SERVICE FOR AN ANNUAL OVERHAUL.

10/81	A	100.0			.0				
	B	.0			.0				
	C	100.0			.0				
	D	100.0			.0				
	E	100.0			.0				
	SYSTEM	100.0			.0	744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE UNIT WAS SHUTDOWN FOR SCHEDULED MAINTENANCE.

11/81	A	100.0	37.8	100.0	36.2				
	B	.0	.0		.0				
	C	100.0	75.7	100.0	72.4				
	D	100.0	59.2	100.0	56.6				
	E	100.0	73.1	100.0	69.9				
	SYSTEM	100.0	63.2	100.0	59.0	720	689	423	40.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER AND NOVEMBER MODULE B WAS DOWN FOR MAINTENANCE IN THE
 QUENCHER SECTION DUE TO CORROSION OF THE UDDEHOLM 904L.

12/81	A	46.8	47.1	100.0	46.8				
	B	100.0	46.0	100.0	45.7				
	C	69.1	69.5	100.0	69.1				
	D	100.0	89.7	100.0	89.1				
	E	100.0	61.1	100.0	60.7				
	SYSTEM	100.0	78.3	100.0	77.8	744	739	579	70.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER, MODULES A AND C WERE DOWN PART OF THE TIME FOR GENERAL
 MAINTENANCE.

PROBLEMS WERE ENCOUNTERED WITH THE SEAL COATING IN THE ABSORBER FEED TANK.

1/82	A	100.0	82.1	100.0	82.1				
	B	100.0	99.0	100.0	99.0				
	C	100.0	92.0	100.0	92.0				
	D	74.2	82.5	100.0	82.5				
	E	25.8	9.9	100.0	9.9				
	SYSTEM	100.0	91.4	100.0	91.4	744	744	680	85.2

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE D AND E ABSORBER FEED TANK WAS DOWN FOR SEAL COATING.

2/82	A	100.0	51.2	100.0	40.4				
	B	100.0	89.0	100.0	70.1				
	C	100.0	95.0	100.0	74.8				
	D	100.0	92.8	100.0	73.1				
	E	53.6	22.9	100.0	18.1				
	SYSTEM	100.0	82.8	100.0	69.1	672	529	465	76.2

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE E WAS OFF-LINE PART OF FEBRUARY TO MAKE REPAIRS TO THE POTENTIAL PROTECTION.

3/82	A	74.2	55.6	100.0	55.6				
	B	100.0	61.7	100.0	61.7				
	C	100.0	60.4	100.0	60.4				
	D	100.0	98.0	100.0	98.0				
	E	100.0	99.9	100.0	99.9				
	SYSTEM	100.0	93.9	100.0	93.9	744	744	699	76.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULE A WAS DOWN TO REPAIR A LEAK IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

4/82	A	50.0	65.4	100.0	25.8				
	B	76.7	100.0	100.0	71.8				
	C	76.7	100.0	100.0	74.9				
	D	50.0	65.4	100.0	47.0				
	E	80.0	100.0	100.0	76.1				
	SYSTEM	83.3	100.0	100.0	73.9	720	550	532	59.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL MODULES B, C, D, AND E WERE DOWN PART OF THE TIME TO PERFORM MAINTENANCE ON THE MIXERS AND TO INSPECT THE MODULES.

5/82	A	100.0	70.9	100.0	49.6				
	B	96.8	90.3	100.0	63.2				
	C	96.8	93.3	100.0	65.3				
	D	.0	.0		.0				
	E	100.0	72.5	100.0	50.8				
	SYSTEM	98.4	81.7	100.0	57.2	744	521	426	75.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE D WAS DOWN DURING MAY FOR GENERAL MAINTENANCE AND REPAIR.

6/82	A	100.0	56.6	100.0	39.1				
	B	100.0	92.3	100.0	63.8				
	C	100.0	84.2	100.0	58.2				
	D	.0	.0		.0				
	E	100.0	76.3	100.0	52.8				
	SYSTEM	100.0	77.3	100.0	53.5	720	498	385	56.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE MODULE D WAS OUT OF SERVICE FOR NOZZLE REPAIR IN THE QUENCHER SECTION.

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

7/82	A	64.5	30.0	100.0	27.1					
	B	71.0	58.4	100.0	52.8					
	C	93.5	86.7	100.0	78.3					
	D	67.7	61.6	100.0	55.7					
	E	100.0	95.9	100.0	86.6					
	SYSTEM	99.2	83.2	100.0	75.1			744	672	559

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY MODULES A, B AND D WERE DOWN TO REPAIR NOZZLES IN THE QUENCHER SECTION.

8/82	A	100.0	90.2	100.0	67.3					
	B	100.0	96.3	100.0	71.8					
	C	77.4	80.5	100.0	60.0					
	D	100.0	84.1	100.0	62.8					
	E	12.9	10.3	100.0	7.7					
	SYSTEM	97.6	90.4	100.0	67.4			744	555	501 68.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST MODULES C AND E WERE DOWN FOR MAINTENANCE IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

9/82	A	100.0	92.6	100.0	92.6					
	B	100.0	98.0	100.0	98.0					
	C	16.7	16.6	100.0	16.6					
	D	100.0	86.0	100.0	86.0					
	E	86.7	60.0	100.0	60.0					
	SYSTEM	100.0	88.3	100.0	88.3			720	720	636 66.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER MODULE C WAS DOWN FOR MAINTENANCE IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

10/82	A	100.0	86.1	100.0	49.9					
	B	16.1	10.2	100.0	5.9					
	C	87.1	70.5	100.0	40.8					
	D	71.0	94.2	100.0	54.6					
	E	100.0	76.3	100.0	44.2					
	SYSTEM	93.5	84.3	100.0	48.8			744	431	363 52.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MODULES B, C AND D WERE DOWN FOR MAINTENANCE IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

11/82	A	63.3	44.3	100.0	44.3					
	B	92.9	73.3	100.0	73.3					
	C	100.0	90.8	100.0	90.8					
	D	46.7	23.8	100.0	23.8					
	E	100.0	82.7	100.0	82.7					
	SYSTEM	100.0	78.7	100.0	78.7			720	720	567 56.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER MODULES A, B AND D WERE DOWN FOR MAINTENANCE ON WELDS IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

12/82	A	93.5	70.0	100.0	57.4					
	B	100.0	79.5	100.0	65.2					

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	C	100.0	32.7	100.0	26.8					
	D	100.0	43.9	100.0	36.0					
	E	96.8	57.2	100.0	46.9					
	SYSTEM	100.0	70.8	100.0	58.1		744	610	432	43.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER MODULE A WAS DOWN FOR MAINTENANCE ON THE QUENCHER TOWER MIXERS.

1/83	A	100.0	46.1	100.0	41.7					
	B	100.0	57.5	100.0	52.0					
	C	74.2	.0		.0					
	D	100.0	99.4	100.0	89.9					
	E	100.0	100.1	100.0	90.6					
	SYSTEM	100.0	75.8	100.0	68.5		744	673	510	46.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY MODULE C WAS DOWN FOR MAINTENANCE ON THE ICI ABSORBER FEED PUMP SUCTION VALVE.

2/83	A	100.0	79.2	100.0	72.9					
	B	100.0	88.6	100.0	81.5					
	C	71.4	47.1	100.0	43.3					
	D	39.3	38.5	100.0	35.4					
	E	100.0	83.5	100.0	76.8					
	SYSTEM	100.0	84.2	100.0	77.5		672	618	521	56.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY MODULE D WAS DOWN DUE TO A LEAK IN THE QUENCHER FLOOR.

3/83	A	61.3	55.3	100.0	55.3					
	B	71.0	67.0	100.0	67.0					
	C	100.0	100.0	100.0	100.0					
	D	74.2	69.0	100.0	69.0					
	E	100.0	69.7	100.0	69.7					
	SYSTEM	100.0	90.2	100.0	90.2		744	744	671	66.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MARCH.

4/83	A	99.9	78.3	100.0	60.1					
	B	69.9	58.0	100.0	44.5					
	C	99.9	92.5	100.0	71.0					
	D	99.9	81.7	100.0	62.7					
	E	33.3	8.3	100.0	6.4					
	SYSTEM	100.0	79.7	100.0	61.2		720	553	441	57.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE E WAS DOWN DURING APRIL FOR MAINTENANCE, CLEANING AND PACKING OF THE QUENCHER TOWER MIXERS.

5/83	A	41.9	97.3	100.0	40.6					
	B	41.9	94.6	100.0	39.4					
	C	41.9	92.8	100.0	38.7					
	D	41.9	98.9	100.0	41.2					
	E	.0	.0		.0					
	SYSTEM	41.9	95.9	100.0	40.0		744	310	297	80.2

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN DURING PART OF MAY FOR AN ANNUAL OUTAGE.

6/83	A	.0			.0				
	B	.0			.0				
	C	.0			.0				
	E	.0			.0				
	D	.0			.0				
	SYSTEM	.0			.0	720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

ALL MODULES WERE DOWN DURING JUNE FOR MAINTENANCE AND AN ANNUAL OVERHAUL.

7/83	A	22.6	18.5	100.0	9.8				
	B	58.1	2.8	100.0	1.5				
	C	61.3	96.4	100.0	51.2				
	D	83.9	98.4	100.0	52.3				
	E	47.8	93.6	100.0	49.7				
	SYSTEM	68.4	77.4	100.0	41.1	744	395	306	55.5

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A, B, C, D, AND E WERE DOWN FOR MAINTENANCE DURING PART OF JULY.

8/83	A	100.0	55.1	100.0	50.5				
	B	83.9	50.1	100.0	46.0				
	C	100.0	76.8	100.0	70.5				
	D	87.1	59.8	100.0	54.9				
	E	100.0	84.3	100.0	77.4				
	SYSTEM	100.0	81.5	100.0	74.8	744	683	557	56.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES B AND D WERE DOWN DURING PART OF AUGUST FOR MAINTENANCE.

9/83	A	100.0	88.1	100.0	88.1				
	B	100.0	59.5	100.0	59.5				
	C	86.7	81.0	100.0	81.0				
	C	86.7	81.0	100.0	81.0				
	D	10.0	91.0	100.0	91.0				
	E	100.0	63.7	100.0	63.7				
	SYSTEM	96.7	92.9	100.0	92.9	720	720	669	80.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS DOWN DURING PART OF SEPTEMBER FOR MAINTENANCE REQUIRED ON THE QUENCHER SECTION RESULTING FROM TOWER MIXER PROBLEMS.

10/83	A	67.7	45.8	100.0	39.5				
	B	100.0	80.6	100.0	69.5				
	C	55.0	54.0	100.0	46.6				
	D	100.0	66.9	100.0	57.7				
	E	100.0	91.9	100.0	79.3				
	SYSTEM	100.0	84.8	100.0	73.2	744	642	544	70.9

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND C WERE DOWN DURING PART OF OCTOBER FOR MAINTENANCE ON THE ABSORBER RECYCLE TANK MIXERS.

11/83	A	80.0	60.8	100.0	60.8				
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BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/83	B	100.0	69.6	100.0	69.6						
	C	100.0	97.4	100.0	97.4						
	D	43.3	34.9	100.0	34.9						
	E	100.0	83.9	100.0	83.9						
	SYSTEM	100.0	86.7	100.0	86.7			720	720	624	70.8
	A	100.0	89.0	100.0	82.4						
	B	100.0	85.3	100.0	79.0						
	C	100.0	44.7	100.0	41.4						
	D	64.5	51.6	100.0	47.8						
	E	100.0	55.4	100.0	51.3						
	SYSTEM	100.0	81.5	100.0	75.5			744	689	561	69.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING NOVEMBER AND DECEMBER 1983.

1/84	A	80.6	54.0	100.0	49.6					
	B	100.0	82.7	100.0	76.0					
	C	100.0	42.4	100.0	39.0					
	D	100.0	57.2	100.0	52.6					
	E	100.0	77.7	100.0	71.4					
	SYSTEM	100.0	78.5	100.0	72.2		744	684	537	62.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN FOR MAINTENANCE OF TANK MIXERS AND REPAIR OF A FEED PUMP.

2/84	A	89.7	71.7	100.0	66.1					
	B	100.0	51.1	100.0	47.1					
	C	13.8	13.6	100.0	12.6					
	D	100.0	80.5	100.0	74.3					
	E	100.0	86.5	100.0	79.8					
	SYSTEM	100.0	75.9	100.0	70.0		696	642	487	59.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MODULE C WAS DOWN FOR MAINTENANCE DURING FEBRUARY.

3/84	A	100.0	89.8	100.0	87.7					
	B	100.0	95.4	100.0	93.1					
	C	93.5	45.2	100.0	44.1					
	D	9.7	3.4	100.0	3.3					
	E	100.0	83.1	100.0	81.1					
	SYSTEM	100.0	79.2	100.0	77.3		744	726	575	60.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MODULE D WAS DOWN FOR MAINTENANCE DURING MARCH.

4/84	A	99.9	97.2	100.0	93.1					
	B	20.0	7.2	100.0	6.9					
	C	99.9	88.6	100.0	84.9					
	D	79.9	74.6	100.0	71.5					
	E	99.9	86.4	100.0	82.8					
	SYSTEM	99.9	88.5	100.0	84.8		720	690	611	76.3

BASIN ELECTRIC POWER: LARAMIE RIVER 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS DOWN FOR MECHANICAL MAINTENANCE DURING APRIL.

MODULE D WAS DOWN FOR MECHANICAL REVISIONS OF ABSORBER TANK MIXERS.

5/84	A	100.0	97.0	100.0	97.0				
	B	71.0	65.2	100.0	65.2				
	C	100.0	84.2	100.0	84.2				
	D	100.0	79.7	100.0	79.7				
	E	32.3	27.0	100.0	27.0				
	SYSTEM	100.0	88.3	100.0	88.3	744	744	657	67.4

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES B AND E WERE DOWN DURING MAY FOR MAINTENANCE.

6/84	A	53.3	62.2	100.0	9.9				
	B	53.3	.0		.0				
	C	46.7	83.5	100.0	13.3				
	D	100.0	79.0	100.0	12.6				
	E	46.7	92.6	100.0	14.8				
	SYSTEM	75.0	79.3	100.0	12.7	720	115	91	50.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MODULES A, C, D AND E WERE OUT FOR TANK MIXER REPAIRS.

7/84	A	.0	.0		.0				
	B	100.0	94.8	100.0	90.7				
	C	100.0	51.9	100.0	49.7				
	D	100.0	86.9	100.0	83.2				
	E	100.0	84.6	100.0	81.0				
	SYSTEM	100.0	79.6	100.0	76.1	744	712	566	58.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING JULY.

8/84	A	71.0	45.5	100.0	45.3				
	B	74.2	71.7	100.0	71.4				
	C	71.0	69.1	100.0	68.8				
	D	100.0	79.4	100.0	79.0				
	E	100.0	75.0	100.0	74.7				
	SYSTEM	100.0	85.1	100.0	84.8	744	741	631	61.3

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A,B AND C WERE DOWN DURING PART OF AUGUST FOR TANK MIXER REPAIRS.

9/84	SYSTEM					720			
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BASIN ELECTRIC POWER	
PLANT NAME	LARAMIE RIVER	
UNIT NUMBER	2	
CITY	WHEATLAND	
STATE	WYOMING	
REGULATORY CLASSIFICATION	A	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	86.	(.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1500	
GROSS UNIT GENERATING CAPACITY - MW	570	
NET UNIT GENERATING CAPACITY W/FGD - MW	500	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	570	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1321.32	(2800000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	56.1	(133 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	8.7	(28.6 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	19538.	(8400 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****	
AVERAGE ASH CONTENT - %	7.89	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	28.92	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	.54	
RANGE SULFUR CONTENT - %	0.2-0.8	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** ESP

NUMBER	1	
TYPE	COLD SIDE	
SUPPLIER	BABCOCK & WILCOX	
INLET FLUE GAS CAPACITY - CU.M/S	1085.4	(2300000 ACFM)
INLET FLUE GAS TEMPERATURE - C	141.1	(286 F)
PRESSURE DROP - KPA	.8	(3. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.6	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	RESEARCH-COTTRELL
A-E FIRM	BURNS & MCDONNELL

BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
CURRENT STATUS	1
COMMERCIAL START-UP	7/86
INITIAL START-UP	7/81
CONTRACT AWARDED	1/77
** DESIGN AND OPERATING PARAMETERS	
** QUENCHER/PRESATURATOR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** ABSORBER	
NUMBER	5
GENERIC TYPE	COMBINATION TOWER
SPECIFIC TYPE	SPRAY/PACKED
TRADE NAME/COMMON TYPE	N/A
SUPPLIER	RESEARCH-COTTRELL
DIMENSIONS - FT	30.0 X 30.0 X 88.0
SHELL GENERIC MATERIAL	STAINLESS STEEL; HIGH ALLOY
SHELL SPECIFIC MATERIAL	AUSTENITIC; IRON BASE/NICKEL-CHROMIUM-COPPER-MOL
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L; ALLOY 904L
LINER GENERIC MATERIAL	NONE
LINER SPECIFIC MATERIAL	N/A
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A
GAS CONTACTING DEVICE TYPE	VERTICAL CROSS CHANNEL FIXED GRID PACKING
NUMBER OF CONTACTING ZONES	2
DISTANCE BETWEEN GAS CONTACTING ZONES - CM	61.0 (24.0IN)
L/G RATIO L/CU.M	8.0 (60.0 GAL/1000 ACF)
SUPERFICIAL GAS VELOCITY M/SEC	3.0 (10.0 FT/S)
INLET GAS FLOW - CU. M/S	1085.37 (2300000 ACFM)
INLET GAS TEMPERATURE - C	141.1 (286 F)
SO2 REMOVAL EFFICIENCY %	90.0
PARTICLE REMOVAL EFFICIENCY - %	.0
** MIST ELIMINATOR	
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	VERTICAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	1
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** REHEATER	
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON TYPE	N/A
CONSTRUCTION MATERIAL GENERIC TYPE	NONE
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A
** FANS	
NUMBER	2
DESIGN	CENTRIFUGAL
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	AXIAL
SUPPLIER	BABCOCK & WILCOX
FUNCTION	UNIT
APPLICATION	FORCED DRAFT

BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	13.6 (15 TPH)
PRODUCT QUALITY - % SOLIDS	30.0
** TANKS	
SERVICE	NUMBER
-----	-----
NR	****
** PUMPS	
SERVICE	NUMBER
-----	-----
NR	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	3
NUMBER OF SPARES	0
DIMENSIONS FT	110.0 DIA X 10.0
SHELL GENERIC MATERIAL TYPE	INORGANIC
SHELL SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED CONCRETE
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	CENTRIFUGE
NUMBER	1
NUMBER OF SPARES	0
FEED STREAM CHARACTERISTICS	35% SOLIDS
OUTLET STREAM CHARACTERISTICS	60% SOLIDS
*** SLUDGE	
** TREATMENT	
METHOD	FORCED OXIDATION
DEVICE	OXIDATION TANK
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	CONVEYED
SITE TREATMENT	NONE
SITE SERVICE LIFE - YRS	35
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH, SOLIDS, SO2 INLET, ACFM, SO2 OUTLET
PROCESS CONTROL MANNER	AUTOMATIC

BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

** WATER BALANCE
 WATER LOOP TYPE CLOSED
 MAKEUP WATER ADDITION - LITERS/S 16.9 (269 GPM)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

7/81 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATION OF THE FGD SYSTEM BEGAN DURING JULY 1981.

8/81	A	100.0	78.2	100.0	77.6				
	B	52.4	52.8	100.0	52.4				
	C	100.0	82.3	100.0	81.7				
	D	31.9	32.2	100.0	31.9				
	E	100.0	28.8	100.0	28.6				
	SYSTEM	96.1	68.6	100.0	68.1	744	738	506	46.7

** PROBLEMS/SOLUTIONS/COMMENTS

B AND D MODULES WERE OUT OF SERVICE SO THAT BRACING WORK ON ROUND-OFF CORNERS COULD BE PERFORMED.

9/81	A	100.0	94.0	100.0	77.4				
	B	100.0	99.0	100.0	81.5				
	C	37.7	31.2	100.0	25.7				
	D	100.0	41.7	100.0	34.3				
	E	100.0	60.4	100.0	49.7				
	SYSTEM	100.0	81.6	100.0	67.2	720	593	483	55.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO PROBLEMS WITH THE FGD SYSTEM WERE ENCOUNTERED IN THE MONTH OF SEPTEMBER.

10/81	A	83.9	78.9	100.0	78.1				
	B	100.0	99.1	100.0	98.1				
	C	100.0	99.2	100.0	98.2				
	D	100.0	96.0	100.0	94.9				
	E	38.7	11.7	100.0	11.6				
	SYSTEM	100.0	96.2	100.0	95.0	744	736	708	88.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MODULES E AND A WERE OFF-LINE PART OF THE TIME FOR THE INSTALLATION OF BRACING.

11/81	A	100.0	99.9	100.0	99.9				
	B	100.0	99.9	100.0	99.9				
	C	100.0	99.9	100.0	99.9				
	D	100.0	94.0	100.0	94.0				
	E	.0	.0		.0				
	SYSTEM	100.0	98.4	100.0	98.0	720	720	708	95.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER MODULE E WAS DOWN FOR MAINTENANCE ON THE WELDS IN THE QUENCHER SECTION DUE TO CORROSION OF THE UDDEHOLM 904L.

12/81	A	100.0	90.9	100.0	73.4				
	B	100.0	94.1	100.0	76.0				
	C	100.0	94.4	100.0	76.2				
	D	20.5	25.4	100.0	20.5				

BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	E	100.0	65.6	100.0	52.9						
	SYSTEM	100.0	92.6	100.0	74.8			744	601	556	69.4

** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGE TIME DURING DECEMBER RESULTED FROM PROBLEMS WITH THE SEAL COATING IN THE ABSORBER FEED TANK. GENERAL MAINTENANCE WAS PERFORMED ON MODULE D, WHICH ALSO ACCOUNTED FOR PART OF THE OUTAGE TIME.

1/82	A	100.0	99.3	100.0	96.3						
	B	100.0	99.5	100.0	96.5						
	C	100.0	99.1	100.0	96.1						
	D	.0	.0		.0						
	E	100.0	94.7	100.0	91.8						
	SYSTEM	100.0	98.1	100.0	95.0			744	722	708	93.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE MODULE D ABSORBER FEED TANK WAS RESEALED.

2/82	A	100.0	99.8	100.0	94.7						
	B	100.0	87.6	100.0	83.1						
	C	100.0	75.7	100.0	71.8						
	D	42.9	29.6	100.0	28.1						
	E	100.0	89.2	100.0	84.6						
	SYSTEM	100.0	96.0	100.0	91.0			672	638	609	83.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE SEAL COATING OF THE D ABSORBER FEED TANK CONTINUED INTO FEBRUARY.

THE D MODULE WAS DOWN PART OF THE TIME TO MAKE REPAIRS TO THE POTENTIAL PROTECTION.

3/82	A	48.4	33.8	100.0	31.5						
	B	100.0	69.4	100.0	64.8						
	C	100.0	84.2	100.0	78.6						
	D	100.0	93.0	100.0	86.8						
	E	100.0	74.4	100.0	69.4						
	SYSTEM	100.0	89.0	100.0	83.0			744	694	616	70.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULE A WAS OFF-LINE APPROXIMATELY 384 HOURS TO RESEAL THE ABSORBER FEED TANK.

4/82	A	6.7	.0		.0						
	B	26.7	33.3	100.0	1.2						
	C	3.3	48.1	100.0	1.8						
	D	23.3	100.0	100.0	3.8						
	E	26.7	77.8	100.0	2.9						
	SYSTEM	21.7	64.8	100.0	2.4			720	27	18	1.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE MODULES WERE DOWN PART OF APRIL TO SEAL COAT THE ABSORBER FEED TANKS.

MAINTENANCE WAS PERFORMED ON THE SPRAY NOZZLES IN THE QUENCHER SECTION OF EACH MODULE.

5/82	A	93.5	53.6	100.0	50.2						
	B	100.0	78.6	100.0	73.7						
	C	.0	.0		.0						

BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	D	100.0	80.2	100.0	75.2					
	E	100.0	92.6	100.0	86.8					
	SYSTEM	98.4	76.2	100.0	71.5		744	697	532	75.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY MODULE C WAS TAKEN OFF-LINE FOR MAINTENANCE AND REPAIRS.

6/82	A	100.0	89.3	100.0	89.3					
	B	86.7	69.3	100.0	69.3					
	C	16.7	11.7	100.0	11.7					
	D	100.0	76.1	100.0	76.1					
	E	100.0	96.9	100.0	96.9					
	SYSTEM	100.0	85.8	100.0	85.8		720	720	618	66.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE MODULE C WAS OUT OF SERVICE PART OF THE TIME FOR NOZZLE REPAIR IN THE QUENCHER SECTION.

7/82	A	67.7	54.7	100.0	43.6					
	B	61.3	55.2	100.0	44.1					
	C	100.0	77.8	100.0	62.1					
	D	100.0	91.0	100.0	72.7					
	E	74.2	45.9	100.0	36.7					
	SYSTEM	100.0	81.2	100.0	64.8		744	594	482	60.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY MODULES A, B AND E WERE DOWN TO REPAIR NOZZLES IN THE QUENCHER SECTION.

8/82	A	80.6	67.0	100.0	63.9					
	B	100.0	93.9	100.0	89.5					
	C	100.0	97.4	100.0	92.8					
	D	22.6	21.7	100.0	20.6					
	E	83.9	58.0	100.0	55.2					
	SYSTEM	96.8	84.5	100.0	80.5		744	709	599	65.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST MODULES A AND D WERE DOWN FOR MAINTENANCE IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

9/82	A	100.0	98.7	100.0	94.3					
	B	100.0	99.9	100.0	95.4					
	C	36.7	38.0	100.0	36.4					
	D	63.3	61.3	100.0	58.6					
	E	.0	.0		.0					
	SYSTEM	75.0	74.5	100.0	71.2		720	688	513	46.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER MODULES C, D AND E WERE DOWN FOR MAINTENANCE IN THE QUENCHER SECTION RESULTING FROM THE CORROSION OF UDDEHOLM 904L.

10/82	A	25.8	24.5	100.0	24.4					
	B	33.7	34.2	100.0	34.0					
	C	77.4	72.5	100.0	72.2					
	D	74.2	72.7	100.0	72.4					
	E	100.0	98.9	100.0	98.5					
	SYSTEM	79.0	75.7	100.0	75.4		744	741	561	41.8

BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MODULE A WAS DOWN FOR MAINTENANCE ON WELDS IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

DURING OCTOBER MODULE D WAS DOWN FOR REPAIRS OF BRACING.

11/82	A	.0	.0		.0				
	B	63.3	33.1	100.0	22.8				
	C	100.0	97.9	100.0	67.3				
	D	100.0	63.4	100.0	43.6				
	E	100.0	93.6	100.0	64.3				
	SYSTEM	90.8	72.0	100.0	49.5	720	495	356	41.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER MODULES A AND B WERE DOWN FOR MAINTENANCE ON WELDS IN THE QUENCHER SECTION RESULTING FROM CORROSION OF THE UDDEHOLM 904L.

12/82	A	32.3	27.1	100.0	26.2				
	B	100.0	90.4	100.0	87.3				
	C	100.0	97.2	100.0	93.9				
	D	100.0	50.2	100.0	48.6				
	E	100.0	100.0	100.0	96.6				
	SYSTEM	100.0	91.2	100.0	88.2	744	719	656	68.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER MODULE A WAS DOWN FOR MAINTENANCE ON THE TOWER MIXERS AND WETTED FILM CONTACT PACKING.

1/83	A	100.0	92.2	100.0	71.6				
	B	22.6	9.4	100.0	7.3				
	C	100.0	88.1	100.0	68.4				
	D	83.9	74.2	100.0	57.7				
	E	100.0	81.2	100.0	63.1				
	SYSTEM	100.0	86.3	100.0	67.0	744	578	498	61.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY MODULE B WAS DOWN TO ROUND OFF WELDS IN THE SCRUBBER.

2/83	A	25.0	16.5	100.0	15.1				
	B	89.3	72.9	100.0	66.7				
	C	100.0	96.6	100.0	88.4				
	D	100.0	57.8	100.0	52.9				
	E	85.7	72.3	100.0	66.2				
	SYSTEM	100.0	79.0	100.0	72.3	672	615	486	53.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY MODULE A WAS DOWN DUE TO PROBLEMS WITH THE INLET ISOLATION GUILLotine DAMPER.

DURING FEBRUARY MODULE E WAS DOWN TO CLEAN THE TOWER PACKING.

3/83	A	100.0	95.4	100.0	90.3				
	B	100.0	83.7	100.0	79.2				
	C	100.0	93.9	100.0	88.8				
	D	100.0	46.6	100.0	44.1				
	E	51.6	28.8	100.0	27.2				
	SYSTEM	100.0	87.1	100.0	82.4	744	704	613	62.4

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULE E WAS DOWN FOR MAINTENANCE IN THE QUENCHER SECTION AND
 TO CLEAN THE WETTED CONTACT PACKING.

4/83	A	99.9	98.9	100.0	98.6				
	B	99.9	74.1	100.0	73.9				
	C	46.7	45.1	100.0	45.0				
	D	99.9	31.5	100.0	31.5				
	E	99.9	96.4	100.0	96.1				
	SYSTEM	100.0	86.5	100.0	86.3	720	718	621	64.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS DOWN DURING APRIL FOR A CLEANING OF THE ABSORBER PACKING
 AND GENERAL TOWER MAINTENANCE.

5/83	A	100.0	95.4	100.0	56.5				
	B	100.0	92.1	100.0	54.6				
	C	.0	.0		.0				
	D	100.0	92.3	100.0	54.7				
	E	100.0	75.4	100.0	44.7				
	SYSTEM	100.0	88.8	100.0	52.6	744	441	392	64.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS DOWN DURING MAY FOR MAINTENANCE IN THE QUENCHER SECTION.

6/83	A	100.0	100.0	100.0	100.0				
	B	100.0	76.5	100.0	76.5				
	C	13.3	8.0	100.0	8.0				
	D	100.0	85.6	100.0	85.6				
	E	100.0	81.3	100.0	81.3				
	SYSTEM	100.0	87.9	100.0	87.9	720	720	633	65.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS DOWN DURING JUNE FOR MAINTENANCE.

7/83	A	48.1	44.0	100.0	41.4				
	B	100.0	84.0	100.0	79.1				
	C	100.0	98.1	100.0	92.4				
	D	100.0	83.2	100.0	78.4				
	E	64.5	33.8	100.0	31.8				
	SYSTEM	100.0	85.8	100.0	80.8	744	701	601	57.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND E WERE DOWN DURING PART OF JULY FOR REPAIRS IN THE QUENCHER
 SECTION.

8/83	A	35.5	31.4	100.0	30.9				
	B	71.0	66.6	100.0	65.7				
	C	100.0	95.0	100.0	93.6				
	D	100.0	99.1	100.0	97.6				
	E	100.0	60.4	100.0	59.5				
	SYSTEM	100.0	88.1	100.0	86.8	744	733	646	62.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND D WERE DOWN DURING PART OF AUGUST FOR MAINTENANCE.

9/83	A	100.0	64.0	100.0	3.8				
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BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	26.7	.0		.0				
	C	100.0	98.8	100.0	5.9				
	D	73.3	100.0	100.0	6.0				
	E	100.0	99.4	100.0	5.9				
	SYSTEM	100.0	90.6	100.0	5.4		720	43	39 59.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES B AND D WERE DOWN DURING PART OF SEPTEMBER FOR MAINTENANCE ON THE QUENCHER TOWER MIXERS.

10/83	A	100.1	92.7	100.0	16.3				
	B	100.1	93.9	100.0	16.5				
	C	100.1	100.0	100.0	17.8				
	D	.0	.0		.0				
	E	100.1	80.5	100.0	14.2				
	SYSTEM	100.0	91.8	100.0	16.2		744	131	121 72.2

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE D WAS DOWN DURING PART OF OCTOBER FOR MAINTENANCE ON WELDS IN THE QUENCHER SECTION.

ABSORBER RECYCLE TANK MIXERS WERE REPAIRED AT MODULE D DURING THE MONTH.

11/83	A	100.0			.0				
	B	100.0			.0				
	C	100.0			.0				
	D	43.3			.0				
	E	46.7			.0				
	SYSTEM	97.5			.0		720	0	0 .0

12/83	A	100.0	93.3	100.0	28.0				
	B	100.0	98.7	100.0	29.6				
	C	100.0	91.0	100.0	27.3				
	D	100.0	.0		.0				
	E	41.9	.0		.0				
	SYSTEM	100.0	70.7	100.0	21.2		744	223	158 42.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN THE ENTIRE MONTH OF NOVEMBER AND MOST OF DECEMBER DUE TO LOW POWER DEMAND.

1/84	A	100.0	99.3	100.0	55.2				
	B	100.0	95.5	100.0	53.1				
	C	100.0	97.7	100.0	54.4				
	D	100.0	.0		.0				
	E	100.0	.0		.0				
	SYSTEM	100.0	73.1	100.0	40.7		744	414	303 42.9

2/84	A	100.0			.0				
	B	100.0			.0				
	C	100.0			.0				
	D	100.0			.0				
	E	100.0			.0				
	SYSTEM	100.0			.0		696	0	0 .0

3/84	A	100.0			.0				
	B	100.0			.0				
	C	100.0			.0				
	D	100.0			.0				
	E	100.0			.0				
	SYSTEM	100.0			.0		744	0	0 .0

BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER OF 1984.

4/84	A	.0			.0					
	B	.0			.0					
	C	.0			.0					
	D	.0			.0					
	E	.0			.0					
	SYSTEM	.0			.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

A UNIT OUTAGE OCCURRED DURING THE MONTH OF APRIL.

5/84	A	6.5			.0					
	B	9.7			.0					
	C	.0			.0					
	D	3.2			.0					
	E	9.7			.0					
	SYSTEM	7.3			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS DOWN FOR MAINTENANCE ON ALL ABSORBER FEED TANKS.

6/84	A	100.0	84.6	100.0	72.6					
	B	100.0	91.6	100.0	78.7					
	C	33.3	35.2	100.0	30.2					
	D	93.3	63.2	100.0	54.2					
	E	100.0	95.4	100.0	81.9					
	SYSTEM	100.0	92.5	100.0	79.4		720	618	572	77.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS DOWN FOR MECHANICAL REPAIRS DURING JUNE.

7/84	A	100.0	44.2	100.0	44.2					
	B	100.0	85.7	100.0	85.7					
	C	67.7	64.4	100.0	64.4					
	D	90.3	72.8	100.0	72.8					
	E	100.0	94.2	100.0	94.2					
	SYSTEM	100.0	90.3	100.0	90.3		744	744	672	75.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING JULY.

8/84	A	100.0	76.8	100.0	76.5					
	B	100.0	89.3	100.0	89.0					
	C	29.0	8.4	100.0	8.3					
	D	100.0	92.0	100.0	91.6					
	E	100.0	98.7	100.0	98.3					
	SYSTEM	100.0	91.3	100.0	90.9		744	741	677	70.8

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS DOWN DURING PART OF AUGUST FOR ABSORBER MIXER REPAIRS.

WELDING WAS DONE IN THE QUENCHER SECTION DURING AUGUST.

9/84	SYSTEM						720			
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BASIN ELECTRIC POWER: LARAMIE RIVER 2 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR SEPTEMBER 1984.

SECTION 13
 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BASIN ELECTRIC POWER	
PLANT NAME	LARAMIE RIVER	
UNIT NUMBER	3	
CITY	WHEATLAND	
STATE	WYOMING	
REGULATORY CLASSIFICATION	A	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	86.	(.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1500	
GROSS UNIT GENERATING CAPACITY - MW	570	
NET UNIT GENERATING CAPACITY W/FGD - MW	500	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	570	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1321.32	(2800000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	69.4	(157 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	8.7	(28.6 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT J/G	19538.	(8400 BTU/LB)
RANGE HEAT CONTENT BTU/LB		7906-8244
AVERAGE ASH CONTENT - %	7.89	
RANGE ASH CONTENT %	4.0-13.0	
AVERAGE MOISTURE CONTENT - %	28.92	
RANGE MOISTURE CONTENT - %	22.2-34.7	
AVERAGE SULFUR CONTENT - %	.54	
RANGE SULFUR CONTENT %	0.2-0.5	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	0.00-0.04	
 *** PARTICLE CONTROL		
 ** FABRIC FILTER		
NUMBER	0	
TYPE	NONE	
 ** ESP		
NUMBER	1	
TYPE	COLD SIDE	
SUPPLIER	BABCOCK & WILCOX	
INLET FLUE GAS CAPACITY - CU.M/S	1085.4	(2300000 ACFM)
INLET FLUE GAS TEMPERATURE - C	69.4	(157 F)
PRESSURE DROP - KPA	.2	(1. IN-H2O)
PARTICLE REMOVAL EFFICENCY - %	99.6	
 ** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
 *** FGD SYSTEM		

BASIN ELECTRIC POWER: LARAMIE RIVER 3 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	SPRAY DRYING
PROCESS TYPE	LIME/SPRAY DRYING
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	BURNS & MCDONNELL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	82.50
CURRENT STATUS	1
COMMERCIAL START-UP	11/82
INITIAL START-UP	11/82
CONTRACT AWARDED	10/78

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY DRYER	
SPECIFIC TYPE	NR	
TRADE NAME/COMMON TYPE	HYDRAULIC PRESSURE NOZZLE	
SUPPLIER	BABCOCK & WILCOX	
DIMENSIONS - FT	54'8"W X 46'10"H	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	0.	(0 GPM)
L/G RATIO - L/CU.M	.0	(.3 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.6	(6.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	1.5	(5.0 FT/S)
INLET GAS FLOW - CU. M/S	377.52	(800000 ACFM)
INLET GAS TEMPERATURE C	137.2	(279 F)
SO2 REMOVAL EFFICIENCY. %	85.0	
PARTICLE REMOVAL EFFICIENCY - %	99.6	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	NONE
GENERIC TYPE	N/A
SPECIFIC TYPE	N/A
TRADE NAME/COMMON TYPE	N/A
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** REHEATER

GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	3.0	
INLET FLUE GAS FLOW RATE - CU. M/S	49.93	(105800 ACFM)
INLET FLUE GAS TEMPERATURE - C	371.1	(700 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	

** FANS

DESIGN	NR
FUNCTION	NA
APPLICATION	NR
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	NA

BASIN ELECTRIC POWER: LARAMIE RIVER 3 (CONT.)

** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DAMPERS	
NUMBER	4
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	5.4 (6 TPH)
PRODUCT QUALITY - % SOLIDS	30.0
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	5.4 (6 TPH)
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	****
NR	****
REAGENT PREP PRODUCT	****
** PUMPS	
SERVICE	NUMBER
-----	-----
NR	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	N/A
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TREATMENT	NONE
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	SO2, ACFM, SOLIDS
PROCESS CONTROL MANNER	AUTOMATIC

BASIN ELECTRIC POWER: LARAMIE RIVER 3 (CONT.)

** WATER BALANCE

WATER LOOP TYPE	OPEN	
EVAPORATION WATER LOSS - LITER/S	22.9	(363 GPM)
MAKEUP WATER ADDITION - LITERS/S	4.6	(73 GPM)

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIME
CONSUMPTION	3 TPH

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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11/82	SYSTEM						720		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT INITIAL START-UP OCCURRED DURING NOVEMBER 1982.

12/82	SYSTEM						744		
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1/83	SYSTEM						744		
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2/83	SYSTEM						672		
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3/83	SYSTEM						744		
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4/83	SYSTEM						720		
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5/83	SYSTEM						744		
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6/83	SYSTEM						720		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM IS CURRENTLY BEING TESTED AND IS STILL IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

7/83	SYSTEM						744		
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8/83	SYSTEM						744		
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9/83	SYSTEM						720		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY CONTINUED PERFORMANCE TESTING ON THE FGD SYSTEM DURING THE THIRD QUARTER OF 1983.

10/83	SYSTEM						744		
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11/83	SYSTEM						720		
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12/83	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT LARAMIE RIVER 3 DID NOT OPERATE DURING THE FOURTH QUARTER DUE TO MAJOR DESIGN MODIFICATIONS OF THE SPRAY DRYER AND SLURRY PREPARATION SECTIONS.

1/84	SYSTEM						744		
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2/84	SYSTEM						696		
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3/84	SYSTEM						744		
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

BASIN ELECTRIC POWER: LARAMIE RIVER 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/84	SYSTEM						720			
5/84	SYSTEM						744			
6/84	SYSTEM						720			
7/84	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT THE FGD SYSTEM WAS DOWN DURING THE PERIOD OF JANUARY THROUGH JULY, 1984 DUE TO A CONTINUATION OF MAJOR DESIGN MODIFICATIONS IN THE SPRAY DRYER AND THE SLURRY PREPARATION SYSTEM.										
8/84	SYSTEM						744			
9/84	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.										

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BIG RIVERS ELECTRIC
PLANT NAME	D.B. WILSON
UNIT NUMBER	1
CITY	CENTERTOWN
STATE	KENTUCKY
REGULATORY CLASSIFICATION	A
PARTICULATE EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	880
GROSS UNIT GENERATING CAPACITY - MW	440
NET UNIT GENERATING CAPACITY W/FGD - MW	495
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	440

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	FOSTER WHEELER
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	***** (***** ACFM)
BOILER FLUE GAS TEMPERATURE - C	***** (**** F)
STACK HEIGHT - M	***** (**** FT)
STACK SHELL	NR
STACK TOP DIAMETER - M	***** (***** FT)

** FUEL DATA

FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	***** (***** BTU/LB)
RANGE HEAT CONTENT - BTU/LB	9600-11600
AVERAGE ASH CONTENT - %	*****
RANGE ASH CONTENT - %	15.0-25.0
AVERAGE MOISTURE CONTENT - %	*****
RANGE MOISTURE CONTENT - %	8.0-14.0
AVERAGE SULFUR CONTENT - %	3.75
RANGE SULFUR CONTENT - %	2.5-5.0
AVERAGE CHLORIDE CONTENT - %	*****
RANGE CHLORIDE CONTENT - %	*****

*** PARTICLE CONTROL

** ESP

NUMBER	2
TYPE	COLD SIDE
SUPPLIER	BUELL DIVISION, ENVIROTECH
INLET FLUE GAS CAPACITY - CU.M/S	412.9 (875000 ACFM)
INLET FLUE GAS TEMPERATURE - C	162.8 (325 F)

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	M.W. KELLOGG
A-E FIRM	BURNS & ROE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

BIG RIVERS ELECTRIC: D.B. WILSON 1 (CONT.)

CURRENT STATUS	1
COMMERCIAL START-UP	9/84
INITIAL START-UP	9/84
CONTRACT AWARDED	8/80
** DESIGN AND OPERATING PARAMETERS	
** QUENCHER/PRESATURATOR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** ABSORBER	
NUMBER	3
GENERIC TYPE	SPRAY TOWER
SPECIFIC TYPE	OPEN CROSSCURRENT SPRAY
TRADE NAME/COMMON TYPE	HORIZONTAL SPRAY CHAMBER
SHELL GENERIC MATERIAL	NR
SHELL SPECIFIC MATERIAL	NR
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR
LINER GENERIC MATERIAL	NR
LINER SPECIFIC MATERIAL	NR
LINER MATERIAL TRADE NAME/COMMON TYPE	NR
GAS CONTACTING DEVICE TYPE	NONE
** MIST ELIMINATOR	
PRE-MIST ELIMINATOR/MIST ELIMINATOR	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** REHEATER	
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
DESIGN	NR
FUNCTION	NA
APPLICATION	NR
SERVICE	NA
CONSTRUCTION MATERIAL GENERIC TYPE	NA
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	NA
DEVICE TYPE	NA
** TANKS	
SERVICE	NUMBER
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NR	****

BIG RIVERS ELECTRIC: D.B. WILSON 1 (CONT.)

** PUMPS	
SERVICE	NUMBER
-----	-----
NR	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NA
*** SLUDGE	
** TREATMENT	
METHOD	FORCED OXIDATION
DEVICE	NA
PROPRIETARY PROCESS	NA
** DISPOSAL	
NATURE	NA
TYPE	NA
SITE TREATMENT	NA

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	FACTOR

9/84	SYSTEM								720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT INITIAL START-UP OF THE FGD SYSTEM COMMENCED IN SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BIG RIVERS ELECTRIC
PLANT NAME	GREEN
UNIT NUMBER	1
CITY	SEBREE
STATE	KENTUCKY
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	444
GROSS UNIT GENERATING CAPACITY - MW	242
NET UNIT GENERATING CAPACITY W/FGD - MW	222
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	242
 ** UNIT DATA BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	471.90 (1000000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9 (300 F)
STACK HEIGHT - M	107. (350 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	4.6 (15.0 FT)
 ** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	22795. (9800 BTU/LB)
RANGE HEAT CONTENT BTU/LB	8200-11800
AVERAGE ASH CONTENT - %	15.38
RANGE ASH CONTENT - %	9.6-27.5
AVERAGE MOISTURE CONTENT - %	11.40
RANGE MOISTURE CONTENT - %	5.3-20.1
AVERAGE SULFUR CONTENT %	3.91
RANGE SULFUR CONTENT - %	2.0-6.0
AVERAGE CHLORIDE CONTENT - %	.05
RANGE CHLORIDE CONTENT - %	UNKNOWN
 *** PARTICLE CONTROL	
 ** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
 ** ESP	
NUMBER	2
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	AMERICAN AIR FILTER
INLET FLUE GAS CAPACITY - CU.M/S	235.9 (500000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9 (300 F)
PRESSURE DROP KPA	.3 (1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.6
 ** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
 *** FGD SYSTEM	

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	MAG
SYSTEM SUPPLIER	AMERICAN AIR FILTER
A-E FIRM	BURNS & ROE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
CURRENT STATUS	1
COMMERCIAL START-UP	12/79
INITIAL START-UP	12/79
CONTRACT AWARDED	10/76

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	23260.0	(10000 BTU/LB)
DESIGN COAL ASH CONTENT - %	20.00	
DESIGN MOISTURE CONTENT - %	11.25	
DESIGN CHLORIDE CONTENT - %	.05	
SPACE REQUIREMENTS - SQ M	10869.3	(117000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	272.0	

** QUENCHER/PRESATURATOR

NUMBER	0
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	AMERICAN AIR FILTER	
DIMENSIONS - FT	34 X 71.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	MASTIC	
LINER MATERIAL TRADE NAME/COMMON TYPE	PENNGUARD ADHESIVE	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1008.	(16000 GPM)
L/G RATIO - L/CU.M	4.3	(32.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP KPA	.4	(1.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.8	(9.2 FT/S)
INLET GAS FLOW - CU. M/S	235.95	(500000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
SO2 REMOVAL EFFICIENCY - %	90.0	

** REHEATER

NUMBER	1	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	EXTERNAL STEAM HEAT EXCHANGER	
TRADE NAME/COMMON TYPE	FIN TUBE BUNDLE	
LOCATION	HEATED AIR INJECTED INTO BYPASS DUCT	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	13.9	(25 F)
INLET FLUE GAS FLOW RATE - CU. M/S	75.50	(160000 ACFM)
INLET FLUE GAS TEMPERATURE - C	-9.4	(15 F)
OUTLET FLUE GAS FLOW RATE - CU. M/S	120.81	(256000 ACFM)
OUTLET FLUE GAS TEMPERATURE - C	148.9	(300 F)
NUMBER OF HEAT EXCHANGER BANKS	3	
NUMBER OF BUNDLES PER BANK	6	

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

NUMBER OF TUBES PER BUNDLE	20
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	274.80 (582330 ACFM)
FLUE GAS TEMPERATURE - C	148.9 (300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	UNIT
APPLICATION	INDUCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE CU.M/S	274.80 (582330 ACFM)
FLUE GAS TEMPERATURE - C	148.9 (300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
SERVICE CONDITIONS	350 F/INDEFINITE
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
SERVICE CONDITIONS	350 F/INDEFINITE
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN AIR FILTER
SERVICE CONDITIONS	350 F/INDEFINITE
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	BOTTOM ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
MODULATION	OPEN
SERVICE CONDITIONS	350 F/INDEFINITE
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	11 X 11 X 43.5 LENGTH
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	MASTIC

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

** DUCTWORK	
LOCATION	ABSORBER OUTLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	10 X 10 X 16 LENGTH
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** DUCTWORK	
LOCATION	BYPASS
CONFIGURATION	RECTANGULAR
DIMENSIONS	11 X 11 X 64 LENGTH
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]
LINER GENERIC MATERIAL TYPE	ORGANIC/INORGANIC
LINER SPECIFIC MATERIAL TYPE	MASTIC/SYNTHETIC BRICK
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	WALLACE & TIEMAN
NUMBER	4
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	3.6 (4 TPH)
PRODUCT QUALITY - % SOLIDS	22.0
** TANKS	
SERVICE	NUMBER
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REACTION	2
SCREEN	2
THICKENER RETURN WATER	1
MIST ELIMINATOR WASH	1
ADDITIVE HOLD	2
ADDITIVE SURGE	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	3
RECYCLE SLURRY BLEED	4
THICKENER UNDERFLOW	4
ADDITIVE FEED	2
THICKENER RETURN	2
SLUDGE FEED	3
ADDITIVE SUPPLY	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	3
NUMBER OF SPARES	1
DIMENSIONS - FT	12 DIA X 20 LONG
CAPACITY	20 TPH [291 GPM AT 25-30% SOLIDS]
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER SPECIFIC MATERIAL TYPE	NYLON
BELT GENERIC MATERIAL TYPE	ORGANIC
BELT SPECIFIC MATERIAL TYPE	POLYPROPYLENE
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	25% SOLIDS
OUTLET STREAM CHARACTERISTICS	45% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	1% SOLIDS, 360 GPM
OUTLET STREAM DISPOSITION	PUG MILL
OVERFLOW STREAM DISPOSITION	THICKENER
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	2
NUMBER OF SPARES	0

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

CONFIGURATION	CIRCULAR
DIMENSIONS FT	125 DIA X 15.5 DEPTH
CAPACITY	900000 GAL
SHELL GENERIC MATERIAL TYPE	INORGANIC
SHELL SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED CONCRETE
LINER GENERIC MATERIAL TYPE	CARBON STEEL
LINER SPECIFIC MATERIAL TYPE	ASTM A-36 [1/4"]
FEED STREAM SOURCE	BLEED PUMP DISCHARGE
FEED STREAM CHARACTERISTICS	774 GPM, 6% SOLIDS
OUTLET STREAM CHARACTERISTICS	136 GPM, 25% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	638 GPM, 1% SOLIDS
OUTLET STREAM DISPOSITION	TO VACUUM FILTERS
OVERFLOW STREAM DISPOSITION	THICKENER RETURN WATER TANK
*** SALEABLE BYPRODUCTS	
NATURE	NONE
QUALITY - %	25.0
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	18.2 (20.0 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	75.0
% CASO3 - DRY	82.4
% CASO4 - DRY	11.8
% ASH - DRY	5.8
** TREATMENT	
METHOD	STABILIZATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-O-TEC]
INLET FLOW RATE - LITER/S	17.1 (272 GPM)
INLET QUALITY - %	25.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	NONE
SITE DIMENSIONS	200 ACRES
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	ABSORBER RECYCLE
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	% SOLIDS
CONTROL LEVELS	PH 9, 6% SOLIDS
MONITOR TYPE	LEEDS & NORTHRUP/TEXAS NUCLEAR
MONITOR LOCATION	SCREEN TANKS
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS LITER/S	.8 (12 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	.3 (4 GPM)
SLUDGE INTERSTITIAL WATER LOSS - LITERS/S	.3 (4 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
RECEIVING WATER STREAM	N/A
MAKEUP WATER ADDITION - LITERS/S	23.1 (366 GPM)
SOURCE OF MAKEUP WATER	COOLING TOWER BLOWDOWN [290 GPM]/RIVER WATER [76
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIME [THIOSORBIC]
PRINCIPAL CONSTITUENT	92% CAO, 2-6% INERTS, 2-6% MGO
SOURCE/SUPPLIER	DRAVO LIME
CONSUMPTION	230 TPD
UTILIZATION - %	93.2

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	30.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	.0
THICKENER - %	.0
VACUUM FILTER - %	33.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.4
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
THICKENER	.0
VACUUM FILTER	.1

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
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12/79	SYSTEM						744			
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD OPERATION COMMENCED IN MID-DECEMBER 1979. THE UNIT OPERATED IN A STARTUP PHASE DURING THIS PERIOD.

1/80	SYSTEM						744			
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2/80	SYSTEM						696			
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3/80	SYSTEM						744			
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** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE FIRST QUARTER, 1980.

4/80	A	65.0	56.0	78.8	45.0					
	B	65.0	56.0	79.0	45.0					
	SYSTEM	65.0	56.0	79.0	45.0		720	576	324	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FOLLOWING FIVE OUTAGES OCCURRED IN APRIL AND ACCOUNTED FOR THE LOW AVAILABILITY OF THE FGD SYSTEM.

1. LOW ADDITIVE IN TANK
2. INSTRUMENT TROUBLE
3. WATER IN THE PANEL
4. LOW ON LIME IN THE HOLDING TANKS
5. THE ESPS TRIPPED

5/80	A	73.7	76.1	79.0	73.7					
	B	73.7	76.0	78.9	73.5					
	SYSTEM	73.7	76.1	79.0	73.7		744	720	548	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE FGD SYSTEM WAS OFF LINE FOR APPROXIMATELY 548 HOURS DUE TO THE FOLLOWING PROBLEMS.

1. SULFUR OXIDES TOO HIGH
2. LOW LEVEL IN ADDITIVE TANK
3. INSTRUMENT TROUBLE
4. SCHEDULED MAINTENANCE OUTAGE
5. SOLIDS ON CARRY OVER
6. SOLID WASTE PROBLEM
7. UNIT TRIPPED

-----PERFORMANCE DATA-----						
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART. HOURS
						BOILER FGD CAP. HOURS HOURS HOURS FACTOR

8. CONSTRUCTION WORK						
6/80	SYSTEM					720
** PROBLEMS/SOLUTIONS/COMMENTS						
INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.						
7/80	SYSTEM					744
8/80	SYSTEM					744
9/80	SYSTEM				40.7	720 293
** PROBLEMS/SOLUTIONS/COMMENTS						
DURING SEPTEMBER THE VENDOR INSTALLED NEW SWITCHES ON BOTH MODULES' TRAVELING SCREENS.						
10/80	SYSTEM	80.4			40.9	744 304
** PROBLEMS/SOLUTIONS/COMMENTS						
ON SEPTEMBER 12 THE FGD SYSTEM WAS TAKEN OFF-LINE FOR A SCHEDULED OUTAGE. THE SYSTEM WAS PLACED BACK IN SERVICE ON OCTOBER 13.						
DURING OCTOBER A CONTROL SYSTEM MALFUNCTION CAUSED APPROXIMATELY 2 1/2 DAYS OF OUTAGE TIME.						
DUE TO LOST LEVEL IN ADDITIVE HOLD TANK THE SCREW CONVEYOR TRIPPED OUT. THE THICKENER WAS CLEANED OUT AND THE LEAKS REPAIRED DURING THE MONTH.						
LEAKS WERE ENCOUNTERED ON THE EXPANSION JOINTS LOCATED ON THE ABSORBER OUTLET DUCT. THESE EXPANSION JOINTS WERE REPLACED DURING THE MONTH.						
11/80	SYSTEM	97.5			96.0	720 691
** PROBLEMS/SOLUTIONS/COMMENTS						
A LEAK IN MODULE A BLEED LINE DURING NOVEMBER CAUSED APPROXIMATELY 10 HOURS OF OUTAGE TIME.						
12/80	SYSTEM	97.9			93.5	744 695
** PROBLEMS/SOLUTIONS/COMMENTS						
DURING DECEMBER SEVEN HOURS OF DOWN TIME WAS DUE TO PROBLEMS AT THE SOLID WASTE FACILITY.						
LEAKS WERE ENCOUNTERED WITH THE MIST ELIMINATOR WASH LINES.						
PROBLEMS WERE ENCOUNTERED WITH THE CLARIFIERS AT THE COOLING TOWER CAUSING THE FGD SYSTEM TO BE TAKEN OUT OF SERVICE FOR APPROXIMATELY 23 HOURS.						
1/81	SYSTEM	88.4			82.9	744 617
** PROBLEMS/SOLUTIONS/COMMENTS						
DURING THE FIRST PART OF JANUARY THE UTILITY EXPERIENCED PROBLEMS WITH HAULING THE WASTE PRODUCT. THIS CAUSED THE SYSTEM TO BE TAKEN OFF LINE APPROXIMATELY THREE DAYS.						
DURING THE MONTH IT WAS NECESSARY TO WASH THE ID FAN.						

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

PROBLEMS WERE ENCOUNTERED WITH THE RECYCLE PUMP PACKING.

2/81	SYSTEM	90.9		84.9		696		591
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS EXPERIENCED BYPASS DAMPER PROBLEMS AND IN FEBRUARY INSTALLED A SOLENOID ON THE DAMPER TO RESOLVE THE PROBLEM.

REPAIR WORK ON THE MIST ELIMINATOR LEAKS WAS PERFORMED DURING THE MONTH.

THICKENER MAINTENANCE CAUSED AN OUTAGE WHICH LASTED 22 HOURS.

THE ADDITIVE FEED LINE TO MODULE A REACTION TANK PLUGGED.

3/81	SYSTEM	100.0		51.4		744		382
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS SHUT DOWN DURING THE FIRST TWO WEEKS OF MARCH FOR SCHEDULED MAINTENANCE.

4/81	SYSTEM	100.0		60.7		720		437
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** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING APRIL.

5/81	SYSTEM	84.7		79.3		744		590
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** PROBLEMS/SOLUTIONS/COMMENTS

AT THE FIRST OF MAY GENERAL MAINTENANCE WAS PERFORMED ON THE SYSTEM.

PLUGGING WAS EXPERIENCED IN THE LINES ASSOCIATED WITH THE SLAKER.

THICKENER MAINTENANCE CAUSED THE SYSTEM TO BE OFF-LINE APPROXIMATELY 15 HOURS.

TWO OUTAGES WERE CAUSED BY THE THICKENER RAKE.

A LINE LEAK IN THE MIST ELIMINATOR WASH TANK WAS ENCOUNTERED. FIVE HOURS OF OUTAGE TIME WAS NEEDED TO MAKE THE NECESSARY REPAIRS.

PLUGGED ADDITIVE LINES CAUSED TWO OUTAGES DURING THE MONTH.

6/81	SYSTEM	95.1		95.1		720		684
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE ADDITIVE LINES TO BOTH MODULES PLUGGED CAUSING THE SYSTEM TO SHUT DOWN THREE SEPARATE TIMES.

THE BYPASS DAMPER SOLENOID MALFUNCTIONED AND HAD TO BE REPLACED.

PROBLEMS HAVE BEEN ENCOUNTERED WITH THE MODULE B INLET DAMPER.

7/81	A	98.3	96.2	96.2	96.2				
	B	98.3	96.2	96.2	96.2				
	SYSTEM	98.3	96.2	96.2	96.2	744	744	716	93.9

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE MAJORITY OF THE OUTAGE TIME DURING THE MONTH RESULTED FROM PLUGGING OF THE ADDITIVE FEED LINES AND CONTROL VALVES, AS WELL AS MECHANICAL PROBLEMS WITH THE LIMIT SWITCHES ON THE DAMPERS.

8/81	A	95.2	92.6	92.6	85.3				
	B	95.2	92.6	92.6	85.3				
	SYSTEM	95.2	92.6	92.6	85.3	744	686	635	88.9
9/81	A	84.5	96.4	96.4	79.9				
	B	84.5	96.4	96.4	79.9				
	SYSTEM	84.5	96.4	96.4	79.9	720	597	575	71.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER, THE FGD SYSTEM AVAILABILITY WAS SLIGHTLY LIMITED DUE TO THE REPLACEMENT OF THE CHEVRON MIST ELIMINATORS ON BOTH MODULES. THE MIST ELIMINATORS WERE REPLACED DUE TO THEIR NORYL MATERIAL OF CONSTRUCTION WHICH MELTED AT TEMPERATURES GREATER THAN 180 F. THE REPLACEMENT MIST ELIMINATORS ARE CONSTRUCTED OF FIBERGLASS [FIRST STAGE] AND RYTON [SECOND STAGE] RATED FOR TEMPERATURES GREATER THAN 300 F.

10/81	A	75.3	98.3	98.3	74.8				
	B	75.3	98.3	98.3	74.8				
	SYSTEM	75.3	98.3	98.3	74.8	744	566	557	69.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER A PROBLEM WAS ENCOUNTERED WITH THE BY-PASS SOLENOID CAUSING DOWN TIME.

OUTAGE TIME WAS NECESSARY TO REPAIR LEAKS ON THE INLET DAMPERS AND TO INSPECT THE CHEVRONS.

A LOW PH CAUSED THE ADDITIVE LINE TO MODULE A TO PLUG RESULTING IN AN OUTAGE.

THE BLEED LINE TO MODULE A RUPTURED ACCOUNTING FOR ADDITIONAL DOWN TIME.

11/81	A	96.2	94.9	94.9	94.9				
	B	94.9	94.9	94.9	94.9				
	SYSTEM	95.6	94.9	94.9	94.9	720	720	683	97.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS OCCURRED.

12/81	A	98.9	97.6	97.6	97.6				
	B	98.9	97.6	97.6	97.6				
	SYSTEM	98.9	97.6	97.4	97.6	744	744	726	91.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER NO MAJOR FGD-RELATED PROBLEMS WERE EXPERIENCED.

1/82	A	92.9	90.6	90.6	90.6				
	B	94.8	91.3	91.3	91.3				
	SYSTEM	93.8	91.0	91.0	91.0	744	744	677	88.2

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JANUARY.

2/82	A	95.4	93.1	93.1	93.1					
	B	97.0	93.1	93.1	93.1					
	SYSTEM	96.2	93.1	93.1	93.1		672	672	626	87.6
3/82	A	98.4	94.4	94.4	93.8					
	B	98.4	94.4	94.4	93.8					
	SYSTEM	98.4	94.4	94.4	93.8		744	739	698	89.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY AND MARCH NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED.

4/82	A	86.9	96.4	96.4	58.8					
	B	86.9	96.4	96.4	58.8					
	SYSTEM	86.9	96.4	96.4	58.8		720	439	423	56.4
5/82	A	99.1	98.1	98.1	98.1					
	B	98.1	98.1	98.1	98.1					
	SYSTEM	98.6	98.1	98.1	98.1		744	744	730	88.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING APRIL AND MAY.

6/82	G1-A	98.5	98.5	98.5	98.5					
	G1-B	98.5	98.5	98.5	98.5					
	SYSTEM	98.5	98.5	98.5	98.5		720	720	709	79.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/82	G1-A	98.2	96.2	96.2	96.2					
	G1-B	98.2	96.2	96.2	96.2					
	SYSTEM	98.2	96.2	96.2	96.2		744	744	716	93.9

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING OF ADDITIVE FEED LINES AND CONTROL VALVES CONTRIBUTED TO THE OUTAGE TIME DURING JULY.

MECHANICAL PROBLEMS WITH LIMIT SWITCHES ON THE DAMPERS ALSO CONTRIBUTED TO OUTAGE TIME DURING THE MONTH.

8/82	G1-A	100.0	99.2	99.2	91.8					
	G1-B	100.0	99.2	99.2	91.8					
	SYSTEM	100.0	99.2	99.2	91.8		744	689	683	70.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.

9/82	SYSTEM						720			
10/82	SYSTEM						744			

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

11/82	SYSTEM							720		
12/82	SYSTEM							744		
1/83	SYSTEM							744		
2/83	SYSTEM							672		
3/83	SYSTEM							744		
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF SEPTEMBER 1982 THROUGH MARCH 1983.										
4/83	SYSTEM							720		
5/83	SYSTEM							744		
6/83	SYSTEM							720		
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING THE MONTHS OF APRIL AND MAY THE FOLLOWING REPAIRS WERE MADE:										
BOTH DOUBLE-LOUVRE SEAL AIR DAMPERS LOCATED AT THE INLET OF THE ABSORBER VESSELS WERE REPLACED WITH BOTTOM-ENTRY GUILLOTINE SEAL AIR DAMPERS. THE DOUBLE-LOUVRE DAMPERS DID NOT PROVIDE ADEQUATE ISOLATION TO ALLOW MAINTENANCE DURING BOILER OPERATION. THE UTILITY ALSO REPORTED THAT THE DOUBLE-LOUVRE DAMPERS CLOSED TOO SLOWLY DURING BYPASS (REASON WHY ORIGINAL NORYL MIST ELIMINATORS WERE MELTED). THE FAULTY PRE-KRETE G-8 LINER MATERIAL IN THE ABSORBER VESSELS WAS REPLACED WITH PENNGUARD MASTIC. THE PENNGUARD MASTIC WAS APPLIED TO THE ABSORBER AND DUCTWORK FROM THE MIST ELIMINATORS TO THE OUTLET ABSORBER GUILLOTINE DAMPERS. PENNGUARD MASTIC AND PENNGUARD BLOCK WERE BOTH APPLIED TO THE DUCTWORK LOCATED BETWEEN THE OUTLET ABSORBER GUILLOTINE DAMPERS AND THE STACK INLET.										
THE UTILITY ALSO REPORTED REDUCING THE L/G RATIO ON BOTH ABSORBER VESSELS (PUMP SPEEDS WERE REDUCED). THE UTILITY REPORTS STILL MEETING COMPLIANCE LIMITS BUT HAVING A 14 PERCENT DECREASE IN LIME USAGE OVER LAST YEAR.										
7/83	SYSTEM							744		
8/83	SYSTEM							744		
9/83	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE THIRD QUARTER. THE NEXT SCHEDULED UNIT OUTAGE IS SET TO BEGIN THE FIRST WEEK OF NOVEMBER AND WILL LAST TWO WEEKS.

ABSORBER LIQUID RECIRCULATION WAS DECREASED IN CONJUNCTION WITH CHANGES TO NOZZLE HEADER DESIGN IN ORDER TO SAVE ON LIME CONSUMPTION. THE UTILITY REPORTED THAT THE FGD SYSTEM WAS REMOVING MORE SO2 THAN REQUIRED BY LAW. THE LIQUID RECIRCULATION RATE FOR EACH OF THE TWO ABSORBERS WAS DECREASED FROM A DESIGN FLOW RATE OF 20,280 GPM (L/G OF 40.6) TO 16,000 GPM (L/G OF 32.0). THREE OF THE SIX SPRAY HEADERS ON HALF OF THE PIG TAIL NOZZLES WERE CHANGED TO FULL-FLOW TYPE (BASICALLY A 1-7/8 INCH OPEN HOLE) NOZZLES. DURING NORMAL OPERATIONS 1 PIG TAIL HEADER IS USED IN CONJUNCTION WITH 2 COMBINATION HEADERS. WHEN THESE BECOME PLUGGED, AN ADDITIONAL COMBINATION HEADER IS VALVED IN. WHEN ALL SIX HEADERS ARE USED THE

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

LIQUID RECIRCULATION RATE IS 16,000 GPM. HOWEVER, ONLY THREE OF THE FOUR HEADERS ARE USED FOR NORMAL OPERATING CONDITIONS HAVING A LIQUID RECIRCULATION RATE OF APPROXIMATELY 11,000 TO 13,000 GPM. BECAUSE OF THIS CHANGE THE UTILITY REPORTED SAVING 11,200 TONS OF LIMESTONE AT A SAVINGS OF \$392,000 (COMPARED TO 1982 BASED ON A 9-MONTH PERIOD) WHILE STILL MEETING ITS SO2 LIMITATIONS.

10/83	SYSTEM	744
11/83	SYSTEM	720
12/83	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING THE PERIOD. THE UNIT WAS DOWN FOR THE FIRST AND SECOND WEEKS OF NOVEMBER FOR SCHEDULED MAINTENANCE.

DURING 1983, THE UNIT AND FGD SYSTEM OPERATED A TOTAL OF 7854.5 AND 7592.7 HOURS, RESPECTIVELY. TOTAL FGD SYSTEM AVAILABILITY FOR THE YEAR WAS 96.7 PERCENT.

THE AVERAGE COAL SULFUR CONTENT FOR THE YEAR WAS 3.58 PERCENT AND THE LIME TO COAL USAGE RATIO FOR THE YEAR WAS 16:1.

1/84	SYSTEM	744
2/84	SYSTEM	696
3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE PENNGUARD BLOCKS INSTALLED IN THE OUTLET DUCT DURING THE SPRING OF 1983 HAVE WORKED FAVORABLY TO DATE.

THE UTILITY REPORTED THAT THE NEW DAMPERS, WHICH HAVE BEEN IN USE 18 MONTHS TO DATE, HAVE OPERATED FAVORABLY.

MIST ELIMINATOR WASH PIPE PLUGGAGE WAS REPORTED. A HIGH PRESSURE WASH (5000 PSI) WAS REQUIRED TO CLEAR THE PLUGGED LINES.

OVERALL FGD SYSTEM AVAILABILITY DURING THE FIRST THREE QUARTERS OF 1984 WAS ESTIMATED AT 90%. NO MAJOR OUTAGES OCCURRED DURING THIS TIME.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BIG RIVERS ELECTRIC
PLANT NAME	GREEN
UNIT NUMBER	2
CITY	SEBREE
STATE	KENTUCKY
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	444
GROSS UNIT GENERATING CAPACITY - MW	242
NET UNIT GENERATING CAPACITY W/FGD - MW	222
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	242
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	471.90 (1000000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9 (300 F)
STACK HEIGHT - M	107. (350 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	4.6 (15.0 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	22795. (9800 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	8200-11800
AVERAGE ASH CONTENT - %	15.38
RANGE ASH CONTENT - %	9.6-27.5
AVERAGE MOISTURE CONTENT - %	11.40
RANGE MOISTURE CONTENT - %	5.3-20.1
AVERAGE SULFUR CONTENT - %	3.91
RANGE SULFUR CONTENT - %	2.0-6.0
AVERAGE CHLORIDE CONTENT - %	.05
RANGE CHLORIDE CONTENT - %	UNKNOWN
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	2
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	AMERICAN AIR FILTER
INLET FLUE GAS CAPACITY - CU.M/S	235.9 (500000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9 (300 F)
PRESSURE DROP - KPA	.3 (1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.6
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
*** FGD SYSTEM	

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	MAG
SYSTEM SUPPLIER	AMERICAN AIR FILTER
A-E FIRM	BURNS & ROE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
CURRENT STATUS	1
COMMERCIAL START-UP	12/80
INITIAL START-UP	11/80
CONTRACT AWARDED	5/77

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	23260.0	(10000 BTU/LB)
DESIGN COAL ASH CONTENT - %	20.00	
DESIGN MOISTURE CONTENT - %	11.25	
DESIGN CHLORIDE CONTENT - %	.05	
SPACE REQUIREMENTS - SQ M	10869.3	(117000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	272.0	

** QUENCHER/PRESATURATOR

NUMBER	0
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	AMERICAN AIR FILTER	
DIMENSIONS - FT	34 X 71.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	MASTIC	
LINER MATERIAL TRADE NAME/COMMON TYPE	PENNGUARD ADHESIVE	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1008.	(16000 GPM)
L/G RATIO - L/CU.M	4.3	(32.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.4	(1.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.8	(9.2 FT/S)
INLET GAS FLOW CU. M/S	235.95	(500000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
SO2 REMOVAL EFFICIENCY - %	90.0	

** REHEATER

NUMBER	1	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	EXTERNAL STEAM HEAT EXCHANGER	
TRADE NAME/COMMON TYPE	FIN TUBE BUNDLE	
LOCATION	HEATED AIR INJECTED INTO BYPASS DUCT	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	13.9	(25 F)
INLET FLUE GAS FLOW RATE - CU. M/S	75.50	(160000 ACFM)
INLET FLUE GAS TEMPERATURE - C	-9.4	(15 F)
OUTLET FLUE GAS FLOW RATE - CU. M/S	120.81	(256000 ACFM)
OUTLET FLUE GAS TEMPERATURE - C	148.9	(300 F)
NUMBER OF HEAT EXCHANGER BANKS	3	
NUMBER OF BUNDLES PER BANK	6	

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

NUMBER OF TUBES PER BUNDLE	20
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	274.80 (582330 ACFM)
FLUE GAS TEMPERATURE - C	148.9 (300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	UNIT
APPLICATION	INDUCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	274.80 (582330 ACFM)
FLUE GAS TEMPERATURE - C	148.9 (300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
SERVICE CONDITIONS	350 F/INDEFINITE
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
SERVICE CONDITIONS	350 F/INDEFINITE
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN AIR FILTER
SERVICE CONDITIONS	350 F/INDEFINITE
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	BOTTOM ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
MODULATION	OPEN
SERVICE CONDITIONS	350 F/INDEFINITE
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	11 X 11 X 43.5 LENGTH
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	MASTIC

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

** DUCTWORK	
LOCATION	ABSORBER OUTLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	10 X 10 X 16 LENGTH
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** DUCTWORK	
LOCATION	BYPASS
CONFIGURATION	RECTANGULAR
DIMENSIONS	11 X 11 X 64 LENGTH
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	MASTIC
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	WALLACE & TIEMAN
NUMBER	4
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	3.6 (4 TPH)
PRODUCT QUALITY - % SOLIDS	22.0
** TANKS	
SERVICE	NUMBER
-----	-----
REACTION	2
SCREEN	2
THICKENER RETURN WATER	1
MIST ELIMINATOR WASH	1
ADDITIVE HOLD	2
ADDITIVE SURGE	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	3
RECYCLE SLURRY BLEED	4
THICKENER UNDERFLOW	4
ADDITIVE FEED	2
THICKENER RETURN	2
SLUDGE FEED	3
ADDITIVE SUPPLY	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	3
NUMBER OF SPARES	1
DIMENSIONS - FT	12 DIA X 20 LONG
CAPACITY	20 TPH [291 GPM AT 25-30% SOLIDS]
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER SPECIFIC MATERIAL TYPE	NYLON
BELT GENERIC MATERIAL TYPE	ORGANIC
BELT SPECIFIC MATERIAL TYPE	POLYPROPYLENE
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	25% SOLIDS
OUTLET STREAM CHARACTERISTICS	45% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	1% SOLIDS, 360 GPM
OUTLET STREAM DISPOSITION	PUG MILL
OVERFLOW STREAM DISPOSITION	THICKENER
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	2
CONFIGURATION	CIRCULAR

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

DIMENSIONS - FT	125 DIA X 15.5 DEPTH
CAPACITY	900000 GAL
SHELL GENERIC MATERIAL TYPE	INORGANIC
SHELL SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED CONCRETE
LINER GENERIC MATERIAL TYPE	CARBON STEEL
LINER SPECIFIC MATERIAL TYPE	ASTM A-36 [1/4"]
FEED STREAM SOURCE	BLEED PUMP DISCHARGE
FEED STREAM CHARACTERISTICS	774 GPM, 6% SOLIDS
OUTLET STREAM CHARACTERISTICS	136 GPM, 25% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	638 GPM, 1% SOLIDS
OUTLET STREAM DISPOSITION	TO VACUUM FILTERS
OVERFLOW STREAM DISPOSITION	THICKENER RETURN WATER TANK
*** SALEABLE BYPRODUCTS	
NATURE	NONE
QUALITY - %	25.0
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	18.2 (20.0 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	75.0
% CASO3 - DRY	82.4
% CASO4 DRY	11.8
% ASH - DRY	5.8
** TREATMENT	
METHOD	STABILIZATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
INLET FLOW RATE - LITER/S	17.1 (272 GPM)
INLET QUALITY - %	25.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	NONE
SITE DIMENSIONS	200 ACRES
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	ABSORBER RECYCLE
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	% SOLIDS
CONTROL LEVELS	PH 9, 6% SOLIDS
MONITOR TYPE	LEEDS & NORTHROP/TEXAS NUCLEAR
MONITOR LOCATION	SCREEN TANKS
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	.8 (12 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	.3 (4 GPM)
SLUDGE INTERSTITIAL WATER LOSS - LITERS/S	.3 (4 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
RECEIVING WATER STREAM	N/A
MAKEUP WATER ADDITION - LITERS/S	23.1 (366 GPM)
SOURCE OF MAKEUP WATER	COOLING TOWER BLOWDOWN (290 GPM)/RIVER WATER (76
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIME [THIOSORBIC]
PRINCIPAL CONSTITUENT	92% CAO, 2-6% INERTS, 2-6% MGO
SOURCE/SUPPLIER	DRAVO LIME
CONSUMPTION	230 TPD
UTILIZATION %	93.2
POINT OF ADDITION	SLAKER

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

** FGD SPARE CAPACITY INDICES

ABSORBER - %	30.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	.0
THICKENER - %	.0
VACUUM FILTER - %	33.0

** FGD SPARE COMPONENT INDICES

ABSORBER	.4
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
THICKENER	.0
VACUUM FILTER	.1

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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11/80	SYSTEM	94.2			91.8		720	661	
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** PROBLEMS/SOLUTIONS/COMMENTS

ON NOVEMBER 14, 1980 OPERATION OF UNIT 2 COMMENCED.

DURING THE MONTH TWO OUTAGES WERE CAUSED BY THICKENER RAKE PROBLEMS.

THE ADDITIVE FEED LINE PLUGGED CAUSING ABOUT EIGHT HOURS OF DOWN TIME.

DURING OPERATION ON LOW RECYCLE FLOW, A WELD ON THE BYPASS DAMPER ADJUSTMENT ARM ROD FAILED.

12/80	SYSTEM	96.2			26.1		744	194	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN FOR 18 DAYS AT THE BEGINNING OF DECEMBER.

PROBLEMS WITH THE BYPASS DAMPER WAS ENCOUNTERED DURING THE MONTH.

1/81	SYSTEM	94.3			68.1		744	506	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE DAMPERS MALFUNCTIONED ON MODULE B, WHEN THE RECYCLE PUMP TRIPPED, CAUSING ABOUT SEVEN HOURS OF OUTAGE TIME.

THE UTILITY IS EXPERIENCING PROBLEMS WITH HAULING THE WASTE PRODUCT.

THE MODULE B REACTION TANK HAS EXPERIENCED PLUGGING DUE TO THE INABILITY TO MAINTAIN THE PH.

2/81	SYSTEM	94.5			94.0		696	654	
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THICKENER MAINTENANCE WAS PERFORMED.

3/81	SYSTEM	97.9			97.9		744	728	
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4/81	SYSTEM	99.9			99.5		720	716	
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BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MARCH AND APRIL.

5/81	SYSTEM	92.7			92.0		744		684
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** PROBLEMS/SOLUTIONS/COMMENTS

THE ADDITIVE LINE TO THE REACTION TANK PLUGGED CAUSING OUTAGE TIME DURING MAY.

6/81	SYSTEM	96.2			95.6		720		688
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** PROBLEMS/SOLUTIONS/COMMENTS

THE MODULE A DISCHARGE LINE SEPARATED DURING THE MONTH CAUSING A 10 HOUR OUTAGE.

PROBLEMS WERE ENCOUNTERED WITH THE INLET PRESSURE SWITCH ON BOTH MODULES. THE SWITCHES FOULED APPROXIMATELY SIX TIMES DURING JUNE CAUSING A TOTAL OF 14 HOURS OF OUTAGE TIME.

7/81	A	94.0	89.1	89.1	77.2				
	B	94.0	89.1	89.1	77.2				
	SYSTEM	94.0	89.1	89.1	77.2		744	645	574 77.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY, PLUGGING OF THE ADDITIVE FEED LINES AND CONTROL VALVES, AS WELL AS MECHANICAL PROBLEMS WITH THE LIMIT SWITCHES ON THE DAMPERS CONTRIBUTED TO THE MAJORITY OF THE OUTAGE TIME.

8/81	A	96.4	94.0	94.0	86.0				
	B	97.8	94.0	94.0	86.0				
	SYSTEM	97.1	94.0	94.0	86.0		744	681	640 85.1

9/81	A	99.7	98.5	98.5	98.4				
	B	99.7	98.5	98.5	98.4				
	SYSTEM	99.7	98.5	98.5	98.4		720	719	708 84.7

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD-RELATED PROBLEMS WERE REPORTED FOR THE MONTHS OF AUGUST AND SEPTEMBER.

10/81	A	76.3	96.2	96.2	72.9				
	B	76.1	96.2	96.2	72.9				
	SYSTEM	76.2	96.2	96.2	72.9		744	564	542 66.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE UTILITY REPORTED THAT PROBLEMS WERE ENCOUNTERED WITH A RECYCLE PUMP VALVE.

THE BELT ON THE C MODULE RECYCLE PUMP WAS ADJUSTED ACCOUNTING FOR SOME DOWN TIME.

DURING THE MONTH THE FALL SCHEDULED MAINTENANCE OUTAGE COMMENCED.

11/81	A	62.6	87.4	87.4	44.5				
	B	62.6	87.4	87.4	44.5				
	SYSTEM	62.6	87.4	87.4	44.5		720	367	320 45.5

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE FALL SCHEDULED MAINTENANCE OUTAGE CONTINUED THROUGH THE BEGINNING OF NOVEMBER.

THE ADDITIVE MASS VALVE ON THE A MODULE REACTION TANK WAS REPAIRED.

ADDITIONAL OUTAGE TIME WAS CAUSED BY A BROKEN REHEAT ISOLATION DAMPER DRIVE AND A LEAK IN THE MIST ELIMINATOR MAKE UP.

THE B MODULE ADDITIVE MASS LINE PLUGGED CAUSING A PH DROP.

THE MIST ELIMINATORS WERE REPLACED DUE TO THEIR NORLYL MATERIAL OF CONSTRUCTION WHICH MELTED AT TEMPERATURES GREATER THAN 180 F. THE REPLACEMENT MIST ELIMINATORS ARE CONSTRUCTED OF FIBERGLASS [FIRST STAGE] AND RYTON [SECOND STAGE] RATED FOR TEMPERATURES GREATER THAN 300 F.

12/81	A	99.9	98.1	98.1	87.0				
	B	99.9	98.1	98.1	87.0				
	SYSTEM	99.9	98.1	98.1	87.0	744	660	647	78.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER.

1/82	A	96.5	95.1	95.1	95.1				
	B	96.8	94.4	94.4	94.4				
	SYSTEM	96.6	94.8	94.8	94.8	744	744	705	86.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JANUARY.

2/82	A	99.7	97.8	97.8	97.8				
	B	99.7	97.8	97.8	97.8				
	SYSTEM	99.7	97.8	97.8	97.8	672	672	657	88.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED EXPERIENCING NO MAJOR FGD-RELATED PROBLEMS DURING FEBRUARY.

3/82	A	39.9	91.9	91.9	39.9				
	B	39.9	91.9	91.9	39.9				
	SYSTEM	39.9	91.9	91.9	39.9	744	323	297	40.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE SYSTEM WAS TAKEN OFF-LINE PART OF THE TIME FOR A SCHEDULED OUTAGE.

4/82	A	61.8	92.6	92.6	55.6				
	B	61.8	92.6	92.6	55.6				
	SYSTEM	61.8	92.6	92.6	55.6	720	432	401	50.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT AND SYSTEM WERE DOWN PART OF APRIL FOR A SPRING OUTAGE.

5/82	A	99.6	97.8	97.8	90.1				
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	99.6	97.8	97.8	90.1					
	SYSTEM	99.6	97.8	97.8	90.1		744	685	671	77.8

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE MONTH OF MAY.

6/82	G2-A	99.3	97.7	97.7	95.9					
	G2-B	99.3	97.7	97.7	95.9					
	SYSTEM	99.3	97.7	97.7	95.9		720	707	690	80.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/82	G2-A	94.0	89.1	89.1	77.2					
	G2-B	94.0	89.1	89.1	77.2					
	SYSTEM	94.0	89.1	89.1	77.2		744	645	574	77.5

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING OF ADDITIVE FEED LINES AND CONTROL VALVES CONTRIBUTED TO THE OUTAGE TIME DURING JULY.

MECHANICAL PROBLEMS WITH LIMIT SWITCHES ON THE DAMPERS ALSO CONTRIBUTED TO OUTAGE TIME DURING THE MONTH.

8/82	G2-A	98.5	98.5	98.5	98.5					
	G2-B	98.5	98.5	98.5	98.5					
	SYSTEM	98.5	98.5	98.5	98.5		744	744	733	78.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.

9/82	SYSTEM						720			
10/82	SYSTEM						744			
11/82	SYSTEM						720			
12/82	SYSTEM						744			
1/83	SYSTEM						744			
2/83	SYSTEM						672			
3/83	SYSTEM						744			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF SEPTEMBER 1982 THROUGH MARCH 1983.

4/83	SYSTEM						720			
5/83	SYSTEM						744			
6/83	SYSTEM						720			

BIG RIVERS ELECTRIC: GREEN 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS
									FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTHS OF APRIL AND MAY THE FOLLOWING REPAIRS WERE MADE:

BOTH DOUBLE-LOUVRE SEAL AIR DAMPERS LOCATED AT THE INLET OF THE ABSORBER VESSELS WERE REPLACED WITH BOTTOM-ENTRY GUILLOTINE SEAL AIR DAMPERS. THE DOUBLE-LOUVRE DAMPERS DID NOT PROVIDE ADEQUATE ISOLATION TO ALLOW MAINTENANCE DURING BOILER OPERATION. THE UTILITY ALSO REPORTED THAT THE DOUBLE-LOUVRE DAMPERS CLOSED TOO SLOWLY DURING BYPASS (REASON WHY ORIGINAL NORYL MIST ELIMINATORS WERE MELTED). THE FAULTY PRE-KRETE G-8 LINER MATERIAL IN THE ABSORBER VESSELS WAS REPLACED WITH PENNGUARD MASTIC. THE PENNGUARD MASTIC WAS APPLIED TO THE ABSORBER AND DUCTWORK FROM THE MIST ELIMINATORS TO THE ABSORBER OUTLET GUILLOTINE DAMPERS. PENNGUARD MASTIC AND PENNGUARD BLOCK WILL BE APPLIED DURING THE NEXT MAJOR OUTAGE PERIOD TO THE DUCTWORK LOCATED BETWEEN THE ABSORBER OUTLET GUILLOTINE DAMPERS AND THE STACK INLET.

THE UTILITY ALSO REPORTED REDUCING THE L/G RATIO ON BOTH ABSORBER VESSELS (PUMP SPEEDS WERE REDUCED). THE UTILITY REPORTS STILL MEETING COMPLIANCE LIMITS BUT HAVING A 14 PERCENT DECREASE IN LIME USAGE OVER LAST YEAR.

7/83	SYSTEM	744
8/83	SYSTEM	744
9/83	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

ABSORBER LIQUID RECIRCULATION WAS DECREASED IN CONJUNCTION WITH CHANGES TO NOZZLE HEADER DESIGN IN ORDER TO SAVE ON LIME CONSUMPTION. THE UTILITY REPORTED THAT THE FGD SYSTEM WAS REMOVING MORE SO2 THAN REQUIRED BY LAW. THE LIQUID RECIRCULATION RATE FOR EACH OF THE TWO ABSORBERS WAS DECREASED FROM A DESIGN FLOW RATE OF 20,280 GPM (L/G OF 40.6) TO 16,000 GPM (L/G OF 32.0). THREE OF THE SIX SPRAY HEADERS ON HALF OF THE PIG TAIL NOZZLES WERE CHANGED TO A FULL-FLOW TYPE (BASICALLY A 1-7/8 INCH OPEN HOLE) NOZZLES. DURING NORMAL OPERATIONS 1 PIG TAIL HEADER IS USED IN CONJUNCTION WITH 2 COMBINATION HEADERS. WHEN THESE BECOME PLUGGED, AN ADDITIONAL COMBINATION HEADER IS VALVED IN. WHEN ALL SIX HEADERS ARE USED THE LIQUID RECIRCULATION RATE IS 16,000 GPM. HOWEVER, ONLY THREE OF THE FOUR HEADERS ARE USED FOR NORMAL OPERATING CONDITIONS HAVING A LIQUID RECIRCULATION RATE OF APPROXIMATELY 11,000 TO 13,000 GPM. BECAUSE OF THIS CHANGE THE UTILITY REPORTED SAVING 11,200 TONS OF LIMESTONE AT A SAVINGS OF \$392,000 (COMPARED TO 1982 BASED ON A 9-MONTH PERIOD) WHILE STILL MEETING ITS SO2 LIMITATIONS.

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE THIRD QUARTER. THE NEXT SCHEDULED UNIT OUTAGE IS SET TO BEGIN THE FIRST WEEK OF NOVEMBER AND WILL LAST TWO WEEKS.

10/83	SYSTEM	744
11/83	SYSTEM	720
12/83	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING THE PERIOD. THE UNIT WAS DOWN FOR THE THIRD AND FOURTH WEEKS OF NOVEMBER FOR SCHEDULED MAINTENANCE.

DURING 1983, THE UNIT AND FGD SYSTEM OPERATED A TOTAL OF 7966.7

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

AND 7742.7 HOURS, RESPECTIVELY. TOTAL FGD SYSTEM AVAILABILITY FOR THE YEAR WAS 97.2 PERCENT.

THE AVERAGE COAL SULFUR CONTENT FOR THE YEAR WAS 3.58 PERCENT AND THE LIME TO COAL RATIO FOR THE YEAR WAS 16:1.

1/84	SYSTEM	744
2/84	SYSTEM	696
3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT A NEW OUTLET DUCT LINING (STEBBINS TILE) WAS INSTALLED AT THE OUTLET DUCT MIXING ZONE DURING THE FIRST THREE QUARTERS OF 1984.

THE UTILITY REPORTED THAT THE NEW DAMPERS, WHICH HAVE BEEN IN USE 18 MONTHS TO DATE, HAVE OPERATED FAVORABLY.

MIST ELIMINATOR WASH PIPE PLUGGAGE WAS REPORTED. A HIGH PRESSURE WASH (5000 PSI) WAS REQUIRED TO CLEAR THE PLUGGED LINES.

OVERALL FGD SYSTEM AVAILABILITY DURING THE FIRST THREE QUARTERS OF 1984 WAS ESTIMATED AT 90%. NO MAJOR OUTAGES OCCURRED DURING THIS TIME.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	CENTRAL ILLINOIS LIGHT	
PLANT NAME	DUCK CREEK	
UNIT NUMBER	1	
CITY	CANTON	
STATE	ILLINOIS	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	378	
GROSS UNIT GENERATING CAPACITY - MW	416	
NET UNIT GENERATING CAPACITY W/FGD - MW	378	
NET UNIT GENERATING CAPACITY WO/FGD - MW	390	
EQUIVALENT SCRUBBED CAPACITY - MW	416	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	717.29	(1520000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	135.0	(275 F)
STACK HEIGHT - M	152.	(500 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.8	(19.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	24181.	(10396 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		9800-11000
AVERAGE ASH CONTENT - %	9.12	
RANGE ASH CONTENT - %	6-18	
AVERAGE MOISTURE CONTENT - %	15.43	
RANGE MOISTURE CONTENT - %	13-23	
AVERAGE SULFUR CONTENT - %	3.40	
RANGE SULFUR CONTENT - %	2.4-4.0	
AVERAGE CHLORIDE CONTENT - %	.06	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	2	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	POLLUTION CONTROL-WALTHER	
INLET FLUE GAS CAPACITY - CU.M/S	358.6	(760000 ACFM)
INLET FLUE GAS TEMPERATURE C	135.0	(275 F)
PRESSURE DROP - KPA	.1	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.8	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	ENVIRONEERING, RILEY STOKER
A-E FIRM	GILBERT/COMMONWEALTH ASSOCIATES
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.30
ENERGY CONSUMPTION - %	2.9
CURRENT STATUS	1
COMMERCIAL START-UP	8/78
INITIAL START-UP	7/76
CONTRACT AWARDED	8/73

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	22794.8	(9800 BTU/LB)
DESIGN COAL ASH CONTENT - %	18.00	
DESIGN MOISTURE CONTENT - %	23.00	
DESIGN CHLORIDE CONTENT - %	.05	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	144.0	

** QUENCHER/PRESATURATOR

NUMBER	0
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	ROD DECK	
TRADE NAME/COMMON TYPE	VENTRI-SORBER	
SUPPLIER	ENVIRONEERING, RILEY STOKER	
DIMENSIONS - FT	40.0 X 5.0 X 40.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL; HIGH ALLOY [ATOP ABSORBER]	
SHELL SPECIFIC MATERIAL	AUSTENITIC; NICKEL BASE/CHROMIUM-IRON-COPPER-MOL	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L; HASTELLOY G	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	ROD DECKS	
NUMBER OF CONTACTING ZONES	8	
LIQUID RECIRCULATION RATE LITER/S	992.	(15750 GPM)
L/G RATIO - L/CU.M	5.9	(44.5 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	3.0	(12.0 IN-H2O)
SUPERFICAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
INLET GAS FLOW CU. M/S	167.05	(354000 ACFM)
INLET GAS TEMPERATURE C	135.0	(275 F)
SO2 REMOVAL EFFICIENCY - %	85.3	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	4	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	VERTICAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
FREEBOARD DISTANCE - M	3.66	(12.0 FT)
DISTANCE BETWEEN STAGES - CM	121.92	(48.0 IN)
DISTANCE BETWEEN VANES - CM	6.3	(2.50 IN)
VANE ANGLES - DEGREES	90	
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
SUPERFICAL GAS VELOCITY - M/S	4.0	(13.0 FT/S)

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM
WASH WATER SOURCE	SUPERNATANT
WASH FREQUENCY	EVERY 20 MINUTES
WASH RATE - L/S	102.8 (1630 GAL/MIN)
** REHEATER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON TYPE	N/A
CONSTRUCTION MATERIAL GENERIC TYPE	NONE
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A
** FANS	
NUMBER	4
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	BUFFALO FORGE
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	167.05 (354000 ACFM)
FLUE GAS TEMPERATURE - C	135.0 (275 F)
PRESSURE DROP - KPA	11.6 (38.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN STANDARD
SEAL AIR FLOW - CU. M/S	1.96 (4150 ACFM)
SERVICE CONDITIONS	450
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	8
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	ENVIRONMENTAL ELEMENTS
SEAL AIR FLOW - CU. M/S	.57 (1200 ACFM)
SERVICE CONDITIONS	450
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN STANDARD
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	450
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	1
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

MANUFACTURER	AMERICAN STANDARD
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	8
FUNCTION	CONTROL
GENERIC TYPE	NR
SPECIFIC TYPE	NR
MANUFACTURER	BUFFALO FORGE
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AMERICAN STANDARD
SEAL AIR FLOW - CU. M/S	1.96 (4150 ACFM)
SERVICE CONDITIONS	700
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET & BYPASS
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	HIGH ALLOY
SHELL SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	TRANSITION DUCT AT BASE OF STACK
CONFIGURATION	CIRCULAR TO SQUARE
SHELL GENERIC MATERIAL TYPE	HIGH ALLOY
SHELL SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	36.3 (40 TPH)
PRODUCT QUALITY - % SOLIDS	35.0

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

** TANKS	
SERVICE	NUMBER
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ABSORBER RECYCLE	4
WASTE SLURRY BLEED	1
REAGENT PREP PRODUCT	1
MIST ELIMINATOR WASH	4
MILL SLURRY	1
** PUMPS	
SERVICE	NUMBER
-----	-----
POND RETURN	2
MIST ELIMINATOR WASH	8
ABSORBER RECIRCULATION	12
SLURRY TRANSFER	2
MILL SLURRY	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	57 ACRES
SITE CAPACITY - CU.M	125969 (103.0 ACRE-FT)
SITE SERVICE LIFE - YRS	5
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	ABSORBER RECYCLE
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	PERCENT SOLIDS, LIQUID LEVEL
CONTROL LEVELS	PH 6.0 AT INLET, 5.5 AT OUTLET
MONITOR LOCATION	RECYCLE TANK
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
RECEIVING WATER STREAM	NONE
MAKEUP WATER ADDITION - LITERS/S	37.8 (600 GPM)
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	95% CaCO ₃
CONSUMPTION	40 TPH
UTILIZATION - %	67.0
POINT OF ADDITION	RECYCLE TANK
** FGD SPARE CAPACITY INDICES	
ABSORBER %	.0
MIST ELIMINATOR - %	.0
FAN %	.0
BALL MILL - %	.0
EFFLUENT HOLD TANK %	.0
RECIRCULATION PUMP %	33.0

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

** FGD SPARE COMPONENT INDICES

ABSORBER	.0
MIST ELIMINATOR	.0
FAN	.0
BALL MILL	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	4.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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7/76	SYSTEM				1.1	91.60	744		8
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** PROBLEMS/SOLUTIONS/COMMENTS

CONSTRUCTION OF DUCK CREEK 1 BEGAN IN EARLY 1972 AND WAS VIRTUALLY COMPLETED BY SPRING 1976. COMMERCIAL OPERATION WAS INITIATED IN JUNE 1976 WITH THE ESP MODULES IN THE GAS PATH. THE FIRST MODULE OF THE 4-MODULE SCRUBBING SYSTEM WAS INSTALLED BY JUNE 1976 AND START-UP FOR SHAKEDOWN/DEBUGGING PURPOSES OCCURRED IN JULY 1976. THE REMAINING THREE MODULES WILL BE INSTALLED LATER WITH A 4-MODULE START-UP SCHEDULED FOR THE SUMMER OF 1978.

INITIAL OPERATION OF THE FIRST SCRUBBER MODULE FOR SHAKEDOWN AND DEBUGGING PURPOSES OCCURRED DURING THE MONTH. LIMITED SERVICE TIME RESULTED FROM PROBLEMS WITH BAD WELDS, FAULTY PIPE HANGERS, AND ABSORBER LEAKS.

8/76	SYSTEM				2.4		744		18
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** PROBLEMS/SOLUTIONS/COMMENTS

LIMITED OPERATIONS CONTINUED THROUGHOUT AUGUST BECAUSE OF THE START-UP AND CONSTRUCTION PROBLEMS MENTIONED FOR JULY, 1976. THE MODULE WAS TAKEN OUT OF THE GAS PATH AT THIS POINT TO CONCENTRATE ON RESOLVING THESE PROBLEM AREAS.

9/76	SYSTEM				50.0		744		360
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** PROBLEMS/SOLUTIONS/COMMENTS

MODULE RESTART OCCURRED ON SEPTEMBER 9. OPERATION CONTINUED THROUGHOUT THE REMAINDER OF THE MONTH ON AN INTERMITTANT BASIS. MAJOR PROBLEMS INCLUDED PIPE BREAKING, PUMP LINER FAILURES, PLUGGING AND SCALING OF MIST ELIMINATORS, AND SOME BOILER-RELATED PROBLEMS. THE MODULE REMAINED IN SERVICE FOR APPROXIMATELY 15 DAYS OF NON-CONTINUOUS OPERATION. THE ESP MODULES HAVE REMAINED IN SERVICE WITHOUT THE OCCURRENCE OF ANY MAJOR PROBLEMS.

10/76	SYSTEM				51.8		744		385
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** PROBLEMS/SOLUTIONS/COMMENTS

TOTAL OPERATION TIME DURING THE MONTH WAS APPROXIMATELY 16 DAYS (NON-CONTINUOUS). THE MAJOR PROBLEM AREA WAS THE CONTINUATION OF MASSIVE SCALE DEVELOPMENT ON THE MIST ELIMINATORS, RESULTING IN PLUGGING OF THE PIPING AND NOZZLES TO THE COMPONENTS SPRAY SYSTEM.

11/76	SYSTEM				3.3		720		24
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** PROBLEMS/SOLUTIONS/COMMENTS

SPORADIC OPERATION RESULTED FROM CONTINUED SCALING PROBLEMS IN THE MIST ELIMINATOR SECTION. RILEY AND CILCO INITIATED MODIFICATIONS TO THE DESIGN OF THE MODULE. SPECIFICALLY, A ROD DECK WAS CHANGED IN THE ABSORBER, PRESSURE DROP ACROSS THE ABSORBER WAS INCREASED, PIPING AND PUMP LINER MATERIALS WERE MODIFIED/REPLACED, AND A FRESH WATER WASH SYSTEM WAS IN-

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

STALLED FOR THE MIST ELIMINATOR.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/76	SYSTEM				.0		744		0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE MODULE REMAINED OUT OF SERVICE THE ENTIRE MONTH. DURING THIS TIME, THE BOILER FIRED LOW SULFUR (0.6%) KENTUCKY COAL.

1/77	SYSTEM				.0		744	0	0	.0
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2/77	SYSTEM				.0		672	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE NO. 1 UNIT WAS DOWN THROUGHOUT THE ENTIRE JANUARY-FEBRUARY PERIOD FOR TURBINE/BOILER OVERHAUL. DURING THE UNIT OUTAGE, A NUMBER OF MODIFICATIONS WERE MADE TO THE SCRUBBER.

3/77	SYSTEM				47.0		744		350	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE NO. 1 UNIT WAS RETURNED TO SERVICE IN MID-MARCH. THE SCRUBBER WAS PLACED IN SERVICE TO TEST THE MODIFICATIONS MADE DURING THE PRECEDING OUTAGE. THESE MODIFICATIONS INCLUDED:

THE MIST ELIMINATOR SPRAY WASH SYSTEM PIPING WAS CHANGED FROM PVC TO FRP MATERIALS. ALSO, AN ADDITIONAL SPRAY HEADER WAS ADDED.

THE SLURRY CIRCULATION SYSTEM WAS REVAMPED.

NEOPRENE PUMP LINERS HAVE REPLACED THE ORIGINAL RUBBER LINERS.

FLUSH/DRAIN SYSTEMS HAVE BEEN INCLUDED TO MINIMIZE SOLIDS BUILD UP.

PIPING VALVES MOVED CLOSER TO THE RECYCLE TANK.

SLURRY STORAGE TANKS EQUIPPED WITH FLUSH/DRAIN SYSTEMS.

ADDITIONAL MIXERS ADDED FOR GREATER AGITATION TO PROMOTE PROCESS CHEMISTRY.

DURING THE LAST PART OF MARCH THE MODULE REMAINED IN SERVICE ON A CONTINUAL BASIS WITH THE EXCEPTION OF A FEW MINOR BOILER OUTAGES. CILCO INTENDS TO CONTINUE EXPERIMENTAL OPERATIONS THROUGHOUT THE APRIL-MAY PERIOD, TESTING THE MECHANICAL MODIFICATIONS AND THE AUTOMATIC CONTROL LOOPS (SYSTEM CHEMISTRY WILL BE CONTROLLED BY INLET/OUTLET SO2 LOADING, SOLUTION PH, SOLUTION SOLIDS. OPERATION UP TO THIS POINT HAS PROCEEDED IN A MANUAL CONTROL MODE). CONTINUED OPERATION BEYOND THIS TIME FRAME WILL DEPEND UPON THE SUCCESS OF EXPERIMENTAL OPERATIONS. CILCO HAS THE OPTION OF FIRING LOW SULFUR COAL UNTIL THE ENTIRE 4-MODULE SCRUBBER PLANT IS READY FOR SERVICE IN AUGUST 1978.

4/77	SYSTEM				.0		720		0	
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5/77	SYSTEM				.0		744		0	
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6/77	SYSTEM				.0		720		0	
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7/77	SYSTEM				.0		744		0	
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8/77	SYSTEM				.0		744		0	
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9/77	SYSTEM				.0		720		0	
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10/77	SYSTEM				.0		744		0	
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11/77	SYSTEM				.0		720		0	
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12/77	SYSTEM				.0		744		0	
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1/78	SYSTEM				.0		744		0	
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

2/78	SYSTEM				.0			672		0	
3/78	SYSTEM				.0			744		0	
4/78	SYSTEM				.0			720		0	
5/78	SYSTEM				.0			744		0	
6/78	SYSTEM				.0			720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT CONTINUED TO FIRE LOW-SULFUR COLORADO COAL DURING THE REPORT PERIOD. THE RESTART OF SCRUBBER OPERATIONS CONTINUES TO BE SCHEDULED FOR AUGUST 1978.

7/78 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

ALL FOUR MODULES BECAME OPERATIONAL ON JULY 24.

MODIFICATIONS WERE MADE TO THE UNDER DESIGNED SLURRY TRANSFER TANK.

A PLUGGING PROBLEM CAUSED BY COAL FINES IN THE SLURRY WAS EXPERIENCED. THE FINES RESULTED FROM A COMMON COAL AND LIMESTONE HANDLING SYSTEM.

8/78	SYSTEM	45.0	46.0	46.0	42.0		744	691	315	62.5
9/78	SYSTEM	46.0	46.0	46.0	44.0		720	691	317	62.5

** PROBLEMS/SOLUTIONS/COMMENTS

SCREEN BASKETS WERE USED TO KEEP COAL PARTICLES FROM THE LIMESTONE. THE COAL PARTICLES RESULT FROM THE COMMON COAL-LIMESTONE HANDLING SYSTEM.

THE SLURRY TRANSFER SYSTEM PREVENTED PROPER SLURRY FLOW DUE TO UNDER DESIGN. THE OLD SYSTEM WAS REPLACED WITH A NEW PIPING SYSTEM.

PLUGGING OF THE RECYCLE PUMP SHUT-OFF VALVES OCCURED. THE VALVES ARE BEING REPLACED WITH PINCH VALVES.

THE SCRUBBER WASTE WATER SUMP PUMPS HAVE BEEN PLUGGING. NEW PUMPS ARE BEING INVESTIGATED.

10/78	A	19.1	31.6	31.6	19.1					
	B	22.5	37.2	37.2	22.5					
	C	.8	1.3	1.3	.8					
	D	20.5	33.9	33.9	20.5					
	SYSTEM	15.7	26.0	26.0	15.7		744	449	117	32.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE MAJOR CAUSES FOR DOWNTIME OCCURRING IN OCTOBER WERE VALVE LEAKS AND SUBSEQUENT RECYCLE GLAND SEAL CONTAMINATION AND THE INSTALLATION OF A LIQUID/SOLID SEPARATOR.

A LEAKING VALVE RESULTED IN CONTAMINATION OF THE RECYCLE PUMP GLAND SEAL WATER SYSTEM WITH POND RETURN WATER CAUSING SCALING AND PLUGGING FORCING SHUTDOWN OF THE RECYCLE PUMPS. A NEW VALVE SYSTEM WAS INSTALLED AND THE OPERATING PRESSURES WERE CHANGED TO PREVENT RECURRENCE OF THE CONTAMINATION.

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THE RECYCLE PUMPS WERE SHUT DOWN WHEN CONTAMINATION OF THE GLAND SEAL WATER SYSTEM CAUSED BY A FAULTY VALVE OCCURRED.

A FLOW CONTROL VALVE ON THE D-MODULE WAS REMOVED BECAUSE IT CAUSED ABRASION AND FAILURE OF THE RECYCLE HEADER. NONE OF THE MODULES NOW UTILIZE FLOW CONTROL VALVES.

THE MIST ELIMINATOR SPRAY NOZZLES PLUGGED BY COAL PARTICLES WERE CLEANED THE COAL PARTICLES RESULT FROM A COMMON COAL/LIMESTONE HANDLING SYSTEM. A LIQUID/SOLID SEPARATOR HAS BEEN INSTALLED IN THE SLURRY SYSTEM TO PREVENT RECURRENCE.

EXCESSIVE LIMESTONE CARRYOVER TO THE MIST ELIMINATOR WAS NOTED. THE TOP ROD DECK WAS REMOVED TO IMPROVE GAS FLOW AND ELIMINATE THE CARRYOVER PROBLEM.

BLANK OFF PLATES WERE ADDED TO THE LOWER SEVEN ROD DECKS TO MAINTAIN PRESSURE DROP REQUIREMENTS. THIS HAS BEEN FOUND TO BE AN ACCEPTABLE SOLUTION AT OTHER ENVIRONEERING FGD SYSTEM INSTALLATIONS.

11/78	A	8.1	8.8	8.8	8.1				
	B	8.1	8.8	8.8	8.1				
	C	8.1	8.8	8.8	8.1				
	D	8.1	8.8	8.8	8.1				
	SYSTEM	8.1	8.8	8.8	8.1	720	661	59	63.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE 1B SLURRY TANK PUMP LINER EXPERIENCED A FAILURE RESULTING IN SCRUBBING SYSTEM SHUTDOWN FOR 84 HOURS. THE LINER FAILED AFTER ONLY THREE MONTHS. THE SPARE PUMP WAS ALREADY OUT OF SERVICE FOR A MOTOR REPLACEMENT.

A SPARE SLURRY TANK PUMP WAS OUT OF SERVICE TO REPLACE THE ORIGINAL 50-HP MOTOR WITH A 75-HP MOTOR.

THE PINION BEARING ON THE BALL MILL DRIVE FAILED. THE FAILURE IS BEING INVESTIGATED. FGD SYSTEM OPERATION WAS HALTED DUE TO THE FAILURE. THIS ACCOUNTED FOR MOST OF THE NOVEMBER OUTAGE TIME.

THE LEVEL AND DENSITY INSTRUMENTS ON RECYCLE TANKS ARE BEING MODIFIED.

THE LEEDS & NORTHRUP LEVEL AND DENSITY TRANSMITTERS ARE BEING REPLACED WITH ROSEMOUNT TRANSMITTERS.

12/78	A	23.3	24.5	24.5	23.3				
	B	26.2	27.6	27.6	26.2				
	C	21.3	22.5	22.5	21.3				
	D	10.2	10.8	10.8	10.2				
	SYSTEM	20.3	21.4	21.4	20.3	744	706	151	70.3

** PROBLEMS/SOLUTIONS/COMMENTS

ISOLATION DAMPER FAILURES AND SLURRY RECYCLE DISCHARGE VALVE FAILURES OCCURRED DURING DECEMBER.

LIMESTONE MILL PROBLEMS AND A PLUGGED LIMESTONE FEEDER HAMPERED SCRUBBER OPERATIONS DURING DECEMBER.

THE SYSTEM EXPERIENCED FROZEN INSTRUMENT CONTROL LINES IN DECEMBER. THIS WAS THE MAJOR CAUSE OF THE DECEMBER SCRUBBER UNAVAILABILITY.

1/79	SYSTEM	.0	.0	.0	.0	744	738	0	77.0
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-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

FROZEN INSTRUMENT CONTROL LINES, RECYCLE TANK SUCTION LINES, MAIN MODULE DRAIN LINES AND MIST ELIMINATOR DRAIN LINES WERE MAJOR PROBLEM AREAS DURING JANUARY.

SLURRY RECYCLE VALVE PLUGGING AND SLURRY TRANSFER PUMP FAILURE CONTRIBUTED TO THE SYSTEM OUTAGE TIME.

2/79	SYSTEM	.0	.0	.0	.0	672	533	0	63.8
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** PROBLEMS/SOLUTIONS/COMMENTS

RECYCLE PUMP SUCTION VALVE FAILURES AND A SLURRY TRANSFER PUMP FAILURE CONTRIBUTED TO THE NON-OPERATION OF THE FGD SYSTEM.

FROZEN MIST ELIMINATOR DRAINS, ABSORBER DRAINS AND INSTRUMENT LINES WERE A MAJOR PROBLEM DURING FEBRUARY.

3/79	A	33.7	31.1	31.1	31.1				
	B	6.7	6.7	6.7	6.7				
	C	.0	.0	.0	.0				
	D	.0	.0	.0	.0				
	SYSTEM	10.1	9.5	9.5	9.5	744	744	70	

** PROBLEMS/SOLUTIONS/COMMENTS

FREEZING PROBLEMS CONTINUED TO HAMPER FGD OPERATIONS DURING MARCH. THE C AND D MODULE WERE STILL NOT BACK IN SERVICE DUE TO MAJOR CLEAN-UP FROM THE FREEZING PROBLEMS.

BROKEN MIST ELIMINATOR SPRAY LINES AND PLUGGED MIST ELIMINATOR NOZZLES WERE PROBLEM AREAS DURING MARCH.

RECYCLE PUMP FAILURES AND WASTE WATER PUMP FAILURES WERE EXPERIENCED DURING MARCH.

PLUGGED SLURRY NOZZLES AND GENERAL INSTRUMENTATION PROBLEMS WERE REPORTED BY THE UTILITY.

4/79	A	100.0	71.9	100.0	67.3				
	B	84.3	50.5	75.0	47.3				
	C	86.5	81.2	84.9	76.0				
	D	21.3	22.7	21.3	21.3				
	SYSTEM	73.0	56.6	70.3	53.0	720	674	380	55.9

** PROBLEMS/SOLUTIONS/COMMENTS

INLET DAMPER MALFUNCTIONS HINDERED FGD OPERATION DURING APRIL.

PLUGGED MIST ELIMINATOR SPRAY NOZZLES DURING APRIL HINDERED FGD OPERATION.

SLURRY CONTROL VALVE MALFUNCTIONS WERE REPORTED BY THE UTILITY.

RECYCLE TANK MIXER FAILURES WERE EXPERIENCED DURING APRIL.

RECYCLE PUMP BELT AND BEARING FAILURES AND SLURRY SUPPLY LINE FAILURES WERE REPORTED BY THE UTILITY.

5/79	A	95.7	37.4	69.7	9.9				
	B	95.7	44.2	73.2	11.7				
	C	94.7	41.8	71.1	11.1				

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
	D	1.3	5.0	1.3	1.3				
	SYSTEM	71.9	32.1	53.8	8.5		744	197	63 14.8

** PROBLEMS/SOLUTIONS/COMMENTS

MIST ELIMINATOR PUMP MALFUNCTIONS WERE REPORTED DURING MAY. MODULE D WAS UNAVAILABLE DUE TO A MIST ELIMINATOR WASH LINE FAILURE.

MILL SHAKER BASKET DRIVE MOTOR FAILURES WERE ENCOUNTERED.

SLURRY SUPPLY LINE FAILURES OCCURRED DURING THE MONTH.

STACK LINER BLISTERING WAS DISCOVERED DURING A SPRING INSPECTION. REPAIRS WERE MADE. THE STACK WILL BE INSPECTED AGAIN IN MARCH 1980.

6/79	A	81.9	76.9	79.6	70.6				
	B	89.2	86.9	88.1	79.8				
	C	86.6	83.0	85.1	76.2				
	D	92.0	90.0	91.1	82.7				
	SYSTEM	87.4	84.2	86.0	77.3		720	661	557 70.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE SOME PROBLEMS WITH THE MIST ELIMINATOR WERE ENCOUNTERED. THESE PROBLEMS INCLUDED PLUGGING IN THE MIST ELIMINATOR AND THE MIST ELIMINATOR LINES AND A BROKEN MIST ELIMINATOR RETURN LINE.

THE UTILITY REPORTED STORAGE PUMP LEAKS, RECYCLE PUMP FAILURES, SLURRY SUPPLY LINE PLUGGING AND DAMPER AND MILL SHAKER BASKET FAILURES.

7/79	A	93.1	85.6	89.7	59.9				
	B	94.9	88.3	92.3	61.7				
	C	95.8	87.9	93.6	61.5				
	D	96.1	86.4	93.9	60.4				
	SYSTEM	95.0	87.1	92.4	60.9		744	520	453 48.7

** PROBLEMS/SOLUTIONS/COMMENTS

IN JULY THE MIST ELIMINATOR PLUGGED CAUSING OPERATIONAL PROBLEMS.

RECYCLE PUMP FAILURES WERE ENCOUNTERED DURING THE PERIOD.

8/79	A	3.0	4.0	3.0	3.0				
	B	26.1	31.4	24.0	23.4				
	C	13.6	18.3	13.6	13.6				
	D	9.5	12.7	9.5	9.5				
	SYSTEM	13.1	16.6	12.5	12.4		744	555	92 53.8

** PROBLEMS/SOLUTIONS/COMMENTS

IN AUGUST THE MIST ELIMINATOR AND THE MIST ELIMINATOR DRAIN LINES PLUGGED CAUSING EXTENSIVE DOWNTIME FOR MODULE CLEANING.

FAILURES WITH THE LIMESTONE SLURRY FORWARDING PUMP AND THE RECYCLE PUMP WERE ENCOUNTERED.

DAMPER MALFUNCTIONS WERE REPORTED BY THE UTILITY.

9/79	A	63.9	53.9	58.0	49.8				
	B	61.2	48.4	53.5	44.7				
	C	49.0	38.9	41.4	35.9				
	D	88.8	86.2	87.6	79.6				
	SYSTEM	65.7	56.9	60.1	52.5		720	665	378 69.1

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING IN THE MIST ELIMINATOR, MIST ELIMINATOR HEADER AND NOZZLES WERE ENCOUNTERED IN AUGUST CONTINUED IN SEPTEMBER.

THE DAMPER FAILED CAUSING A PROBLEM DURING SEPTEMBER.

THE UTILITY REPORTED MIST ELIMINATOR PUMP CAVITATION PROBLEMS RELATED TO MIST ELIMINATOR PROBLEMS ENCOUNTERED IN AUGUST.

PLUGGED SLURRY NOZZLES AND LIMESTONE CONVEYOR FAILURES CONTRIBUTED TO THE OUTAGES EXPERIENCED.

SCRUBBER UNAVAILABILITY WAS PRIMARILY A RESULT OF CARRY-OVER PLUGGING PROBLEMS FROM AUGUST AND SUBSEQUENT CLEAN-UP.

10/79	A	84.8	82.3	89.2	82.3				
	B	93.7	86.2	92.4	86.2				
	C	91.7	75.8	90.5	75.8				
	D	93.5	91.9	93.4	91.9				
	SYSTEM	90.9	84.1	91.4	84.1	744	744	625	72.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF OCTOBER PROBLEMS WERE ENCOUNTERED WITH THE MIST ELIMINATOR SECTIONS. THE MIST ELIMINATOR PUMP MALFUNCTIONED, THE LINES PLUGGED AND A HEADER FLANGE GASKET FAILED.

OUTAGE TIME RESULTED FROM THE MODULE ISOLATION DAMPER FAILURE INCLUDING DAMPER MOTOR MALFUNCTION.

THE SLURRY SUPPLY LINE NEEDED REPAIRS.

11/79	A	43.1	52.1	52.1	42.2				
	B	12.4	15.3	18.8	12.4				
	C	22.4	22.6	24.9	18.3				
	D	51.0	61.9	62.0	50.1				
	SYSTEM	32.2	38.0	39.5	30.8	720	583	221	61.2

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE ISOLATION DAMPER PROBLEMS CONTINUED DURING NOVEMBER.

THE MIST ELIMINATOR AND THE MIST ELIMINATOR DRAIN PLUGGED CAUSING DOWN TIME.

ALL RECYCLE PUMP SUCTION VALVES WERE REPLACED DURING THE MONTH. THIS WAS THE PRIMARY CAUSE FOR THE LOW SYSTEM AVAILABILITY.

SLURRY SUPPLY LINES FAILED AGAIN, DURING NOVEMBER.

12/79	A	54.5	72.6	77.6	53.5				
	B	35.1	47.6	51.0	35.1				
	C	43.0	58.4	61.9	43.0				
	D	25.5	34.6	40.9	25.5				
	SYSTEM	39.5	53.3	57.9	39.3	744	548	292	60.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE ISOLATION DAMPER FAILURES CONTINUED.

THE MIST ELIMINATOR PROBLEMS WITH PLUGGING AND HEADER RUPTURES OCCURRED DURING DECEMBER.

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THE MODULE B AND D RECYCLE TANK LINERS WERE REPAIRED AND TANK COVERS WERE
 INSTALLED.

MIST ELIMINATOR PLUGGING AND RECYCLE TANK REPAIRS ACCOUNTED FOR MOST OF
 THE DECEMBER SCRUBBER OUTAGE TIME.

1/80	A	24.8	27.0	29.8	24.8				
	B	58.5	63.6	65.9	58.5				
	C	17.1	18.6	20.3	17.1				
	D	29.2	31.8	35.3	29.3				
	SYSTEM	32.4	35.3	37.8	32.4	744	684	241	81.6

** PROBLEMS/SOLUTIONS/COMMENTS

MOST OF THE JANUARY OUTAGE TIME WAS REQUIRED FOR RECYCLE TANK COVERING
 WORK.

THE MIST ELIMINATOR SECTION PLUGGED ALONG WITH THE NOZZLES HINDERING
 SYSTEM OPERATIONS. THE MIST ELIMINATOR DRAIN LINE WAS MODIFIED ALSO
 CAUSING OUTAGE TIME.

OTHER PROBLEMS ENCOUNTERED DURING THE MONTH INCLUDED A PLUGGED LIMESTONE
 FEEDER, INLET DAMPER PROBLEMS, SLURRY SUPPLY HEADER LEAKS AND STORAGE
 PUMP DISCHARGE VALVE REPAIRS.

2/80	A	11.8	11.8	12.5	11.8				
	B	72.7	72.7	73.5	72.7				
	C	70.7	70.7	71.5	70.7				
	D	41.3	41.3	47.9	41.3				
	SYSTEM	49.1	49.1	51.4	49.1	696	696	342	73.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY SOME OUTAGE TIME WAS DUE TO MODULE D CLEANING AND THE
 CLEANING OF THE MODULE D MIST ELIMINATOR SECTION.

THE INLET DAMPER DRIVE WAS REPLACED DURING THE MONTH.

REPAIR OF THE FIBERGLASS ON THE SLURRY RECYCLE LINE HINDERED OPER-
 ATIONS DURING THIS MONTH.

THE MODULES A AND D RECYCLE DISCHARGE VALVE WERE REPLACED CAUSING EXTENSIVE
 DOWN TIME.

3/80	A	52.9	62.5	64.7	52.9				
	B	73.2	86.6	86.9	73.2				
	C	51.0	60.3	60.5	51.0				
	D	34.0	40.2	45.9	34.0				
	SYSTEM	52.8	62.4	65.1	52.8	744	629	393	68.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH NEW RECYCLE PUMP DISCHARGE VALVES WERE INSTALLED IN ORDER TO
 ELIMINATE RESTRICTED FLOW OF THE OLD VALVES.

CARRIER BEARINGS ON THE INLET DAMPER WERE REPLACED IN ORDER TO MAINTAIN
 MODULE ISOLATION CAPABILITY.

THE MIST ELIMINATOR WASH SYSTEM WAS CONVERTED TO RETURN WATER IN ORDER
 TO ACHIEVE A HIGHER QUALITY ELIMINATION WASH WATER.

FIBERGLASS LINES ON THE RECYCLE PUMP DISCHARGE WERE ALSO REPAIRED DURING
 EXTENSIVE

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

4/80	A	53.0	81.7	95.9	52.9					
	B	54.2	83.6	87.5	54.2					
	C	57.2	88.3	95.3	57.2					
	D	26.0	40.1	71.9	26.0					
	SYSTEM	47.6	73.4	89.2	47.6		720	466	342	35.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE MAJOR PROBLEM HINDERING SYSTEM OPERATIONS DURING APRIL WAS THE REBUILD OF THE RECYCLE TANK MIXER.

MINOR PROBLEMS DURING THE MONTH WERE CAUSED BY THE INOPERABILITY OF THE LIMESTONE HANDLING SYSTEM.

5/80	A	44.6	68.6	72.0	44.6					
	B	45.7	70.3	73.5	45.7					
	C	34.7	53.3	59.1	34.7					
	D	43.6	67.0	73.9	43.6					
	SYSTEM	42.1	64.8	69.7	42.1		744	484	314	49.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY REPAIRS WERE MADE TO THE RECYCLE TANK RUBBER LINER.

EXPANSION JOINT LEAKS WERE ALSO REPAIRED DURING THE MONTH.

OTHER OPERATIONAL PROBLEMS INCLUDED THE REPLACEMENT OF THE LIMESTONE STORAGE TANK MIXER MOTOR, MODIFICATION OF ROD DECKS TO REDUCE SYSTEM DIFFERENTIAL PRESSURE AND REPAIR OF THE LIMESTONE FEEDER SYSTEM.

6/80	A	87.6	82.3	87.1	82.1					
	B	86.8	82.6	86.0	82.3					
	C	84.5	81.4	84.3	81.1					
	D	80.0	73.1	75.8	72.9					
	SYSTEM	84.8	79.9	84.3	79.6		720	718	573	78.5

** PROBLEMS/SOLUTIONS/COMMENTS

A LEAK WAS REPAIRED IN THE SLURRY SUPPLY HEADER DURING JUNE.

WORK CONTINUED ON THE MODIFICATIONS BEING DONE ON THE ROD DECKS IN THE ABSORBER MODULES.

7/80	A	91.2	81.0	87.6	70.1					
	B	83.5	70.0	80.0	60.6					
	C	90.5	78.8	86.4	68.2					
	D	87.5	74.9	85.4	64.8					
	SYSTEM	88.2	76.2	84.9	65.9		744	644	490	67.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY FGD SYSTEM OUTAGE TIME RESULTED FROM THE NECESSARY REPAIR OF THE SLURRY SUPPLY LINE AND REPAIR OF THE MALFUNCTIONING CLUTCH IN THE MILL SYSTEM.

ADDITIONAL OUTAGE TIME OCCURRED SO REPAIRS TO THE 1B STORAGE TANK PUMP DISCHARGE VALVES AND THE STORAGE TANK MIXER MOTOR COULD BE COMPLETED.

8/80	A	88.6	85.4	92.7	81.9					
	B	91.4	86.3	90.8	82.7					
	C	91.3	84.6	88.9	81.0					
	D	90.6	85.1	90.1	81.6					
	SYSTEM	90.5	85.4	90.7	81.9		744	713	609	76.5

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE SLURRY SUPPLY ISOLATION VALVE WAS REPAIRED IN AUGUST.

THE POND WATER RETURN LINE WAS ALSO REPAIRED DURING THE MONTH.

REPAIRS WERE MADE TO THE ELECTRICAL SYSTEM AFTER A POWER FAILURE IN THE WASTEWATER BUILDING.

9/80	A	43.1	39.2	41.5	39.2				
	B	47.8	47.2		48.2				
	C	45.6	43.2	45.9	43.2				
	D	46.3	46.0	47.6	46.0				
	SYSTEM	45.6	43.9	45.9	43.9	720	720	316	81.3

** PROBLEMS/SOLUTIONS/COMMENTS

MAJOR PROBLEMS DURING SEPTEMBER INCLUDED REPAIR OF THE LIMESTONE BALL MILL. AFTER IT WAS REPAIRED, THE BALL MILL MOTOR BURNED OUT AND HAD TO BE REPLACED.

SLURRY CONTAMINATION OF THE MILL BEARING OIL AND REPAIR OF THE RECYCLE PUMP SUCTION SCREEN CAUSED THE FGD SYSTEM TO BE DOWN FOR SEVERAL HOURS DURING THE MONTH.

10/80	A	73.0	73.0	75.9	73.0				
	B	73.3	65.9	71.8	65.9				
	C	74.2	74.1	75.8	74.1				
	D	73.4	73.2	76.6	73.2				
	SYSTEM	72.8	71.5	75.1	71.6	744	744	532	64.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE FGD SYSTEM WAS DOWN APPROXIMATELY 168 HOURS DUE TO PROBLEMS WITH THE LIMESTONE BALL MILL MOTOR.

SOME OUTAGE TIME DURING THE MONTH WAS DUE TO NECESSARY REPAIRS TO THE RECYCLE TANK PUMP AND PROBLEMS WITH THE DISCHARGE VALVE ON THE STORAGE TANK PUMP.

11/80	A	98.9	92.3	100.0	70.3				
	B	96.2	88.1	97.2	67.1				
	C	99.2	91.8	99.6	69.9				
	D	95.4	82.7	100.0	62.9				
	SYSTEM	97.4	88.7	99.2	67.5	720	548	486	50.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE FGD SYSTEM WAS OFF LINE FOR APPROXIMATELY 192 HOURS DUE TO A PLANT OUTAGE (BOILER RELATED).

THE FRESH WATER FLUSH VALVE IN THE MIST ELIMINATOR FAILED ADDING TO THE OUTAGE TIME DURING NOVEMBER.

REPAIRS WERE MADE TO THE RECYCLE TANK SUCTION SCREEN CAUSING SOME OUTAGE TIME.

12/80	A	93.5	92.6	94.1	92.2				
	B	94.9	93.9	95.9	93.5				
	C	87.2	86.0	90.7	85.6				
	D	94.0	93.0	96.0	92.6				
	SYSTEM	92.4	91.4	94.2	91.0	744	741	677	79.7

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MINOR PROBLEMS WERE REPORTED FOR DECEMBER, INCLUDING PLUGGING OF RECYCLE TANK PUMP SUCTION SCREENS. REPAIRS WERE MADE DURING THE MONTH TO THE "B" MODULE OUTLET DAMPER AND THE "C" MODULE INLET DAMPER.

1/81	A	92.2	92.1	94.9	92.1				
	B	94.9	94.9	97.8	94.8				
	C	94.2	94.1	98.0	94.1				
	D	88.6	88.6	94.4	88.6				
	SYSTEM	92.5	92.4	96.3	92.4	744	744	687	77.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY SOME OUTAGE TIME WAS DUE TO THE PLUGGING OF THE RECYCLE TANK PUMP SUCTION SCREENS.

REPAIRS WERE MADE TO THE INLET DAMPER OF MODULE C AND THE RECYCLE TANK PUMP OF MODULE D DURING THE MONTH.

2/81	A	95.2	95.8	100.0	94.2				
	B	80.2	81.5	96.9	80.2				
	C	95.1	95.6	100.0	94.0				
	D	94.0	94.6	99.8	93.0				
	SYSTEM	91.1	91.8	99.2	90.3	672	661	607	59.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY PROBLEMS WERE ENCOUNTERED THAT NECESSITATED REPAIRS TO THE LIMESTONE CONVEYOR BELT AND THE SLURRY SUPPLY TANK AND LINES.

3/81	A	93.8	88.5	91.6	85.1				
	B	82.5	79.9	84.7	76.9				
	C	84.7	81.5	85.5	78.4				
	D	86.8	84.1	90.8	80.8				
	SYSTEM	86.9	83.5	88.2	80.2	744	715	597	68.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH OUTAGE TIME WAS DUE TO THE REPLACEMENT OF THE LIMESTONE MILL HIGH LIFT PUMP AND THE SLURRY STORAGE TANK PUMP, BOTH LIMITING THE LIMESTONE SLURRY SUPPLY. THE RECYCLE TANK PUMP ON MODULE C WAS ALSO REPLACED.

ADDITIONAL OUTAGE TIME WAS CAUSED BY PLUGGING IN THE MIST ELIMINATOR SECTION OF ALL THE MODULES.

4/81	A	26.2	27.1	28.1	23.3				
	B	27.1	28.1	29.5	24.2				
	C	44.8	29.1	30.2	25.0				
	D	52.1	28.4	29.5	24.4				
	SYSTEM	37.5	28.1	29.2	24.2	720	619	174	58.6

** PROBLEMS/SOLUTIONS/COMMENTS

EXTENSIVE PLUGGING THROUGHOUT EACH MODULE WAS OBSERVED AT THE BEGINNING OF APRIL, RESULTING IN THE NEED FOR EXTENSIVE MAINTENANCE CLEANING, REPAIRS, AND UPGRADING OF EACH MODULE. THE MODULES WERE TAKEN OUT OF SERVICE TWO AT A TIME SO THAT THE WORK COULD BE PERFORMED.

THE ISOLATION DAMPERS ON ALL FOUR MODULES HAVE BEEN A CONTINUAL PROBLEM. THE DAMPERS STICK AND FAIL TO SEAL TIGHTLY RESULTING IN GASEOUS CONDITIONS FOR MAINTENANCE CREWS. THE UTILITY IS PRESENTLY INVESTIGATING THE SITUATION.

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

5/81	A	68.7	67.0	69.1	65.9					
	B	68.1	66.4	69.2	65.3					
	C	76.4	69.9	71.4	68.7					
	D	71.4	69.8	73.4	68.5					
	SYSTEM	69.9	68.3	70.8	67.1		744	731	499	64.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY MAJOR REPAIR TO THE MODULE C FAN RESULTED IN LOW SYSTEM AVAILABILITY DUE TO THE NEED FOR BYPASSING AROUND THE MODULE. PROBLEMS WITH OPERATION OF THE MODULE C ISOLATION DAMPER AS WELL AS EXPANSION JOINT LEAKAGE, RESULTED IN GASEOUS WORKING CONDITIONS SUCH THAT REPAIR WORK COULD NOT BE PERFORMED WITH THE SCRUBBER IN SERVICE.

PROBLEMS PERSIST WITH ALL THE ISOLATION DAMPERS.

6/81	1	69.9	60.0	67.4	51.5					
	B	71.3	63.9	71.2	54.8					
	C	72.4	65.2	70.5	55.9					
	D	70.3	61.6	69.5	52.9					
	SYSTEM	71.0	62.7	69.6	53.8		720	618	387	52.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE WORK ON THE MODULE C ID FAN CONTINUED. DUE TO THE CONTINUAL DAMPER PROBLEMS THE MODULE WAS TAKEN OUT OF SERVICE SO THAT THE REPAIRS COULD BE COMPLETED.

7/81	A	78.2	62.4	73.0	53.4					
	B	75.8	62.3	75.7	53.2					
	C	80.5	64.2	75.1	54.8					
	D	53.6	62.7	75.1	53.6					
	SYSTEM	72.0	62.9	74.7	53.8		744	636	400	56.4

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH OPERATION OF THE ISOLATION DAMPERS AND EXPANSION JOINT LEAKAGE DURING THE MONTH RESULTED IN LOW SYSTEM AVAILABILITY DUE TO THE NEED FOR BYPASSING FLUE GAS TO ELIMINATE GASEOUS WORKING CONDITIONS DURING MAINTENANCE OPERATIONS.

SIGNIFICANT REPAIR WORK WAS REQUIRED DURING THE MONTH ON THE MODULE A,B, AND D RECYCLE PUMPS.

8/81	A	79.4	78.6	80.0	78.6					
	B	79.7	78.9	79.6	78.9					
	C	79.6	78.9	80.3	78.9					
	D	60.3	60.3	62.6	60.3					
	SYSTEM	74.8	74.2	75.6	74.2		744	744	552	75.0

** PROBLEMS/SOLUTIONS/COMMENTS

ISOLATION DAMPER AND EXPANSION JOINT PROBLEMS CONTINUED TO LOWER THE OVERALL FGD SYSTEM AVAILABILITY.

MIXER REPAIR ON THE MODULE D RECYCLE TANK RESULTED IN LOW MODULE AVAILABILITY.

10/81	SYSTEM	.0			.0		744	0	0	.0
11/81	A	32.9	82.6	93.7	26.9					
	B	32.9	82.6	93.7	26.9					

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
	C	32.6	82.1	93.4	26.8						
	D	24.5	67.9	81.9	22.2						
	SYSTEM	30.7	78.8	90.8	25.7			720	235	185	20.7

** PROBLEMS/SOLUTIONS/COMMENTS

A MAJOR UNIT OUTAGE STARTED ON SEPTEMBER 18 AND CONTINUED THROUGH OCTOBER AND ENDED ON NOVEMBER 21. DURING THIS TIME THE SCRUBBER WAS DRAINED OF SLURRY AND CLEANED. ISOLATION DAMPER SEAL AIR PROBLEMS RESULTED IN LOW AVAILABILITY DURING OPERATING PERIODS. IT WAS NECESSARY TO BYPASS THE SYSTEM TO ELIMINATE HAZARDOUS WORKING CONDITIONS DURING MAINTENANCE OPERATIONS.

12/81	A	80.3	81.2	81.5	68.1						
	B	81.0	81.6	83.6	68.4						
	C	76.9	81.0	82.5	67.9						
	D	82.1	83.8	84.1	70.3						
	SYSTEM	80.1	81.9	82.9	68.7			744	624	511	63.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER ISOLATION DAMPER SEAL AIR PROBLEMS RESULTED IN LOW AVAILABILITY DURING OPERATING PERIODS. IT WAS NECESSARY TO BYPASS THE SYSTEM TO ELIMINATE HAZARDOUS WORKING CONDITIONS DURING MAINTENANCE OPERATIONS.

1/82	A	79.1	74.4	76.7	72.4						
	B	73.4	68.6	71.5	66.7						
	C	73.8	69.0	71.0	67.1						
	D	67.3	69.1	71.9	67.3						
	SYSTEM	73.4	70.3	72.8	68.4			744	724	509	70.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCHEDULED BOILER OUTAGE THAT STARTED AT THE END OF DECEMBER ENDED ON JANUARY 4.

THE LOW SYSTEM AVAILABILITY DURING JANUARY WAS PARTIALLY DUE TO THE LIME-STONE IN THE STORAGE PILE BEING FROZEN LIMITING ITS DELIVERY TO THE FGD SYSTEM.

LOW AVAILABILITY WAS ALSO DUE TO ISOLATION DAMPER SEAL AIR PROBLEMS RE-QUIRING THE NEED FOR BY-PASSING FLUE GAS TO ELIMINATE HAZARDOUS WORKING CONDITIONS DURING MAINTENANCE OPERATIONS.

2/82	A	53.6	53.6	53.6	53.6						
	B	54.5	54.5	54.5	54.5						
	C	49.3	49.3	49.3	49.3						
	D	55.5	55.5	55.5	55.5						
	SYSTEM	53.2	53.2	53.2	53.2			672	672	358	76.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE LOW AVAILABILITY DURING THE MONTH OF FEBRUARY WAS PRIMARILY DUE TO SEVERE PLUGGING OF THE MODULES.

THE ISOLATION DAMPER SEAL AIR PROBLEMS CONTINUED THROUGHOUT FEBRUARY.

3/82	A	32.9	46.6	46.8	32.9						
	B	35.5	50.2	50.4	35.5						
	C	35.7	50.5	50.7	35.7						
	D	34.4	48.7	48.8	34.4						
	SYSTEM	34.6	49.0	49.2	34.6			744	526	258	53.9

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE LOW AVAILABILITY IN MARCH WAS DUE TO SEVERE PLUGGING OF THE ABSORBER MODULES.

MODULE ISOLATION DAMPER SEAL AIR PROBLEMS CONTINUED THROUGH MARCH.

ON MARCH 23 THE UNIT WAS TAKEN OUT OF SERVICE FOR A SCHEDULED OUTAGE. THE UNIT REMAINED OFF-LINE THROUGH THE END OF THE MONTH.

4/82	A	12.2	37.7	46.1	11.0				
	B	19.0	58.9	65.3	15.6				
	C	21.3	66.0	65.6	15.7				
	D	21.3	66.2	65.8	15.8				
	SYSTEM	18.4	57.2	60.7	14.5	720	232	105	17.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCHEDULED OUTAGE STARTED IN MARCH CONTINUED THROUGH TO APRIL 26. DURING THE OUTAGE THE MODULES WERE CLEANED EXTENSIVELY. THIS HAS SHOWN MUCH IMPROVEMENT IN THE SYSTEM'S RELIABILITY.

5/82	A	91.1	91.1	91.1	91.1				
	B	92.2	92.2	92.2	92.2				
	C	91.9	91.9	91.9	91.9				
	D	91.7	91.7	91.7	91.7				
	SYSTEM	91.7	91.7	91.7	91.7	744	744	682	66.9

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE ISOLATION DAMPER SEAL AIR PROBLEMS CONTINUE TO REDUCE THE AVAILABILITY DUE TO THE NEED FOR BY-PASSING FLUE GAS TO ELIMINATE GASEOUS WORKING CONDITIONS DURING MAINTENANCE OPERATIONS.

6/82	A	83.6	83.6	83.6	83.6				
	B	91.6	91.6	91.6	91.6				
	C	91.7	91.7	91.7	91.7				
	D	92.5	92.5	92.5	92.5				
	SYSTEM	89.9	89.9	89.9	89.9	720	720	647	68.2

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE DOWN TIME DURING JUNE WAS TO REMOVE ANY SCALE ACCUMULATION AND TO CLEAN THE MODULES.

7/82	A	85.5	87.3	89.9	78.3				
	B	88.8	90.6	93.2	81.2				
	C	98.0	79.8	89.6	71.6				
	D	87.3	78.4	89.4	70.3				
	SYSTEM	89.9	84.0	90.5	75.3	744	667	560	57.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY.

8/82	A	95.0	95.0	98.5	95.0				
	B	97.4	97.4	98.3	97.4				
	C	91.6	91.1	96.9	91.1				
	D	96.5	93.5	97.6	93.5				
	SYSTEM	95.1	94.3	97.8	94.3	744	744	702	69.4

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.

9/82	A	83.3	81.5	95.3	76.6				
	B	88.3	86.5	96.0	81.3				
	C	87.5	86.5	95.9	81.3				
	D	84.7	82.4	99.4	77.5				
	SYSTEM	85.9	84.2	96.6	79.2	720	677	570	65.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING SEPTEMBER. SYSTEM AVAILABILITY WAS REDUCED ONLY BY BOILER OUTAGE TIME. RELIABILITY MORE ACCURATELY REFLECTS THE OPERATION OF THE SCRUBBER DURING SEPTEMBER.

10/82	A	93.6	93.4	96.0	93.4				
	B	95.9	95.9	96.3	95.9				
	C	95.5	91.5	96.0	91.5				
	D	92.7	92.7	94.6	92.7				
	SYSTEM	94.4	93.4	95.7	93.4	744	744	695	72.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING OCTOBER.

11/82	A	64.7	85.0	97.4	56.7				
	B	65.5	90.1	97.7	60.1				
	C	65.6	89.5	97.6	59.7				
	D	66.7	90.8	97.8	60.5				
	SYSTEM	65.6	88.9	97.6	59.2	720	480	426	43.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE UNIT WAS DOWN FOR CLEANING AND INSPECTION OF THE MODULES.

12/82	A	83.0	76.3	88.4	76.3				
	B	87.0	85.7	89.3	85.7				
	C	87.1	87.1	89.8	87.1				
	D	83.8	83.2	89.2	83.2				
	SYSTEM	85.2	83.1	89.2	83.1	744	744	618	63.0

** PROBLEMS/SOLUTIONS/COMMENTS

A MAJOR PROBLEM OCCURRED WITH THE LIMESTONE PREPARATION EQUIPMENT FROM DECEMBER 16 TO 23, 1982. THE LIMESTONE BALL MILL MOTOR FAILED AND HAD TO BE EXTENSIVELY REPAIRED. DURING THIS TIME AN EMERGENCY SYSTEM WAS SET UP SO THAT LIMESTONE IN A POWDERED FORM COULD BE CONVEYED TO THE SCRUBBER.

1/83	A	93.1	96.9	99.9	89.0				
	B	91.9	95.6	99.9	87.9				
	C	93.3	96.1	99.9	88.3				
	D	88.8	92.2	99.9	84.8				
	SYSTEM	91.7	95.2	99.9	87.5	744	684	651	63.8

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JANUARY.

2/83	A	61.9	97.2	100.0	61.9				
	B	61.4	96.3	100.0	61.4				
	C	62.3	97.8	100.0	62.3				
	D	57.4	90.1	100.0	57.4				
	SYSTEM	60.7	95.3	100.0	60.7	672	428	408	45.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OFF LINE FROM FEBRUARY 18 TO 28, 1983 TO REPAIR THE EXHAUST STACK.

3/83	SYSTEM	.0		.0		744	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OFF LINE FOR THE ENTIRE MONTH OF MARCH TO CONTINUE REPAIRING THE EXHAUST STACK.

4/83	A	.0		.0					
	B	.0		.0					
	C	.0		.0					
	D	.0		.0					
	SYSTEM	.0		.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OFF LINE DURING APRIL TO CONTINUE STACK LINER REPAIRS.

5/83	A	60.8	85.2	99.1	53.5				
	B	60.1	94.0	99.2	59.0				
	C	60.2	87.1	99.1	54.7				
	D	59.7	92.0	96.9	57.8				
	SYSTEM	60.2	89.6	98.6	56.2	744	467	418	40.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OUT OF SERVICE UNTIL MAY 13, 1983 DUE TO CONTINUED MAINTENANCE ON THE STACK LINER.

6/83	A	97.3	95.1	99.3	95.1				
	B	99.3	96.3	99.4	96.3				
	C	98.5	95.2	99.3	95.2				
	D	98.1	96.6	98.6	96.6				
	SYSTEM	98.3	95.8	99.1	95.8	720	720	690	71.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/83	A	100.0	98.7	100.0	98.7				
	B	100.0	97.7	100.0	97.7				
	C	100.0	98.0	100.0	98.0				
	D	100.0	97.8	100.0	97.8				
	SYSTEM	100.0	98.1	100.0	98.1	744	744	730	71.7
8/83	A	100.0	96.4	100.0	96.4				

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

	B	100.0	94.4	100.0	94.4					
	C	97.8	94.7	100.0	94.7					
	D	100.0	95.3	100.0	95.3					
	SYSTEM	99.5	95.2	100.0	95.2		744	744	708	70.3
9/83	A	93.3	89.4	100.0	89.1					
	B	100.0	95.0	100.0	94.7					
	C	97.2	92.5	100.0	92.3					
	D	99.7	95.3	100.0	95.0					
	SYSTEM	97.6	93.0	100.0	92.8		720	718	668	62.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER, 1983.

10/83	A	99.9	95.7	100.0	76.8					
	B	100.0	98.3	100.0	78.9					
	C	100.0	98.2	100.0	78.8					
	D	100.0	97.5	100.0	78.3					
	SYSTEM	100.0	97.4	100.0	78.2		744	597	582	54.6
11/83	A	97.5	91.0	100.0	81.9					
	B	100.0	91.9	100.0	82.7					
	C	100.0	94.0	100.0	84.6					
	D	98.6	91.6	100.0	82.5					
	SYSTEM	99.2	92.5	100.0	83.3		720	648	600	55.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OFF LINE FROM OCTOBER 25 TO NOVEMBER 4, 1983.

12/83	A	88.5	85.2	88.2	85.2					
	B	88.5	85.2	88.2	85.2					
	C	88.5	85.6	88.2	85.6					
	D	88.5	86.7	88.3	86.7					
	SYSTEM	88.5	85.7	88.2	85.7		744	744	638	69.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT SEVERE COLD WEATHER BETWEEN DECEMBER 24 AND 28 DISABLED THE COAL AND LIMESTONE HANDLING EQUIPMENT. LIMESTONE COULD NOT BE LOADED INTO THE FACILITY RESULTING IN THE LOSS OF THE LIMESTONE SLURRY SUPPLY. ALL FOUR MODULES WERE CONSIDERED UNAVAILABLE DURING THIS PERIOD.

1/84	A	94.1	89.0	93.5	81.9					
	B	94.3	86.4	93.6	79.4					
	C	94.0	89.2	93.2	82.0					
	D	93.7	87.6	92.7	80.5					
	SYSTEM	94.0	88.0	93.2	80.9		744	684	602	60.2
2/84	A	100.0	96.0	100.0	96.0					
	B	100.0	96.9	100.0	96.9					
	C	100.0	98.2	100.0	98.2					
	D	100.0	95.8	100.0	95.8					
	SYSTEM	100.0	96.7	100.0	96.7		696	696	673	70.3
3/84	A	100.0	96.1	100.0	91.3					
	B	100.0	95.1	100.0	90.4					
	C	97.8	94.2	99.5	89.5					
	D	100.0	93.7	100.0	89.1					
	SYSTEM	99.5	94.8	99.9	90.1		744	707	670	69.1

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE EXPERIENCED DURING THE FIRST QUARTER OF 1984.

4/84	A	88.9	97.4	100.0	86.6				
	B	88.9	90.6	100.0	80.5				
	C	88.9	96.4	100.0	85.7				
	D	86.9	89.2	100.0	79.3				
	SYSTEM	88.4	93.4	100.0	83.0	720	640	598	58.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS TAKEN OFF LINE ON APRIL 27 FOR INSPECTIONS AND MAINTENANCE.

5/84	A	35.1	84.6	100.0	27.8				
	B	32.1	80.2	100.0	26.3				
	C	35.1	84.8	100.0	27.8				
	D	34.1	81.7	100.0	26.8				
	SYSTEM	34.1	82.8	100.0	27.2	744	244	202	14.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OFF LINE UNTIL MAY 20 DUE TO INSPECTION AND MAINTENANCE.

6/84	A	99.6	95.4	99.5	89.5				
	B	99.4	95.3	99.4	89.4				
	C	99.6	94.1	99.5	88.3				
	D	99.1	94.6	99.5	88.8				
	SYSTEM	99.4	94.8	99.5	89.0	720	676	641	64.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OFF LINE FROM JUNE 15 UNTIL JUNE 18 FOR UNSPECIFIED REASONS.

7/84	A	99.5	98.2	99.9	97.8				
	B	99.5	97.9	99.9	97.5				
	C	99.5	98.4	99.9	98.0				
	D	99.5	92.7	99.9	92.3				
	SYSTEM	99.5	96.8	99.9	96.4	744	741	717	67.2

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING JULY.

8/84	SYSTEM					744			
9/84	SYSTEM					720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	CENTRAL ILLINOIS PUBLIC SERV
PLANT NAME	NEWTON
UNIT NUMBER	1
CITY	NEWTON
STATE	ILLINOIS
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	575
GROSS UNIT GENERATING CAPACITY - MW	617
NET UNIT GENERATING CAPACITY W/FGD - MW	575
NET UNIT GENERATING CAPACITY WO/FGD - MW	590
EQUIVALENT SCRUBBED CAPACITY - MW	617
 ** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1020.95 (2163480 ACFM)
BOILER FLUE GAS TEMPERATURE - C	163.9 (327 F)
STACK HEIGHT M	162. (530 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	***** (***** FT)
 ** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	25353. (10900 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****
AVERAGE ASH CONTENT - %	12.70
RANGE ASH CONTENT - %	*****
AVERAGE MOISTURE CONTENT - %	9.50
RANGE MOISTURE CONTENT - %	*****
AVERAGE SULFUR CONTENT - %	3.00
RANGE SULFUR CONTENT %	2.8-3.2
AVERAGE CHLORIDE CONTENT %	.20
RANGE CHLORIDE CONTENT %	*****
 *** PARTICLE CONTROL	
 ** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
 ** FABRIC FILTER	
NUMBER	0
TYPE	NONE
 ** ESP	
NUMBER	1
TYPE	COLD SIDE
SUPPLIER	RESEARCH-COTTRELL
INLET FLUE GAS CAPACITY - CU.M/S	1080.7 (2290000 ACFM)
INLET FLUE GAS TEMPERATURE - C	162.8 (325 F)
PRESSURE DROP KPA	.0 (0. IN-H2O)
PARTICLE REMOVAL EFFICENCY %	99.5
 ** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A

CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	DUAL ALKALI
SYSTEM SUPPLIER	GE ENVIRONMENTAL SERVICES
A-E FIRM	BUELL DIVISION, ENVIROTECH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	2.4
CURRENT STATUS	1
COMMERCIAL START-UP	12/79
INITIAL START-UP	9/79
CONTRACT AWARDED	8/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00
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** QUENCHER/PRESATURATOR

NUMBER	4
TYPE	PRECOOLER
CONSTRUCTION MATERIAL GENERIC TYPE	NR

** ABSORBER

NUMBER	4
NUMBER OF SPARES	0
GENERIC TYPE	PACKED TOWER
SPECIFIC TYPE	MOBILE BED PACKING
TRADE NAME/COMMON TYPE	POLYSPHERE SCRUBBER
SUPPLIER	BUELL DIVISION, ENVIROTECH
DIMENSIONS - FT	18.0 X 48.0 X 72.0
SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A
LINER GENERIC MATERIAL	ORGANIC
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER
LINER MATERIAL TRADE NAME/COMMON TYPE	NR
GAS CONTACTING DEVICE TYPE	PLASTIC/RUBBER MOBILE BALLS
NUMBER OF CONTACTING ZONES	1
DISTANCE BETWEEN GAS CONTACTING ZONES - CM	45.7 (18.0IN)
LIQUID RECIRCULATION RATE - LITER/S	148. (2351 GPM)
L/G RATIO - L/CU.M	1.3 (10.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.5 (6.0 IN-H2O)
SUPERFICIAL GAS VELOCITY M/SEC	2.5 (8.3 FT/S)
SO2 REMOVAL EFFICIENCY - %	90.0

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	8
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	VERTICAL
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** REHEATER

NUMBER	1
GENERIC TYPE	BYPASS
SPECIFIC TYPE	COLD SIDE
TRADE NAME/COMMON TYPE	N/A
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** FANS

NUMBER	4
DESIGN	CENTRIFUGAL

CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

FUNCTION	BOOSTER
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	MIX TANK
DEVICE	N/A
DEVICE TYPE	AGITATED TANK
** TANKS	
SERVICE	NUMBER
-----	-----
NR	****
** PUMPS	
SERVICE	NUMBER
-----	-----
NR	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	1
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	2
DIMENSIONS - FT	100.0 DIA
SHELL GENERIC MATERIAL TYPE	INORGANIC
SHELL SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED CONCRETE
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
DIMENSIONS FT	100.0 DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
*** SLUDGE	
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
SITE TREATMENT	NR

[illegible]

INITIAL OPERATIONS BEGAN AT THIS UNIT ON SEPTEMBER 1 WHEN FLUE GAS WAS PASSED THROUGH THE INDIVIDUAL FGD MODULES FOR TESTING PURPOSES. TESTING OF THE SYSTEM IN AN INTEGRATED MODE IS EXPECTED TO BEGIN IN DECEMBER.

TESTING OPERATIONS CONTINUED THROUGH OCTOBER AND NOVEMBER.

THE UNIT BEGAN BURNING HIGH SULFUR COAL ON NOVEMBER 18-19 AT WHICH TIME THE FGD SYSTEM BEGAN OPERATIONS IN AN INTEGRATED MODE FOR THE FIRST TIME.

INITIAL START UP PROBLEMS HAVE INCLUDED MIST ELIMINATOR PLUGGING.

LINING FAILURES HAVE ALSO BEEN ENCOUNTERED DURING START UP PHASE.

THE UNIT PASSED A COMPLIANCE TEST ON DECEMBER 5, 1979. IT WAS DETERMINED THAT THE FGD SYSTEM CONTROLLED SO2 EMISSIONS TO WELL BELOW THE ALLOWABLE 1.2 LB/MM BTU STANDARD.

DURING JANUARY TESTS WERE CONDUCTED TO CERTIFY THE GAS EMISSIONS MONITOR AT NEWTON.

PRESATURATOR CORROSION AND EXPANSION JOINT REPAIRS AND A DEPLETION OF THE FLYASH USED FOR SLUDGE STABILIZATION ACCOUNTED FOR THE LOW JANUARY DEPENDABILITY FIGURES.

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE D-MODULE WAS UNAVAILABLE DUE TO THE COLLAPSE OF THE PRECOOLER MIST ELIMINATORS CAUSED BY A TEMPERATURE EXCURSION.

REPAIR WORK ON THE PRESATURATOR CORROSION AND EXPANSION JOINTS AS WELL AS THE FLYASH DEPLETION PROBLEM CONTINUED TO YIELD LOW DEPENDABILITY FIGURES FOR FEBRUARY.

3/80	A	53.4	52.6	53.1	52.3			
	B	47.0	42.3	48.0	42.1			
	C	44.5	41.1	46.5	41.0			
	D	.0	.0	.0	.0			
	SYSTEM	36.2	34.0	36.9	33.9	744	740	252

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER, 1980, THE FOLLOWING PROBLEMS WERE ENCOUNTERED:
 THE VALVES AND PIPING IN THE PRECOOLER LOOP EXPERIENCED CORROSION.
 THE MIST ELIMINATOR ON THE D MODULE FAILED.
 THE FLY ASH SUPPLIES DEPLETED.
 RUBBER LINING AND DUCTWORK LINING FAILURES OCCURRED.
 BOOSTER FAN EXPANSION JOINT FAILURE OCCURRED.
 THE THICKENER EXPERIENCED PLUGGING.

THESE COMBINED PROBLEMS ACCOUNTED FOR THE LOW MARCH PERFORMANCE FIGURES. FOR THE QUARTER, THE TOTAL SYSTEM WAS AVAILABLE 47.2% AND WAS UTILIZED 39.4% OF THE TIME.

4/80	A	33.8	31.3	31.4	31.3			
	B	35.4	25.8	25.8	25.8			
	C	37.4	35.6	35.6	35.6			
	D	26.1	21.8	21.8	21.8			
	SYSTEM	33.2	28.6	28.6	28.6	720	720	206

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEWTON 1 FGD SYSTEM WAS OUT OF SERVICE DURING THE FIRST 12 DAYS OF APRIL FOR NECESSARY REPAIRS ON THE OUTLET DUCT LININGS. THE UTILITY INDICATED THAT THE LINING FAILURES MAY HAVE RESULTED FROM IMPROPER APPLICATION.

DURING THE LAST 18 DAYS OF APRIL MINOR PROBLEMS WERE EXPERIENCED WITH THE OCCURANCE OF PLUGGING IN THE SODIUM CARBONATE THICKENER AND CORROSION OF THE VALVES IN THE PRESATURATOR CIRCUIT.

5/80	A	.0	.0	.0	.0			
	B	9.7	9.6	9.6	6.2			
	C	9.7	9.6	9.6	6.2			
	D	.0	.0	.0	.0			
	SYSTEM	4.8	4.8	4.8	3.1	744	477	23 45.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY, THE FGD SYSTEM WAS DOWN BECAUSE THE FLUIDIZING STONES WERE CAKED WITH FLY ASH. THIS WAS CAUSED BY IMPROPER WIRING OF THE HEATER WHICH BLOWS OVER THE STONES. THE HEATER WAS REWIRED AND THE FLUIDIZING STONES REPLACED. FLUIDIZING STONES ARE LOCATED IN THE FLYASH SILO. HEATED AIR PASSES THROUGH THESE POROUS STONES TO AERATE OR "FLUIDIZE" THE FLYASH SO THAT IT CAN BE CONVEYED TO THE FLYASH/SLUDGE MIXER. WHEN THE FLYASH SUPPLY IS DEPLETED OR THE MATERIAL CANNOT BE DELIVERED TO THE MIXER THE SCRUBBING SYSTEM IS SHUT DOWN. THE SLUDGE MUST BE TREATED WITH FLYASH BEFORE DISPOSAL.

6/80	A	.0	.0	.0	.0			
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CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	40.3	40.3	40.3	40.3					
	C	40.4	40.4	40.4	40.4					
	D	.0	.0	.0	.0					
	SYSTEM	20.2	20.2	20.2	20.2		720	720	145	63.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE A AND D MODULES WERE UNAVAILABLE FOR OPERATION BECAUSE THE MIST ELIMINATORS COLLAPSED.

THE SYSTEM WAS SHUTDOWN DURING THE FIRST HALF OF THE MONTH TO REPAIR THE DRY FLYASH COLLECTION SYSTEM WHICH ACCOUNTED FOR THE LOW B AND C MODULE FIGURES.

7/80	A	3.5	3.7	3.7	3.5					
	B	3.6	3.9	3.9	3.6					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	1.8	1.9	1.9	1.8		744	698	13	67.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY PROBLEMS WERE ENCOUNTERED WITH THE MIST ELIMINATORS.

SOME OF THE SYSTEM OUTAGE TIME RESULTED FROM REPAIRS MADE NECESSARY BY THE OCCURRENCE OF CORROSION IN THE PRESATURATOR.

SCRUBBER PLUGGING DURING JULY CONTRIBUTED TO THE LOW FGD SYSTEM ____ AVAILABILITY.

8/80	A	.0	.0	.0	.0					
	B	64.7	50.2	50.2	49.3					
	C	51.2	34.1	36.9	33.5					
	D	37.6	21.9	24.0	21.5					
	SYSTEM	53.8	36.4	39.9	35.8		744	731	266	68.2

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING PROBLEMS WITHIN THE FGD SYSTEM WERE THE CAUSE OF DOWN TIME IN AUGUST.

BECAUSE OF CHANGES IN SYSTEM OPERATIONS, ONLY 3 MODULES ARE NEEDED TO MEET CURRENT SO2 REGULATIONS.

9/80	A	69.0	20.3	48.6	10.0					
	B	99.6	74.6	80.3	36.8					
	C	96.9	35.8	66.8	17.6					
	D	99.6	80.8	80.8	39.9					
	SYSTEM	99.1	67.8	82.5	33.4		720	355	241	33.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS TAKEN OUT OF SERVICE ON SEPTEMBER 16, 1980 FOR A SCHEDULED MAINTENANCE OUTAGE.

10/80	A	75.9	38.5	46.3	16.9					
	B	83.7	47.9	56.5	21.1					
	C	81.0	51.6	54.5	22.7					
	D	62.4	7.0	13.7	3.1					
	SYSTEM	81.5	48.4	46.3	21.3		744	328	119	30.4

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE FGD SYSTEM AVAILABILITY WAS LOW AS A RESULT OF LOW LIQUOR TEMPERATURES IN THE SCRUBBER FOLLOWING THE FOUR WEEK BOILER OUTAGE. THE LIQUOR WAS PREHEATED WITH STEAM TO PREVENT PLUGGING DUE TO THE "SALTING OUT" OF REAGENTS AT LOW TEMPERATURES.

11/80	A	93.6	69.9	98.2	69.9				
	B	79.6	59.9	100.0	59.9				
	C	89.4	58.8	97.2	58.8				
	D	79.6	70.1	99.0	70.0				
	SYSTEM	99.3	84.9	100.0	84.8	720	719	465	69.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR OUTAGES OCCURRED DURING NOVEMBER.

12/80	A	64.5	45.9	63.8	45.7				
	B	71.5	68.7	72.2	68.4				
	C	72.7	42.1	63.4	41.9				
	D	71.5	52.8	66.7	52.6				
	SYSTEM	74.1	69.5	84.8	69.3	744	741		70.7

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM AVAILABILITY WAS LOWERED DURING DECEMBER AS A RESULT OF THICKENER PLUGGING PROBLEMS.

1/81	A	90.5	75.0	99.1	75.0				
	B	73.9	58.1	99.5	58.1				
	C	96.2	79.8	100.0	79.8				
	D	88.3	57.1	100.0	57.1				
	SYSTEM	99.1	89.5	100.0	89.5	744	744	425	71.4

2/81	A	93.2	49.8	100.0	49.7				
	B	96.0	81.1	100.0	81.0				
	C	92.3	72.3	100.0	72.2				
	D	100.0	82.4	100.0	82.3				
	SYSTEM	100.0	95.1	100.0	94.9	672	671	639	66.6

3/81	A	94.1	56.9	100.0	52.7				
	B	87.1	80.6	100.0	75.0				
	C	86.4	65.9	100.0	61.0				
	D	94.1	65.5	100.0	60.6				
	SYSTEM	90.4	67.2	100.0	62.2	744	689	463	63.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1981.

4/81	A	96.1	73.3	100.0	73.3				
	B	98.2	82.8	100.0	82.8				
	C	96.1	60.6	100.0	60.6				
	D	93.6	85.1	100.0	85.1				
	SYSTEM	99.9	94.5	100.0	94.5	720	720	680	73.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING APRIL.

5/81	A	93.3	66.9	98.3	61.4				
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CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	85.3	78.0	98.5	71.6					
	C	91.9	76.6	98.5	70.3					
	D	93.4	43.2	97.4	39.7					
	SYSTEM	100.0	88.3	98.4	81.0		744	683	603	60.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MAY.

6/81	A	96.5	64.9	100.0	64.6					
	B	92.2	72.1	100.0	71.7					
	C	88.3	46.4	100.0	46.1					
	D	96.7	92.2	100.0	91.7					
	SYSTEM	100.0	91.9	100.0	91.3		720	716	658	64.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

7/81	A	79.6	44.5	79.2	42.9					
	B	85.3	64.6	84.8	62.2					
	C	84.5	35.0	74.3	33.7					
	D	82.5	68.2	84.9	65.7					
	SYSTEM	89.2	70.2	98.9	67.6		744	717	503	55.4

8/81	A	92.7	55.6	100.0	55.6					
	B	90.5	64.5	100.0	64.5					
	C	100.0	67.1	100.0	67.1					
	D	81.3	57.0	100.0	57.0					
	SYSTEM	100.0	81.6	100.0	81.6		744	744	607	57.9

9/81	A	88.8	45.3	100.0	38.9					
	B	99.0	78.4	100.0	67.4					
	C	100.0	79.5	100.0	68.3					
	D	97.9	38.8	100.0	33.3					
	SYSTEM	100.0	80.7	100.0	69.3		720	619	499	47.2

** PROBLEMS/SOLUTIONS/COMMENTS

A SCHEDULED MAINTENANCE OUTAGE (BOTH BOILER AND FGD SYSTEM) BEGAN ON SEPTEMBER 26.

10/81	SYSTEM	100.0	.0	.0	.0		744	7	0	.1
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER A SCHEDULED MAINTENANCE OUTAGE OF THE GENERATING UNIT OCCURRED.

11/81	A	98.6	63.9	76.2	63.5					
	B	85.8	27.8	63.0	27.6					
	C	97.5	55.5	73.0	55.1					
	D	85.7	61.3	73.1	60.8					
	SYSTEM	100.0	69.5	95.1	68.7		720	715	497	61.1

12/81	A	94.8	55.8	99.8	53.8					
	B	84.8	42.2	100.0	40.7					
	C	100.0	82.0	100.0	79.0					
	D	100.0	73.5	100.0	70.8					
	SYSTEM	100.0	84.5	100.0	81.4		744	717	612	52.6

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER AND DECEMBER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

1/82	A	100.0	58.5	100.0	58.2				
	B	100.0	97.9	100.0	97.4				
	C	50.5	42.3	100.0	42.1				
	D	93.4	79.6	100.0	79.3				
	SYSTEM	100.0	92.7	100.0	92.3	744	740	687	63.5
2/82	A	90.0	37.2	100.0	37.2				
	B	93.8	79.6	100.0	79.6				
	C	100.0	92.1	100.0	92.1				
	D	91.1	82.0	100.0	82.0				
	SYSTEM	100.0	97.0	100.0	97.0	672	672	652	70.1
3/82	A	90.9	40.1	84.2	40.1				
	B	93.1	91.4	92.4	91.4				
	C	80.8	61.7	90.0	61.7				
	D	90.5	61.7	89.1	61.7				
	SYSTEM	100.0	85.2	100.0	85.2	744	744	634	66.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1982.

4/82	A	100.0	60.9	100.0	46.5				
	B	98.2	78.9	100.0	60.3				
	C	94.9	91.7	100.0	70.0				
	D	95.0	23.5	100.0	17.9				
	SYSTEM	100.0	85.0	100.0	64.9	720	550	467	43.3
5/82	A	71.0	.0		.0				
	B	100.0	94.3	100.0	26.5				
	C	100.0	40.7	100.0	11.4				
	D	99.3	95.7	100.0	26.9				
	SYSTEM	100.0	76.9	100.0	21.6	744	209	161	13.1
6/82	A	.0	.0		.0				
	B	99.7	97.7	100.0	97.5				
	C	100.0	62.7	100.0	62.6				
	D	98.3	52.6	100.0	52.5				
	SYSTEM	99.4	71.0	100.0	70.9	720	719	510	38.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER.

7/82	A	22.3	14.0	92.8	13.8				
	B	86.6	79.8	98.8	79.0				
	C	94.1	50.0	97.4	49.5				
	D	98.9	81.1	98.7	80.2				
	SYSTEM	97.8	75.2	100.0	74.4	744	737	553	45.5
8/82	A	98.5	97.8	99.5	97.8				
	B	.0	.0		.0				
	C	98.9	76.2	100.0	76.2				
	D	100.0	48.4	100.0	48.4				
	SYSTEM	99.1	74.2	99.8	74.2	744	744	522	43.7

CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
9/82	A	100.0	78.7	100.0	76.4				
	B	.0	.0		.0				
	C	100.0	70.8	100.0	68.8				
	D	100.0	71.2	100.0	69.2				
	SYSTEM	100.0	73.6	100.0	71.4		720	699	514 41.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
DURING THE THIRD QUARTER OF 1982.

10/82	A	48.3	45.7	90.8	45.2				
	B	48.4	35.5	96.0	35.1				
	C	96.5	58.8	94.3	58.2				
	D	93.3	87.8	96.1	86.8				
	SYSTEM	95.5	75.9	100.0	75.1		744	736	559 50.6
11/82	A	.0	.0		.0				
	B	92.4	88.0	97.9	76.3				
	C	95.4	42.1	95.3	36.5				
	D	97.1	89.9	97.7	77.9				
	SYSTEM	96.8	73.3	97.4	63.6		720	624	458 38.9
12/82	A	51.1	35.1	91.7	23.8				
	B	94.6	70.8	96.0	48.0				
	C	91.1	45.4	94.2	30.8				
	D	74.6	63.1	96.4	42.7				
	SYSTEM	93.3	73.4	100.0	49.7		744	504	370 30.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
DURING THE FOURTH QUARTER OF 1982.

1/83	A	77.3	28.0	100.0	19.0				
	B	100.0	134.7	100.0	91.3				
	C	99.3	39.3	88.8	26.6				
	D	88.3	121.6	100.0	82.4				
	SYSTEM	100.0	77.5	100.0	73.1		744	504	544 48.0
2/83	A	99.6	70.5	100.0	70.5				
	B	41.8	36.0	99.2	36.0				
	C	100.0	18.2	100.0	18.2				
	D	100.0	100.0	100.0	100.0				
	SYSTEM	99.9	74.3	100.0	74.3		672	672	500 54.4
3/83	A	81.7	56.9	100.0	56.9				
	B	94.4	94.1	99.7	94.1				
	C	19.4	3.0	100.0	3.0				
	D	94.1	94.1	100.0	94.1				
	SYSTEM	97.6	81.5	99.7	81.5		744	744	606 64.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
DURING THE FIRST QUARTER OF 1983.

4/83	A	99.4	95.6	100.0	95.6				
	B	97.8	89.3	100.0	89.3				
	C	.0	.0		.0				
	D	93.3	88.9	100.0	88.9				
	SYSTEM	96.8	91.3	100.0	100.0		720	720	720 76.8

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS OUT OF SERVICE DURING THE ENTIRE MONTH OF APRIL FOR LINING REPAIRS.

5/83	A	100.0	100.0	100.0	1.3				
	B	100.0	50.0	100.0	.7				
	C	.0	.0		.0				
	D	100.0	100.0	100.0	1.3				
	SYSTEM	100.0	83.5	100.0	1.1	744	10	8	.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS REMOVED FROM SERVICE ON MAY 1 FOR AN ANNUAL MAINTENANCE OUTAGE.

MODULE C REMAINED OUT OF SERVICE DURING MAY FOR REPAIR OF THE FLAKEGLASS LINING.

6/83	A	99.9	77.9	99.7	45.0				
	B	100.0	71.2	100.0	41.1				
	C	100.0	73.6	100.0	42.5				
	D	.0	.0		.0				
	SYSTEM	99.9	76.2	100.0	44.0	720	416	317	43.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OUT OF SERVICE UNTIL JUNE 15 FOR THE ANNUAL MAINTENANCE OUTAGE.

MODULE D WAS OUT OF SERVICE ALL MONTH FOR REPAIR OF THE FLAKEGLASS LINING.

7/83	A	100.0	93.3	100.0	93.3				
	B	98.9	98.9	100.0	98.9				
	C	100.0	100.0	100.0	100.0				
	D	.0	.0		.0				
	SYSTEM	99.6	97.4	100.0	97.4	744	744	725	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE D WAS OUT OF SERVICE DURING THE ENTIRE MONTH OF JULY FOR ABSORBER LINING REPAIRS.

8/83	A	100.0	87.0	100.0	87.0				
	B	94.6	82.9	100.0	82.9				
	C	100.0	99.6	100.0	99.6				
	D	16.8	15.1	100.0	15.1				
	SYSTEM	100.0	94.8	100.0	94.8	744	744	706	

** PROBLEMS/SOLUTIONS/COMMENTS

ABSORBER LINER REPAIRS AT MODULE D CONTINUED IN AUGUST.

9/83	A	65.9	56.7	99.3	56.7				
	B	71.3	32.8	100.0	32.8				
	C	100.0	94.9	100.0	94.9				
	D	100.0	96.7	100.0	96.7				
	SYSTEM	100.0	93.7	100.0	93.7	720	720	674	85.2

CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS UNAVAILABLE DURING PART OF SEPTEMBER DUE TO REPAIR OF THE
 ABSORBER'S FLAKEGLASS LINING.

MODULE B WAS UNAVAILABLE DURING PART OF SEPTEMBER DUE TO SCALE AND TRASH
 BUILD UP IN THE RECIRCULATION PUMP SUCTION STRAINERS CAUSING PLUGGING PRO-
 BLEMS.

10/83	A	82.3	57.8	100.0	57.8				
	B	61.3	31.9	100.0	31.9				
	C	100.0	68.8	100.0	68.8				
	D	84.7	57.8	100.0	57.8				
	SYSTEM	100.0	72.1	100.0	72.1	744	744	536	.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND D WERE DOWN DURING PART OF OCTOBER DUE TO DUCTWORK LINING
 REPAIRS.

MODULE B WAS OUT OF SERVICE DURING PART OF THE MONTH DUE TO PUMP PACKING
 SLEEVE FAILURE.

11/83	A	100.0	99.8	100.0	85.0				
	B	10.6	.0		.0				
	C	98.9	98.4	100.0	83.8				
	D	100.0	96.7	100.0	82.4				
	SYSTEM	100.0	98.3	100.0	83.7	720	613	603	.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS DOWN DURING NOVEMBER DUE TO RECIRCULATING PUMP FAILURE.

12/83	A	80.6	67.3	100.0	57.9				
	B	93.5	88.4	99.1	76.1				
	C	91.9	57.3	95.1	49.3				
	D	98.1	89.5	99.5	77.0				
	SYSTEM	100.0	100.0	100.0	86.8	744	640	646	.0

** PROBLEMS/SOLUTIONS/COMMENTS

A UNIT OUTAGE OCCURRED FROM DECEMBER 1 TO DECEMBER 5, 1983.

1/84	A	98.1	93.1	99.9	93.1				
	B	61.3	41.0	99.7	41.0				
	C	93.1	49.7	99.7	49.7				
	D	99.9	89.9	99.9	89.9				
	SYSTEM	100.0	91.3	100.0	91.3	744	744	679	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING JANUARY.

2/84	A	59.5	12.0	100.0	10.2				
	B	92.8	97.6	100.0	83.2				
	C	92.7	84.5	100.0	72.0				
	D	88.8	52.4	100.0	44.7				
	SYSTEM	100.0	82.2	100.0	70.0	696	593	487	

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS UNAVAILABLE DURING PART OF FEBRUARY DUE TO A PLUGGED SPRAY NOZZLE.

3/84	A	89.0	9.9	100.0	9.5			
	B	100.0	98.5	100.0	95.0			
	C	100.0	99.2	100.0	95.7			
	D	89.7	51.6	100.0	49.7			
	SYSTEM	100.0	86.4	100.0	83.3	744	718	620

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MARCH.

4/84	A	81.1	55.6	100.0	50.1			
	B	94.7	88.2	100.0	79.6			
	C	100.0	90.5	105.4	81.7			
	D	38.5	28.0	100.0	25.3			
	SYSTEM	100.0	87.5	100.0	78.9	720	650	568

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS REMOVED FROM SERVICE APRIL 28 FOR MAINTENANCE.

5/84	A	100.0			.0			
	B	100.0			.0			
	B	100.0			.0			
	C	100.0			.0			
	D	100.0			.0			
	SYSTEM	100.0			.0	744	0	0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OUT OF SERVICE THROUGHOUT MAY DUE TO THE ANNUAL MAINTENANCE OUTAGE.

6/84	A	.0	.0		.0			
	B	57.2	96.8	99.7	51.0			
	C	56.9	61.2	98.7	32.2			
	D	56.1	74.4	98.6	39.2			
	SYSTEM	56.8	77.5	99.0	40.8	720	379	294

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MODULE A WAS BEING RELINED DURING JUNE.

7/84	A	62.5	53.5	100.0	53.5			
	B	100.0	50.3	100.0	50.3			
	C	100.0	34.4	100.0	34.4			
	D	100.0	82.1	100.0	82.1			
	SYSTEM	100.0	73.4	100.0	73.4	744	744	546

** PROBLEMS/SOLUTIONS/COMMENTS

RELINING CONTINUED AT MODULE A DURING JULY.

8/84	A	94.0	40.5	100.0	40.1			
	B	100.0	65.2	100.0	64.5			
	C	85.6	21.7	100.0	21.5			

CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
D		88.3	72.6	100.0	71.9					
SYSTEM		100.0	66.7	100.0	66.0		744	737	491	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD RELATED PROBLEMS AROSE IN AUGUST.

9/84 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	CINCINNATI GAS & ELECTRIC	
PLANT NAME	EAST BEND	
UNIT NUMBER	2	
CITY	RABBIT HASH	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	650	
GROSS UNIT GENERATING CAPACITY - MW	650	
NET UNIT GENERATING CAPACITY W/FGD - MW	600	
NET UNIT GENERATING CAPACITY WO/FGD - MW	619	
EQUIVALENT SCRUBBED CAPACITY - MW	650	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1763.96	(3738000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	357.2	(675 F)
STACK HEIGHT M	198.	(650 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.2	(23.5 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25586.	(11000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10800-13000
AVERAGE ASH CONTENT - %	11.90	
RANGE ASH CONTENT - %	9.0-14.0	
AVERAGE MOISTURE CONTENT - %	10.00	
RANGE MOISTURE CONTENT - %	9.0-11.0	
AVERAGE SULFUR CONTENT - %	2.60	
RANGE SULFUR CONTENT - %	1.0-4.0	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** FABRIC FILTER

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1	
NUMBER OF SPARES	0	
TYPE	HOT SIDE	
SUPPLIER	WESTERN PREC. DIVISION, JOY	
INLET FLUE GAS CAPACITY - CU.M/S	1764.0	(3738000 ACFM)
INLET FLUE GAS TEMPERATURE - C	357.2	(675 F)
PRESSURE DROP KPA	.1	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.6	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	SARGENT & LUNDY
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	87.00
ENERGY CONSUMPTION - %	2.9
CURRENT STATUS	1
COMMERCIAL START-UP	3/81
INITIAL START-UP	3/81
CONTRACT AWARDED	3/78

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	5.10	
DESIGN COAL HEAT CONTENT - J/G	25586.0	(11000 BTU/LB)
DESIGN COAL ASH CONTENT - %	11.90	
DESIGN MOISTURE CONTENT - %	10.00	
SPACE REQUIREMENTS - SQ M	13461.2	(144900 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	144.0	

** QUENCHER/PRESATURATOR

NUMBER	3	
TYPE	VENTURI	
SUPPLIER	BABCOCK & WILCOX	
INLET GAS FLOW - CU. M/S	398.49	(844433 ACFM)
INLET GAS TEMPERATURE - C	136.7	(278 F)
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	552.	(8760 GPM)
L/G RATIO - L/CU. M	1.3	(10.0 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	3	
NUMBER OF SPARES	0	
GENERIC TYPE	COUNTER CURRENT TRAY TOWER	
SPECIFIC TYPE	SIEVE TRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	BABCOCK & WILCOX	
DIMENSIONS - FT	43.0 DIA X 95.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316	
LINER GENERIC MATERIAL	NA	
LINER SPECIFIC MATERIAL	NA	
LINER MATERIAL TRADE NAME/COMMON TYPE	NA	
GAS CONTACTING DEVICE TYPE	PERFORATED TRAYS	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	2205.	(35000 GPM)
L/G RATIO - L/CU.M	6.7	(50.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP KPA	.6	(2.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.4	(8.0 FT/S)
INLET GAS FLOW - CU. M/S	329.66	(698585 ACFM)
INLET GAS TEMPERATURE - C	50.6	(123 F)
SO2 REMOVAL EFFICIENCY - %	87.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	6
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	2
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	BABCOCK & WILCOX	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	1	
FREEBOARD DISTANCE - M	2.13	(7.0 FT)
DISTANCE BETWEEN STAGES - CM	182.88	(72.0 IN)
DISTANCE BETWEEN VANES - CM	7.6	(3.00 IN)
VANE ANGLES - DEGREES	90	
PRESSURE DROP - KPA	.1	(.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	2.4	(8.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	BLENDED	
WASH FREQUENCY	INTERMITTENT	
WASH RATE - L/S	58.4	(926 GAL/MIN)
** REHEATER		
NUMBER	1	
NUMBER OF SPARES	0	
NUMBER PER MODULE	0	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	STEAM	
TRADE NAME/COMMON TYPE	STEAM TUBE BUNDLE	
LOCATION	PLENUM COMBINING GAS FLOW FROM INDIVIDUAL ABSORB	
TEMPERATURE INCREASE - C	13.9	(25 F)
INLET FLUE GAS TEMPERATURE - C	51.7	(125 F)
NUMBER OF HEAT EXCHANGER BANKS	2	
CONSTRUCTION MATERIAL GENERIC TYPE	NA	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NA	
** FANS		
NUMBER	4	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	UNIT	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	1175.12	(2490185 ACFM)
FLUE GAS TEMPERATURE - C	136.7	(278 F)
PRESSURE DROP - KPA	7.3	(23.8 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	639.25	(1354635 ACFM)
FLUE GAS TEMPERATURE - C	37.8	(100 F)
PRESSURE DROP KPA	5.3	(17.5 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	3	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	3	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

SPECIFIC TYPE	OPPOSED BLADE
MANUFACTURER	BABCOCK & WILCOX
MODULATION	OPEN
SERVICE CONDITIONS	278
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DAMPERS	
FUNCTION	CONTROL
MODULATION	OPEN
** DUCTWORK	
LOCATION	AFTER SCRUBBER
CONFIGURATION	CIRCULAR
DIMENSIONS	17 FT. DIAMETER
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	40 MILS PLASITE 4005/2 INCHES KAOCRETE HS
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	COMPARTMENTED
DEVICE TYPE	PASTE
MANUFACTURER	WALLACE & TIERNAN
NUMBER	8
NUMBER OF SPARES	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	3.6 (4 TPH)
PRODUCT QUALITY - % SOLIDS	15.8
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	3
REAGENT PREP PRODUCT	1
THICKENER OVERFLOW	1
THICKENER UNDERFLOW	1
** PUMPS	
SERVICE	NUMBER
-----	-----
FEED SLURRY	2
ABSORBER RECIRCULATION	12
QUENCHER RECIRCULATION	6
THICKENER UNDERFLOW	4
CLARIFIED RECYCLE	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	4
NUMBER OF SPARES	0
CONFIGURATION	HORIZONTAL-PARALLEL
DIMENSIONS FT	12 FT. DIAMETER X 20 FT.
CAPACITY	22 TONS/HR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	POLYPROPYLENE
BELT GENERIC MATERIAL TYPE	RUBBER
BELT SPECIFIC MATERIAL TYPE	USBM 28
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	668 GPM, 30% SOLIDS
OUTLET STREAM CHARACTERISTICS	47.5% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	200 GPM, 30% SOLIDS
OUTLET STREAM DISPOSITION	MIXED WITH FLYASH & LIME
OVERFLOW STREAM DISPOSITION	THICKENERS

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

** SOLIDS CONCENTRATING/DEWATERING

DEVICE	THICKENER
NUMBER	2
NUMBER OF SPARES	0
CONFIGURATION	CYLINDRICAL
DIMENSIONS - FT	190.0 DIA X 25.0
CAPACITY	5000000 GALLONS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	N/A
LINER GENERIC MATERIAL TYPE	POLYESTER RESIN
LINER SPECIFIC MATERIAL TYPE	FLAKE GLASS
BELT GENERIC MATERIAL TYPE	N/A
BELT SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	1458 GPM, 7% SOLIDS
OUTLET STREAM CHARACTERISTICS	655 GPM, 30% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	1129 GPM, 0% SOLIDS
OUTLET STREAM DISPOSITION	PUMPED TO WASTE STABILIZATION SYSTEM
OVERFLOW STREAM DISPOSITION	RECYCLED

*** SLUDGE

FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	16.6	(18.3 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	75.0	
% CASO3 - DRY	77.0	
% CASO4 - DRY	17.0	
% CAOH2 - DRY	3.0	
% CACO3 - DRY	1.0	
% ASH DRY	.0	
% SODIUM COMPOUNDS - DRY	.0	
% OTHER COMPOUNDS - DRY	2.0	

** TREATMENT

METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
INLET FLOW RATE - LITER/S	42.1 (668 GPM)
INLET QUALITY - %	30.0

** DISPOSAL

NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	UNLINED
SITE DIMENSIONS	160 ACRES/120 FEET
SITE CAPACITY - CU.M	23481600 (19200.0 ACRE-FT)
SITE SERVICE LIFE - YRS	35

** WATER BALANCE

WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	21.9 (348 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	.4 (7 GPM)
SLUDGE INTERSTITIAL WATER LOSS - LITERS/S	6.9 (109 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
EFFLUENT WATER LOSS - LITERS/S	.0 (0 GPM)
RECEIVING WATER STREAM	NONE
MAKEUP WATER ADDITION - LITERS/S	29.2 (464 GPM)
SOURCE OF MAKEUP WATER	OHIO RIVER

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	THIOSORBIC LIME
PRINCIPAL CONSTITUENT	90% CAO, 5% MGO, 5% INERT
SOURCE/SUPPLIER	DRAVO LIME
CONSUMPTION	250 TONS/DAY
UTILIZATION - %	96.6
POINT OF ADDITION	RECIRCULATION TANK

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

** FGD SPARE CAPACITY INDICES

SCRUBBER - %	.0
ABSORBER - %	.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	.0
SLAKER - %	25.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP - %	25.0
THICKENER - %	.0
VACUUM FILTER - %	.0

** FGD SPARE COMPONENT INDICES

SCRUBBER	.0
ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
SLAKER	2.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	3.0
THICKENER	.0
VACUUM FILTER	.0

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

3/81	A	98.3	55.3	100.0	14.1					
	B	97.6	48.4	100.0	12.4					
	C	74.4	.0		.0					
	SYSTEM	100.0	51.8	100.0	13.2	47.70	744	190	99	12.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM BEGAN INITIAL AND COMMERCIAL OPERATIONS IN MARCH 1981. NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THIS TIME.

4/81	A	96.3	69.2	100.0	59.0					
	B	89.7	50.6	100.0	43.2					
	C	86.3	47.9	100.0	40.8					
	SYSTEM	100.0	83.8	100.0	71.5	78.70	720	614	515	60.4
5/81	A	84.5	76.6	100.0	60.3					
	B	71.5	35.9	100.0	28.2					
	C	41.2	10.3	100.0	8.1					
	SYSTEM	98.6	61.5	100.0	48.3	96.10	744	586	360	41.4
6/81	A	100.0	82.4	100.0	70.5					
	B	67.8	44.8	100.0	38.3					
	C	94.9	72.0	100.0	61.6					
	SYSTEM	100.0	99.6	100.0	85.2	84.60	720	616	614	62.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM HAS OPERATED SINCE MID-MARCH WITH NO MAJOR PROBLEMS.

7/81	A	89.3	56.4	100.0	56.3					
	B	91.7	72.0	100.0	71.9					
	C	97.4	57.2	100.0	57.1					
	SYSTEM	100.0	92.7	100.0	92.6	92.40	744	743	689	79.6
8/81	A	45.9	15.8	100.0	15.3					
	B	96.0	92.5	100.0	89.7					
	C	97.5	81.8	100.0	79.3					
	SYSTEM	100.0	95.0	100.0	92.1	82.30	744	721	685	76.2

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/81	A	85.7	67.5	100.0	62.9					
	B	96.6	84.6	100.0	78.8					
	C	33.5	10.4	100.0	9.7					
	SYSTEM	100.0	81.3	100.0	75.7	77.40	720	671	545	65.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE ONLY PROBLEM ENCOUNTERED DURING THE THIRD QUARTER INVOLVED ONE OF THE TWO THICKENERS. THE PROBLEM NECESSITATED USE OF THE EMERGENCY ASH POND FOR A SHORT PERIOD OF TIME TO HANDLE THE SLUDGE BEING GENERATED.

THE UTILITY REPORTED THAT TESTING WITH STRAIGHT LIME WILL TAKE PLACE FOR A TWO TO THREE MONTH PERIOD BEGINNING IN NOVEMBER. CURRENTLY, THIOSORBIC LIME IS BEING USED. THE FGD SYSTEM WAS DESIGNED TO OPERATE WITH STRAIGHT LIME AS THE REAGENT AND, AS SUCH, THE TESTING WILL BE PERFORMED TO SEE IF THE SYSTEM CAN MEET DESIGN GUARANTEES.

10/81	A	92.4	31.4	100.0	29.3					
	B	97.6	89.3	100.0	83.3					
	C	91.7	75.0	100.0	85.1					
	SYSTEM	100.0	97.8	100.0	91.3	81.60	744	695	679	68.2
11/81	A	96.4	61.2	100.0	22.6					
	B	96.4	75.8	100.0	28.0					
	C	96.4	12.6	100.0	4.6					
	SYSTEM	100.0	74.5	100.0	27.6	86.70	720	266	198	30.0
12/81	A	93.4	53.7	100.0	49.7					
	B	93.4	56.4	100.0	52.2					
	C	81.0	63.1	100.0	58.4					
	SYSTEM	100.0	86.6	100.0	80.1	85.70	744	689	596	68.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FOURTH QUARTER THE BOILER AND THE FGD SYSTEM WERE TAKEN OFF-LINE FOR AN INSPECTION. THE UTILITY REPORTED THAT THERE WERE NO SIGNS OF ANY CORROSION OR EROSION. THE SYSTEM HAS PERFORMED WELL WITH NO PROBLEMS.

1/82	A	64.1	57.6	100.0	50.5					
	B	97.0	94.5	100.0	82.8					
	C	48.7	34.4	100.0	30.1					
	SYSTEM	100.0	93.2	100.0	81.8	80.60	744	653	608	75.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY PROBLEMS WERE ENCOUNTERED WITH ICE BUILDUP ON THE FANS.

2/82	SYSTEM						672			
3/82	SYSTEM						744			
4/82	SYSTEM						720			
5/82	SYSTEM						744			
6/82	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF MARCH 1982 TO JUNE 1982.

7/82	SYSTEM	100.0	99.0	100.0	98.1		744	733	730	68.7
8/82	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	77.9

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR
9/82	SYSTEM	100.0	99.7	100.0	98.9		720	714	712	61.5
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER, 1982.										
10/82	SYSTEM	100.0	100.0	100.0	2.5		744	19	19	1.6
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS REMOVED FROM SERVICE DURING OCTOBER FOR A MAINTENANCE OUTAGE.										
11/82	SYSTEM	100.0		100.0			720	0		
** PROBLEMS/SOLUTIONS/COMMENTS										
OUTAGE TIME DURING NOVEMBER WAS DUE TO THE RETURN OF SERVICE ON UNIT 2 FROM THE MAINTENANCE OUTAGE IN OCTOBER. BOILER OUTLET TEMPERATURE WAS INSUFFICIENT FOR OPERATION OF THE PRECIPITATORS OR FGD SYSTEM.										
12/82	SYSTEM	100.0	99.4	100.0	95.6		744	715	711	52.2
1/83	SYSTEM	100.0	99.7	100.0	98.4		744	734	732	67.1
2/83	SYSTEM	100.0	100.0	100.0	100.0		672	672	672	74.5
3/83	SYSTEM	100.0	98.9	100.0	89.9		744	677	669	69.2
4/83	SYSTEM	100.0	98.6	100.0	75.1		720	547	541	71.2
5/83	SYSTEM	100.0	99.2	100.0	99.2		744	741	738	91.8
6/83	SYSTEM	100.0	99.4	100.0	90.4		720	655	651	81.7
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF DECEMBER 1982 THROUGH JUNE 1983.										
7/83	SYSTEM	100.0	99.5	100.0	92.9		744	694	691	80.1
8/83	SYSTEM	100.0	99.7	100.0	99.5		744	742	740	85.5
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY AND AUGUST.										
9/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE MONTH OF SEPTEMBER.										
10/83	SYSTEM						744			
11/83	SYSTEM						720			
12/83	SYSTEM						744			

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

CINCINNATI GAS & ELECTRIC: EAST BEND 2 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING THE FOURTH QUARTER
OF 1983. AVAILABILITY WAS REPORTED AS 100%.

1/84	SYSTEM	744
2/84	SYSTEM	696
3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM WAS 100% AVAILABLE DURING THE
FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COLORADO UTE ELECTRIC	
PLANT NAME	CRAIG	
UNIT NUMBER	1	
CITY	CRAIG	
STATE	COLORADO	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	172.	(.400 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	900	
GROSS UNIT GENERATING CAPACITY - MW	455	
NET UNIT GENERATING CAPACITY W/FGD - MW	400	
NET UNIT GENERATING CAPACITY WO/FGD - MW	406	
EQUIVALENT SCRUBBED CAPACITY - MW	455	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	722.29	(1530600 ACFM)
BOILER FLUE GAS TEMPERATURE - C	121.1	(250 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	10.9	(35.8 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		9100-10300
AVERAGE ASH CONTENT - %	8.00	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	16.00	
RANGE MOISTURE CONTENT %	*****	
AVERAGE SULFUR CONTENT - %	.45	
RANGE SULFUR CONTENT - %	0.4-0.5	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT - %	0.00-0.02	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1	
NUMBER OF SPARES	0	
TYPE	HOT SIDE	
SUPPLIER	BELCO	
INLET FLUE GAS CAPACITY - CU.M/S	1392.1	(2950000 ACFM)
INLET FLUE GAS TEMPERATURE - C	398.9	(750 F)
PRESSURE DROP - KPA	.7	(3. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.9	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS
A-E FIRM	STEARNS-ROGER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.80
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	1.3
CURRENT STATUS	1
COMMERCIAL START-UP	12/80
INITIAL START-UP	10/80
CONTRACT AWARDED	5/77

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	.96	
DESIGN COAL HEAT CONTENT - J/G	22329.6	(9600 BTU/LB)
DESIGN COAL ASH CONTENT - %	11.60	
DESIGN MOISTURE CONTENT - %	15.30	
DESIGN CHLORIDE CONTENT - %	.10	
SPACE REQUIREMENTS - SQ M	12140.2	(130680 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	264.0	

** QUENCHER/PRESATURATOR

NUMBER	4	
TYPE	QUENCH DUCT	
SUPPLIER	PEABODY PROCESS SYSTEMS	
INLET GAS FLOW - CU. M/S	217.07	(460000 ACFM)
INLET GAS TEMPERATURE - C	121.1	(250 F)
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	31.	(500 GPM)
L/G RATIO L/CU. M	.1	(1.1 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	PEABODY PROCESS SYSTEMS	
DIMENSIONS - FT	32.0 DIA X 52.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC [SPRAY ZONE]; GLASS FLAKE-FILLED POLYEST	
LINER SPECIFIC MATERIAL	NATURAL RUBBER	
LINER MATERIAL TRADE NAME/COMMON TYPE	BLACK NATURAL RUBBER	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	4	
LIQUID RECIRCULATION RATE - LITER/S	1512.	(24000 GPM)
L/G RATIO - L/CU.M	7.0	(52.2 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.4	(1.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	217.07	(460000 ACFM)
INLET GAS TEMPERATURE - C	121.1	(250 F)
SO2 REMOVAL EFFICIENCY - %	85.0	
PARTICLE REMOVAL EFFICIENCY - %	50.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	4	
FREEBOARD DISTANCE - M	1.52	(5.0 FT)
DISTANCE BETWEEN VANES - CM	3.0	(1.20 IN)
VANE ANGLES - DEGREES	45	
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	RAW WATER	
WASH FREQUENCY	CONTINUOUS	
WASH RATE - L/S	6.3	(100 GAL/MIN)
** REHEATER		
NUMBER	4	
NUMBER OF SPARES	1	
NUMBER PER MODULE	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE-NAME/COMMON TYPE	N/A	
LOCATION	OUTLET DUCT BETWEEN ME & OUTLET DAMPER	
PERCENT GAS BYPASSED - AVG	23.0	
TEMPERATURE INCREASE C	27.8	(50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	194.89	(413000 ACFM)
INLET FLUE GAS TEMPERATURE - C	43.3	(110 F)
OUTLET FLUE GAS FLOW RATE - CU. M/S	302.02	(640000 ACFM)
OUTLET FLUE GAS TEMPERATURE - C	73.9	(165 F)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
** FANS		
NUMBER	4	
NUMBER OF SPARES	0	
DESIGN	AXIAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	INDIRECT REHEAT	
APPLICATION	N/A	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	46.03	(97545 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	4	
NUMBER OF SPARES	1	
DESIGN	AXIAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	372.80	(790000 ACFM)
FLUE GAS TEMPERATURE - C	121.1	(250 F)
PRESSURE DROP - KPA	3.4	(11.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	4	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	
MANUFACTURER	FORNEY ENGINEERING	
MODULATION	OPEN	
SEAL AIR FLOW - CU. M/S	3.07	(6500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	4	
GENERIC TYPE	LOUVER	

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	3.07 (6500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	3.07 (6500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; NR
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	1
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

** DUCTWORK	
LOCATION	INLET TO QUENCH
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET TO DAMPER
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** DUCTWORK	
LOCATION	DAMPER TO STACK
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	9.1 (10 TPH)
PRODUCT QUALITY - % SOLIDS	35.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	4
REAGENT PREP PRODUCT	1
THICKENER OVERFLOW	1
CLASSIFIER OVERFLOW	4
FLOCCULANT	1
WASTE SLURRY BLEED	1
** PUMPS	
SERVICE	NUMBER
-----	-----
RAW WATER	2
RECLAIM SUMP	7
POND	1
COOLING TOWER BLOWDOWN BOOSTER	2
ABSORBER RECIRCULATION	8
WASH SLURRY	8
SUPERNATANT	2
THICKENER UNDERFLOW	2
POLYELECTROLYTE	1
WASTE SLURRY	2
MILL RECIRCULATION	2
LIMESTONE SLURRY FEED	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	CENTRIFUGE
NUMBER	1
NUMBER OF SPARES	1
DIMENSIONS - FT	3.0 DIA X 6.0
CAPACITY	126 GPM

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

SHELL GENERIC MATERIAL TYPE	HIGH ALLOY
SHELL SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
BELT GENERIC MATERIAL TYPE	N/A
BELT SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	35% SOLIDS
OUTLET STREAM CHARACTERISTICS	60% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	60 GPM
OUTLET STREAM DISPOSITION	LANDFILL
OVERFLOW STREAM DISPOSITION	TO WASTE SUMP & THEN TO THICKENER
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CENTER DRAW
DIMENSIONS - FT	75.0 DIA X 15.0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER [WALLS]; MAT-REINFO
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	5% SOLIDS
OUTLET STREAM CHARACTERISTICS	35% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	100 GPM, <1% SUSPENDED SOLIDS
OUTLET STREAM DISPOSITION	TO CENTRIFUGES
OVERFLOW STREAM DISPOSITION	RECYCLED TO PROCESS
*** SALEABLE BYPRODUCTS	
** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	10.5 (11.6 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	40.0
% CASO3 - DRY	22.6
% CASO4 - DRY	70.2
% CAOH2 - DRY	.0
% CACO3 - DRY	2.9
% ASH DRY	.3
% OTHER COMPOUNDS - DRY	3.9
** TREATMENT	
METHOD	NONE
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH, SO2 CONCENTRATION
PHYSICAL VARIABLES	DENSITY, GAS FLOW, LIQUID FLOW
CONTROL LEVELS	PH 5.4, SOLIDS 12-15%
MONITOR TYPE	UNILOK-PH, OHMART-DENSITY, BROOKS-FLOW, DYNASCIE
MONITOR LOCATION	AT MODULE RECYCLE TANK
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS LITER/S	17.8 (282 GPM)
SLUDGE HYDRATION WATER LOSS LITER/S	.6 (9 GPM)
SLUDGE INTERSTITIAL WATER LOSS - LITERS/S	2.1 (33 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
EFFLUENT WATER LOSS - LITERS/S	.0 (0 GPM)

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

RECEIVING WATER STREAM
MAKEUP WATER ADDITION - LITERS/S
SOURCE OF MAKEUP WATER

N/A
20.2 (321 GPM)
COOLING TOWER BLOWDOWN

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	CACO3
CONSUMPTION	7000 LB/HR
UTILIZATION - %	75.0
POINT OF ADDITION	BALL MILL

** FGD SPARE CAPACITY INDICES

ABSORBER - %	33.3
MIST ELIMINATOR - %	33.3
REHEATER - %	33.3
BALL MILL - %	.0
EFFLUENT HOLD TANK - %	33.3
THICKENER - %	.0
CENTRIFUGE - %	50.0

** FGD SPARE COMPONENT INDICES

ABSORBER	1.0
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-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS	FGD CAP. FACTOR
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10/80 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM BEGAN INITIAL OPERATIONS ON OCTOBER 9, 1980 WHEN MODULE D CAME ON LINE. HOWEVER MODULE'S A THROUGH C ARE STILL UNDER CONSTRUCTION.

11/80	D	48.6	44.7	46.2	38.5
	SYSTEM				

720 619 47.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER OPERATED AT ABOUT 50 TO 60% LOAD CAPACITY DURING NOVEMBER. ONLY ONE MODULE IS REQUIRED FOR COMPLIANCE WHEN OPERATING UNDER THE REDUCED LOAD CONDITION.

12/80	A	.0	.0		.0
	B	53.8	44.3	70.4	42.6
	C	73.9	70.4	84.0	67.7
	D	60.5	56.0	80.2	53.9
	SYSTEM	62.7	56.8	78.7	54.7

744 716 407 63.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM EQUIPMENT CHECKOUT CONTINUED THROUGH DECEMBER. MODULE A NEEDED MECHANICAL PARTS FOR REPAIR. AS OF DECEMBER 23, THE PROBLEMS CAUSING LOAD RESTRICTION WERE CORRECTED AND THE UNIT INCREASED TO FULL LOAD.

1/81	A	.0	.0	.0	.0
	B	59.7	70.2	71.0	55.4
	C	48.9	59.8	60.5	47.2
	D	11.3	12.6	12.7	9.9
	SYSTEM	39.9	47.5	48.1	37.5

744 587 279 62.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE FGD SYSTEM EQUIPMENT CHECKOUT CONTINUED. MODULE A REMAINED OUT OF SERVICE BECAUSE THE MECHANICAL PARTS NEEDED FOR REPAIR WERE NOT AVAILABLE.

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/81	A	.0	.0	.0	.0					
	B	12.2	12.4	12.9	10.7					
	C	13.6	12.4	12.9	10.7					
	D	.0	.0	.0	.0					
	SYSTEM	8.6	8.3	8.6	7.1		672	580	36	64.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE CHECKOUT OF THE FGD SYSTEM EQUIPMENT CONTINUED DURING FEBRUARY. MODULE A NEEDED MECHANICAL PARTS FOR REPAIR. THREE OF THE FOUR MODULES WERE TO BE OPERATING BY THE END OF THE MONTH.

MODULES B AND C ENCOUNTERED PROBLEMS WITH THE INLET AND OUTLET DAMPERS DURING FEBRUARY.

3/81	A	.0	.0	.0	.0					
	B	.0	.0	.0	.0					
	C	.0	.0	.0	.0					
	D	35.5	35.5	35.7	35.5					
	SYSTEM	11.8	11.8	11.9	11.8		744	744	88	88.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULES A, B, AND C EXPERIENCED OPERATING PROBLEMS WITH THE DAMPERS.

ADDITIONAL OUTAGE TIME WAS DUE TO THE READJUSTMENT OF THE FAN BLADE PITCHES.

4/81	A	.0	.0	.0	.0					
	B	36.1	59.9	60.9	35.6					
	C	2.8	4.2	4.3	2.5					
	D	25.0	40.5	41.2	23.9					
	SYSTEM	21.3	34.9	26.6	20.7		720	427	149	52.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST HALF OF APRIL THE SYSTEM EXPERIENCED PROBLEMS WITH THE DAMPERS AND CONTROLS MALFUNCTIONING. MODULE A NEEDED PARTS AND THE OTHER MODULES WERE REPAIRED.

ON APRIL 18 THE UNIT WAS SHUT DOWN FOR A SCHEDULED FIVE WEEK MAINTENANCE OUTAGE.

5/81	SYSTEM	.0	.0	.0	.0		744	101	0	
6/81	SYSTEM	.0	.0	.0	.0		720	699	0	97.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY AND JUNE THE SYSTEM WAS OUT OF SERVICE DUE TO DAMAGED MIST ELIMINATOR PADS AND PLUGGING OF THE MIST ELIMINATOR.

THICKENER REPAIRS WERE PERFORMED DURING JUNE.

7/81	SYSTEM	.0	.0	.0	.0		744	724	0	58.9
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM REMAINED OFF LINE THROUGH JULY AS A RESULT OF THE BROKEN MIST ELIMINATOR TRAYS.

8/81	SYSTEM	.0	.0	.0	.0		744	709	0	90.0
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COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

AS OF THE END OF AUGUST, MODULES A AND C WERE READY FOR OPERATION; HOWEVER, MODULE B NEEDED MORE MIST ELIMINATOR TRAYS.

DURING THE MONTH, THE THICKENER WAS DRAINED FOR REPAIRS THAT WERE EXPECTED TO BE COMPLETED BY THE MIDDLE OF SEPTEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/81	SYSTEM	.0	.0	.0	.0		720	677	0	85.4

** PROBLEMS/SOLUTIONS/COMMENTS

MIST ELIMINATOR INSTALLATION WAS COMPLETED ON MODULES A,C, AND D BUT WAS CONTINUING ON MODULE B.

THE THICKENER WAS REFILLED AFTER WORK WAS COMPLETED TO REPAIR LEAKS IN THE BASE. AFTER REFILLING, MORE LEAKS WERE FOUND SO THE THICKENER WAS DRAINED AGAIN.

10/81	A	15.4	15.4	15.5	15.3					
	B	.0	.0	.0	.0					
	C	14.1	13.8	13.9	13.7					
	D	12.8	12.2	12.2	12.1					
	SYSTEM	14.1	13.8	13.9	13.7		744	739	102	81.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER INSTRUMENTATION PROBLEMS WITH MODULES A, C AND D WERE ENCOUNTERED.

11/81	A	91.9	91.9	91.9	91.9					
	B	.0	.0	.0	.0					
	C	68.5	68.4	68.4	68.4					
	D	78.8	78.6	78.6	78.6					
	SYSTEM	79.6	79.5	79.6	79.6		720	720	573	90.8

12/81	A	79.5	79.4	79.4	79.4					
	B	.0	.0	.0	.0					
	C	89.6	89.4	89.4	89.4					
	D	83.6	83.5	83.5	83.5					
	SYSTEM	84.2	84.1	84.1	84.1		744	744	626	88.5

** PROBLEMS/SOLUTIONS/COMMENTS

REPLACEMENT PARTS NEEDED FOR MODULE B KEPT THE MODULE OFF-LINE THROUGH THE FOURTH QUARTER.

DURING NOVEMBER AND DECEMBER PLUGGING IN THE LIMESTONE BALL MILL WAS A MINOR PROBLEM.

1/82	A	82.0	82.5	82.8	81.8					
	B	.0	.0	.0	.0					
	C	87.4	87.5	87.8	86.7					
	D	89.8	90.3	90.6	89.5					
	SYSTEM	86.4	86.8	85.3	86.0		744	737	640	84.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE MIST ELIMINATORS WERE CLEANED WEEKLY.

ROCKS IN THE LIMESTONE HAS CAUSED PLUGGING OF THE BALL MILL. THE SUPPLIER IS WORKING ON THE PROBLEM.

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THE UTILITY IS WAITING FOR PARTS TO MAKE THE NECESSARY REPAIRS TO MODULE B.

2/82	A	72.9	73.1	73.9	72.8				
	B	2.2	2.1	2.1	2.1				
	C	88.8	89.1	90.0	88.7				
	D	65.3	65.5	66.2	65.2				
	SYSTEM	76.5	76.6	76.3	76.3	672	669	513	83.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS REPAIRED DURING THE MONTH AND IS IN THE PROCESS OF BEING STARTED UP.

DURING FEBRUARY PROBLEMS WERE ENCOUNTERED WITH THE LIMESTONE BALL MILL LUBRICATION SYSTEM.

3/82	A	40.9	40.9	41.5	40.9				
	B	85.4	85.4	86.5	85.2				
	C	85.1	85.1	86.2	84.9				
	D	79.7	79.7	80.7	79.5				
	SYSTEM	96.9	97.1	98.3	96.8	744	742	720	80.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULE A WAS DOWN 428 HOURS FOR CLEANING.

4/82	A	46.9	47.1	49.2	46.8				
	B	70.7	71.0	74.2	70.6				
	C	76.1	76.3	79.7	75.8				
	D	20.8	20.8	21.8	20.7				
	SYSTEM	71.5	71.7	75.0	71.3	720	715	513	82.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL PROBLEMS WERE ENCOUNTERED WITH THE SUPERNATE PUMPS.

5/82	A	22.7	56.4	64.9	22.6				
	B	29.2	72.6	83.6	29.1				
	C	29.2	72.5	83.4	29.0				
	D	.0	.0	.0	.0				
	SYSTEM	27.0	67.2	77.3	26.9	744	298	200	25.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE UNIT WAS OFF-LINE FOR THREE WEEKS FOR A SCHEDULED OUTAGE. THE FGD SYSTEM WAS IN COMPLIANCE PRIOR TO THE SHUT DOWN.

6/82	A	.0	.0	.0	.0				
	B	58.2	58.1	58.1	58.1				
	C	58.5	58.2	58.2	58.2				
	D	.0	.0	.0	.0				
	SYSTEM	38.9	38.8	38.8	38.8	720	720	279	77.3

** PROBLEMS/SOLUTIONS/COMMENTS

AT THE BEGINNING OF JUNE, ALL MODULES WERE DOWN DUE TO FAULTY PIPING ON THE SUPERNATE SYSTEM, WHICH WAS REPAIRED BY THE 10TH.

MODULES A AND D WERE OFF-LINE THE REST OF THE MONTH DUE TO LINER PROBLEMS.

7/82	A	.0	.0	.0	.0				
	B	7.9	8.2	9.4	7.9				
	C	41.1	42.4	48.5	41.0				

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	D	.0	.0	.0	.0					
	SYSTEM	16.4	16.9	19.3	16.3		744	720	121	62.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY ABSORBER LINER REPAIRS CONTRIBUTED TO MODULAR OUTAGES.

MAJOR DEMISTER REPAIRS ALSO RESULTED IN DOWN TIME DURING JULY.

8/82	A	68.1	69.7	77.1	68.0					
	B	5.1	5.2	5.7	5.0					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	24.4	25.0	27.6	24.3		744	725	181	64.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES C AND D WERE DOWN DURING AUGUST FOR LINING REPAIRS. A BOILERMAKER STRIKE PREVENTED COMPLETION OF THESE REPAIRS DURING THE MONTH, AND THUS ALSO CONTRIBUTED TO DOWN TIME.

MODULE B EXPERIENCED BOOSTER FAN PROBLEMS DURING AUGUST. THEY WERE CORRECTED, HOWEVER BY THE END OF THE MONTH.

9/82	A	3.5	3.7	3.6	3.5					
	B	84.2	89.2	88.2	84.0					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	29.2	31.0	30.6	29.2		720	678	210	68.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER MODULES C AND D WERE DOWN AWAITING COMPLETION OF THE ABSORBER LINER REPAIRS.

MODULE A WAS DOWN DURING THE MONTH FOR DEMISTER WASH MODIFICATIONS.

10/82	A	61.8	61.7	61.7	61.7					
	B	61.8	61.6	61.6	61.6					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	41.2	41.1	41.1	41.1		744	744	306	78.1

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND B WERE DOWN DURING OCTOBER FOR DEMISTER REPAIRS AND CLEANING.

MODULES C AND D REMAINED OUT OF SERVICE DURING OCTOBER AWAITING REPAIRS ON THE ABSORBER LINER.

11/82	A	63.2	77.1	90.1	63.1					
	B	55.4	67.6	79.0	55.3					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	39.5	48.2	56.3	39.4		720	589	284	41.8

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES C AND D REMAINED OUT OF SERVICE DURING NOVEMBER AWAITING ABSORBER LINER REPAIRS.

THE UNIT WAS DOWN FOR PART OF THE MONTH DUE TO A SCHEDULED OUTAGE.

12/82	A	100.0	100.0	100.0	100.0					
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-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	7.7	7.5	7.5	7.5					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	35.9	35.8	35.8	35.8		744	744	266	71.3

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES C AND D WERE DOWN THE ENTIRE MONTH FOR ABSORBER LINER REPAIRS.
MODULE B WAS DOWN SHORTLY AFTER THE FIRST OF THE MONTH, ALSO FOR LINER REPAIRS.

1/83	A	95.8	95.8	98.1	95.7					
	B	.0	.0	.0	.0					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	31.9	31.9	32.7	31.9		744	743	237	68.5

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES B, C AND D WERE DOWN DURING JANUARY FOR ABSORBER LINER REPAIRS.

2/83	A	57.2	57.5	59.1	57.2					
	B	.0	.0	.0	.0					
	C	.0	.0	.0	.0					
	D	88.1	45.5	46.7	45.2					
	SYSTEM	48.4	34.3	35.3	34.2		672	668	230	63.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN DURING FEBRUARY FOR PREVENTIVE MAINTENANCE.

MODULE B WAS DOWN DURING FEBRUARY FOR ABSORBER LINER REPAIRS.

MODULE C WAS DOWN DURING THE MONTH FOR REPAIRS ON THE BOOSTER FAN LUBE SET.

MODULE D WAS AVAILABLE DURING FEBRUARY BUT NOT IN SERVICE. THE UTILITY WAS ONLY OPERATING ONE MODULE.

3/83	A	.0	.0	.0	.0					
	B	67.1	76.7	79.5	67.1					
	C	.0	.0	.0	.0					
	D	71.0	81.1	84.2	71.0					
	SYSTEM	46.1	52.6	54.6	46.1		744	652	343	61.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN DURING MARCH DUE TO PROBLEMS WITH SCALE BUILD-UP ON THE INLET DUCTWORK.

RECYCLE PUMP PROBLEMS ALSO CONTRIBUTED TO DOWN TIME FOR MODULE A DURING THE MONTH.

MODULE C AWAITED COMPLETION OF WORK ON THE INTERFACE WASH SPRAY HEADER DURING MARCH.

4/83	A	.0	.0	.0	.0					
	B	10.3	9.3	9.7	9.3					
	C	.0	.0	.0	.0					
	D	92.4	89.4	93.4	89.2					
	SYSTEM	33.8	32.9	34.3	32.8		720	718	236	73.6

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN DURING THE MONTH TO ALLOW FOR WORK ON A RECYCLE PUMP.

A CLEANING OF THE INLET DUCTWORK ALSO CAUSED DOWN TIME FOR MODULE A DURING APRIL.

MODULE B WAS OUT OF SERVICE FOR MIST ELIMINATOR CLEANING.

MODULE C WAS DOWN SO THAT REPAIRS COULD BE MADE TO A SECTION OF A WASH SPRAY HEADER.

5/83	A	.0	.0	.0	.0				
	B	64.8	66.9	79.8	64.8				
	C	.0	.0	.0	.0				
	D	32.8	33.7	40.2	32.7				
	SYSTEM	32.5	33.5	40.0	32.5	744	721	242	70.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN DURING THE MONTH FOR RECYCLE PUMP REPAIRS.

MODULE C WAS OUT OF SERVICE SO THAT REPAIRS COULD BE MADE ON A WASH SPRAY HEADER.

6/83	A	31.1	4.6	5.1	4.4				
	B	57.0	31.1	34.5	30.3				
	C	.0	.0	.0	.0				
	D	66.7	68.4	75.8	66.7				
	SYSTEM	51.6	34.7	38.5	33.8	720	701	243	68.4

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN DURING THE FIRST PART OF JUNE DUE TO PROBLEMS WITH RECYCLE PUMP BEARINGS.

MODULE C WAS DOWN FOR THE ENTIRE MONTH OF JUNE DUE TO PROBLEMS WITH THE BOOSTER FAN BLADE PITCH CONTROL.

7/83	A	82.9	82.9	100.0	82.9				
	B	85.3	56.3	71.5	56.3				
	C	50.5	34.4	43.7	34.4				
	D	.0	.0	.0	.0				
	SYSTEM	72.9	57.9	73.5	57.8	744	743	430	74.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS OUT OF SERVICE DURING THE FIRST 12 DAYS OF JULY DUE TO MIST ELIMINATOR HEADER PROBLEMS.

MODULE D WAS OUT OF SERVICE UNTIL JULY 25 DUE TO RECYCLE PUMP PROBLEMS.

8/83	A	96.0	96.1	96.5	96.0				
	B	.0	.0		.0				
	C	100.0	100.0	100.0	100.0				
	D	91.0	8.5	8.5	8.5				
	SYSTEM	95.7	68.2	68.5	68.1	744	743	507	
9/83	A	94.5	94.8	96.3	94.5				
	B	48.4	51.7	52.6	51.6				
	C	56.5	43.6	44.3	43.5				
	D	.0	.0		.0				
	SYSTEM	66.5	63.4	64.4	63.2	720	718	455	75.6

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING AUGUST AND SEPTEMBER.

10/83	A	67.7	100.0	100.0	67.7				
	B	22.3	65.2	65.1	44.1				
	C	.0	.0		.0				
	D	53.0	21.9	21.8	14.8				
	SYSTEM	47.7	62.4	62.3	42.2	744	503	314	82.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OUT OF SERVICE FROM OCTOBER 21 THROUGH THE END OF THE MONTH FOR AN ANNUAL MAINTENANCE OUTAGE.

11/83	A	.0		.0	.0				
	B	46.7		96.0	46.7				
	C	39.3		80.9	39.3				
	D	.0			.0				
	SYSTEM	28.7		59.0	28.7	720		206	

** PROBLEMS/SOLUTIONS/COMMENTS

THE ANNUAL MAINTENANCE OUTAGE WHICH BEGAN IN OCTOBER CONTINUED THROUGH NOVEMBER 12.

THE UTILITY REPORTED PROBLEMS WITH A CIRCULATING WATER PUMP FROM NOVEMBER 13 TO NOVEMBER 15, 1983. THE UNIT WAS BROUGHT DOWN DURING THIS PERIOD.

MODULES A AND C WERE DOWN DURING PART OF NOVEMBER DUE TO ABSORBER GAS AND LIQUID SIDE EQUIPMENT PROBLEMS.

THE UNIT WAS PLACED BACK IN SERVICE ON NOVEMBER 16.

12/83	A	.0	.0		.0				
	B	99.2	100.0	100.0	99.2				
	C	99.2	100.0	100.0	99.2				
	D	15.7	15.9	100.0	15.7				
	SYSTEM	71.4	72.0	100.0	71.4	744	736	531	98.9

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND D EXPERIENCED PROBLEMS WITH ABSORBER LIQUID SIDE EQUIPMENT DURING DECEMBER.

1/84	A	.0	.0		.0				
	B	100.0	100.0	100.0	100.0				
	C	32.5	32.5	32.5	32.5				
	D	96.2	96.2	96.2	96.2				
	SYSTEM	76.3	76.3	76.3	76.3	744	744	567	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN FOR LIQUID SIDE EQUIPMENT PROBLEMS DURING JANUARY.

MODULE C WAS DOWN FOR LIQUID AND GAS SIDE EQUIPMENT PROBLEMS.

2/84	SYSTEM					696			
3/84	SYSTEM					744			
4/84	SYSTEM					720			

COLORADO UTE ELECTRIC: CRAIG 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF FEBRUARY THROUGH APRIL 1984.

5/84	A	99.2	83.7	99.9	83.1				
	B	.0	.0		.0				
	C	99.3	100.0	100.0	99.3				
	D	98.6	99.2	99.2	98.6				
	SYSTEM	99.0	94.3	99.7	93.7	744	739	697	
6/84	A	100.0	100.0	100.0	100.0				
	B	28.3	.0	.0	.0				
	C	100.0	76.5	103.4	76.5				
	D	100.0	89.0	100.0	89.0				
	SYSTEM	100.0	88.5	100.0	88.5	720	720	637	
7/84	A	100.0	78.8	100.0	100.0				
	B	41.9	21.3	93.1	27.0				
	C	91.5	53.7	100.0	68.1				
	D	99.9	78.7	100.0	99.9				
	SYSTEM	100.0	77.5	100.0	98.3	744	744	732	
8/84	A	84.3	80.1	100.0	80.1				
	B	68.4	67.5	147.8	67.5				
	C	100.0	95.6	95.6	95.6				
	D	29.0	19.4		19.4				
	SYSTEM	93.9	87.5	100.0	87.5	744	744	651	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING THE PERIOD OF MAY THROUGH AUGUST 1984.

9/84	SYSTEM					720			
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COLORADO UTE ELECTRIC	
PLANT NAME	CRAIG	
UNIT NUMBER	2	
CITY	CRAIG	
STATE	COLORADO	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	172.	(.400 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	900	
GROSS UNIT GENERATING CAPACITY - MW	455	
NET UNIT GENERATING CAPACITY W/FGD - MW	400	
NET UNIT GENERATING CAPACITY WO/FGD - MW	406	
EQUIVALENT SCRUBBED CAPACITY - MW	455	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	722.29	(1530600 ACFM)
BOILER FLUE GAS TEMPERATURE - C	121.1	(250 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	10.9	(35.8 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	9100-10300	
AVERAGE ASH CONTENT %	8.00	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	16.00	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT %	.45	
RANGE SULFUR CONTENT - %	0.4-0.5	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT %	0.00-0.02	
 *** PARTICLE CONTROL		
 ** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
 ** ESP		
NUMBER	1	
NUMBER OF SPARES	0	
TYPE	HOT SIDE	
SUPPLIER	BELCO	
INLET FLUE GAS CAPACITY - CU.M/S	1392.1	(2950000 ACFM)
INLET FLUE GAS TEMPERATURE - C	398.9	(750 F)
PRESSURE DROP - KPA	.7	(3. IN-H2O)
PARTICLE REMOVAL EFFICENCY - %	99.9	
 ** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
 *** FGD SYSTEM		

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS
A-E FIRM	STEARNS-ROGER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.80
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	1.3
CURRENT STATUS	1
COMMERCIAL START-UP	5/80
INITIAL START-UP	12/79
CONTRACT AWARDED	5/77

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	.96	
DESIGN COAL HEAT CONTENT - J/G	22329.6	(9600 BTU/LB)
DESIGN COAL ASH CONTENT - %	11.60	
DESIGN MOISTURE CONTENT - %	15.30	
DESIGN CHLORIDE CONTENT - %	.10	
SPACE REQUIREMENTS - SQ M	12140.2	(130680 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	264.0	

** QUENCHER/PRESATURATOR

NUMBER	4	
TYPE	QUENCH DUCT	
SUPPLIER	PEABODY PROCESS SYSTEMS	
INLET GAS FLOW - CU. M/S	217.07	(460000 ACFM)
INLET GAS TEMPERATURE - C	121.1	(250 F)
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	31.	(500 GPM)
L/G RATIO - L/CU. M	.1	(1.1 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	PEABODY PROCESS SYSTEMS	
DIMENSIONS - FT	32.0 DIA X 52.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC (SPRAY ZONE); GLASS FLAKE-FILLED POLYEST	
LINER SPECIFIC MATERIAL	NATURAL RUBBER	
LINER MATERIAL TRADE NAME/COMMON TYPE	BLACK NATURAL RUBBER	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	4	
LIQUID RECIRCULATION RATE - LITER/S	1512.	(24000 GPM)
L/G RATIO - L/CU.M	7.0	(52.2 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.4	(1.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	217.07	(460000 ACFM)
INLET GAS TEMPERATURE - C	121.1	(250 F)
SO2 REMOVAL EFFICIENCY - %	85.0	
PARTICLE REMOVAL EFFICIENCY - %	50.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	4	
FREEBOARD DISTANCE - M	1.52	(5.0 FT)
DISTANCE BETWEEN VANES - CM	3.0	(1.20 IN)
VANE ANGLES - DEGREES	45	
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	RAW WATER	
WASH FREQUENCY	CONTINUOUS	
WASH RATE - L/S	6.3	(100 GAL/MIN)
** REHEATER		
NUMBER	4	
NUMBER OF SPARES	1	
NUMBER PER MODULE	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
LOCATION	OUTLET DUCT BETWEEN ME & OUTLET DAMPER	
PERCENT GAS BYPASSED - AVG	23.0	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	194.89	(413000 ACFM)
INLET FLUE GAS TEMPERATURE C	43.3	(110 F)
OUTLET FLUE GAS FLOW RATE - CU. M/S	302.02	(640000 ACFM)
OUTLET FLUE GAS TEMPERATURE - C	73.9	(165 F)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
** FANS		
NUMBER	4	
NUMBER OF SPARES	0	
DESIGN	AXIAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	INDIRECT REHEAT	
APPLICATION	N/A	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	46.03	(97545 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	4	
NUMBER OF SPARES	1	
DESIGN	AXIAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE CU.M/S	372.80	(790000 ACFM)
FLUE GAS TEMPERATURE - C	121.1	(250 F)
PRESSURE DROP - KPA	3.4	(11.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	4	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	
MANUFACTURER	FORNEY ENGINEERING	
MODULATION	OPEN	
SEAL AIR FLOW - CU. M/S	3.07	(6500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	4	
GENERIC TYPE	LOUVER	

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	3.07 (6500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	3.07 (6500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; NR
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	1
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	OPEN
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
MODULATION	CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	ASTM A-285
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

** DUCTWORK		
LOCATION		INLET TO QUENCH
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE		AISI 1110
LINER GENERIC MATERIAL TYPE		NONE
LINER SPECIFIC MATERIAL TYPE		N/A
** DUCTWORK		
LOCATION		OUTLET TO DAMPER
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE		AISI 1110
LINER GENERIC MATERIAL TYPE		ORGANIC
LINER SPECIFIC MATERIAL TYPE		GLASS FLAKE-FILLED POLYESTER
** DUCTWORK		
LOCATION		DAMPER TO STACK
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE		AISI 1110
LINER GENERIC MATERIAL TYPE		NONE
LINER SPECIFIC MATERIAL TYPE		N/A
** DUCTWORK		
LOCATION		BYPASS
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE		AISI 1110
LINER GENERIC MATERIAL TYPE		NONE
LINER SPECIFIC MATERIAL TYPE		N/A
** REAGENT PREPARATION EQUIPMENT		
FUNCTION		WET BALL MILL
DEVICE		COMPARTMENTED
DEVICE TYPE		NR
MANUFACTURER		KENNEDY VAN SAUN
NUMBER		1
NUMBER OF SPARES		0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	9.1	(10 TPH)
PRODUCT QUALITY - % SOLIDS	35.0	
** TANKS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECYCLE	4	
REAGENT PREP PRODUCT	1	
THICKENER OVERFLOW	1	
CLASSIFIER OVERFLOW	4	
FLOCCULANT	1	
WASTE SLURRY BLEED	1	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
RAW WATER	2	
RECLAIM SUMP	7	
POND	1	
COOLING TOWER BLOWDOWN BOOSTER	2	
ABSORBER RECIRCULATION	8	
WASH SLURRY	8	
SUPERNATANT	2	
THICKENER UNDERFLOW	2	
POLYELECTROLYTE	1	
WASTE SLURRY	2	
MILL RECIRCULATION	2	
LIMESTONE SLURRY FEED	2	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE	CENTRIFUGE	
NUMBER	1	
NUMBER OF SPARES	1	
DIMENSIONS FT	3.0 DIA X 6.0	
CAPACITY	126 GPM	

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

SHELL GENERIC MATERIAL TYPE	HIGH ALLOY
SHELL SPECIFIC MATERIAL TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
BELT GENERIC MATERIAL TYPE	N/A
BELT SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	35% SOLIDS
OUTLET STREAM CHARACTERISTICS	60% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	60 GPM
OUTLET STREAM DISPOSITION	LANDFILL
OVERFLOW STREAM DISPOSITION	TO WASTE SUMP & THEN TO THICKENER

** SOLIDS CONCENTRATING/DEWATERING

DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CENTER DRAW
DIMENSIONS - FT	75.0 DIA X 15.0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER (WALLS); MAT-REINFO
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	5% SOLIDS
OUTLET STREAM CHARACTERISTICS	35% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	100 GPM, <1% SUSPENDED SOLIDS
OUTLET STREAM DISPOSITION	TO CENTRIFUGES
OVERFLOW STREAM DISPOSITION	RECYCLED TO PROCESS

*** SLUDGE

FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	10.5	(11.6 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	40.0	
% CASO3 - DRY	22.6	
% CASO4 - DRY	70.2	
% CAOH2 DRY	.0	
% CACO3 - DRY	2.9	
% ASH - DRY	.3	
% OTHER COMPOUNDS - DRY	3.9	

** TREATMENT

METHOD	NONE
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** DISPOSAL

NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK

** PROCESS CONTROL AND INSTRUMENTATION

CHEMICAL PARAMETERS	PH, SO2 CONCENTRATION
PHYSICAL VARIABLES	DENSITY, GAS FLOW, LIQUID FLOW
CONTROL LEVELS	PH 5.4, SOLIDS 12-15%
MONITOR TYPE	UNILOK-PH, OHMART-DENSITY, BROOKS-FLOW, DYNASCIE
MONITOR LOCATION	AT MODULE RECYCLE TANK
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK

** WATER BALANCE

WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	17.8 (282 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	.6 (9 GPM)
SLUDGE INTERSTITIAL WATER LOSS - LITERS/S	2.1 (33 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
EFFLUENT WATER LOSS - LITERS/S	.0 (0 GPM)
RECEIVING WATER STREAM	N/A
MAKEUP WATER ADDITION LITERS/S	20.2 (321 GPM)
SOURCE OF MAKEUP WATER	COOLING TOWER BLOWDOWN

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	CACO3
CONSUMPTION	7000 LB/HR
UTILIZATION - %	75.0
POINT OF ADDITION	BALL MILL

** FGD SPARE CAPACITY INDICES

ABSORBER %	33.3
MIST ELIMINATOR - %	33.3
REHEATER - %	33.3
BALL MILL - %	.0
EFFLUENT HOLD TANK - %	33.3
THICKENER - %	.0
CENTRIFUGE - %	50.0

** FGD SPARE COMPONENT INDICES

ABSORBER	1.0
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-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/79	SYSTEM							744		
8/79	SYSTEM							744		
9/79	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM AT CRAIG 2 WAS UNDERGOING TESTING IN JULY. INITIAL TESTING WITH THE SYSTEM OPERATING ON FLUE GAS TOOK PLACE IN AUGUST 1979. COMMERCIAL OPERATIONS ARE SCHEDULED FOR NOVEMBER 1979.

10/79	SYSTEM							744		
11/79	SYSTEM							720		
12/79	SYSTEM							744		

** PROBLEMS/SOLUTIONS/COMMENTS

THE CRAIG 2 SCRUBBING SYSTEM COMMENCED INITIAL OPERATION OFFICIALLY IN DECEMBER 1979.

THE SYSTEM WAS TAKEN OUT OF SERVICE ON DECEMBER 3 FOR INSPECTION AND SCHEDULED MAINTENANCE. THE FINE SCREEN ON THE TURBINE THROTTLE VALVE WAS REMOVED AND CLEANED. THE BOILER WAS PUT BACK ON LINE ON DECEMBER 9 AT FULL LOAD. THE FGD SYSTEM WAS PUT BACK ON LINE ON DECEMBER 19. SHAKEDOWN OPERATIONS ARE CONTINUING.

1/80	SYSTEM							744		
2/80	SYSTEM							696		
3/80	SYSTEM							744		

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN AT THE END OF THE PERIOD DUE TO TURBINE RELATED PROBLEMS.

WHEN FULL LOAD OPERATIONS WERE ATTEMPTED CONTROL PROBLEMS WERE ENCOUNTERED WITH THE SCRUBBER.

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

PROBLEMS WITH OPENING/CLOSING THE BYPASS DAMPER HAVE BEEN ENCOUNTERED.
 LARGER OPERATORS ARE BEING TESTED THAT MAY SOLVE THE PROBLEM.

4/80 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM IS STILL IN THE STARTUP PHASE OF OPERATIONS. TESTING IS
 BEING PERFORMED ON THE SYSTEM, BUT THERE HAS BEEN NO OPERATIONAL DATA
 REPORTED.

5/80	A	38.4	27.5	28.4	24.5				
	B	42.5	32.1	33.1	28.5				
	C	47.0	37.2	38.4	33.1				
	D	30.0	18.0	18.6	16.0				
	SYSTEM	52.6	38.3	39.5	34.0	640	661	253	76.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE CRAIG 2 UNIT (BOILER AND SCRUBBER) COMMENCED COMMERCIAL OPERATION ON
 MAY 4, 1980.

NOTE: THIS SYSTEM EFFECTIVELY HAS ONE SPARE MODULE SO THAT ONLY THREE ARE
 CURRENTLY NEEDED AT FULL LOAD TO MAINTAIN COMPLIANCE WITH SO2 EMIS-
 SION REGULATIONS. WHEN THE CURRENT LOW SULFUR COAL SOURCE IS
 EXHAUSTED (SEVERAL YEARS FROM NOW) GREATER SCRUBBING CAPACITY WILL
 BE REQUIRED SO THAT THERE WILL NO LONGER BE AN ENTIRE MODULE SET
 ASIDE AS A SPARE DURING FULL LOAD BOILER OPERATIONS. THE "SYSTEM"
 DEPENDABILITY FACTORS WILL BE BASED ON THREE MODULES UNTIL THE
 CURRENT COAL SOURCE IS EXHAUSTED.

6/80	A	47.6	41.2	42.0	37.9				
	B	53.9	48.0	48.9	44.2				
	C	61.1	55.8	56.9	51.4				
	D	34.6	27.0	27.5	24.9				
	SYSTEM	65.7	57.3	58.4	52.8	720	663	380	68.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY AND JUNE, PROBLEMS WERE ENCOUNTERED WITH PLUGGING OF THE
 ABSORBER SPRAY NOZZLES.

A PROBLEM WAS ALSO ENCOUNTERED DURING INITIATION OF COMMERCIAL OPERATION
 WITH A HIGH PH LEVEL IN THE THICKENER UNDERFLOW.

THE SCRUBBING SYSTEM IS STILL UNDERGOING SHAKEDOWN OPERATIONS.

7/80	A	59.1	51.0	51.7	43.8				
	B	61.8	54.1	54.9	46.5				
	C	37.6	26.0	26.3	22.3				
	D	43.7	33.0	33.5	28.4				
	SYSTEM	67.4	54.7	55.5	47.0	744	640	350	65.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY, FGD OUTAGE TIME WAS CAUSED BY PLUGGED ABSORBER SPRAY NOZZLES.

8/80	A	50.0	46.7	48.3	42.2				
	B	50.0	48.4	50.0	43.7				
	C	50.0	47.5	49.1	42.9				
	D	50.0	52.3	54.0	47.2				
	SYSTEM	66.7	65.0	67.1	58.7	744	672	327	75.6

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST THE FGD SYSTEM EXPERIENCED ASSORTED MECHANICAL PROBLEMS.

SPRAY NOZZLE PLUGGING OCCURRED, CAUSING ADDITIONAL OUTAGE TIME WHICH ADDED TO THE LOW AVAILABILITY FACTOR DURING THE MONTH.

9/80	A	48.6	47.5	48.4	47.1				
	B	58.2	58.8	59.9	58.2				
	C	61.1	59.6	60.7	59.0				
	D	67.4	66.2	67.4	65.6				
	SYSTEM	78.4	77.4	78.8	76.6	720	713	552	85.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE SPRAY NOZZLES IN THE ABSORBER MODULE CONTINUED TO PLUG UP DURING SEPTEMBER.

10/80	A	99.5	89.4	93.7	11.9				
	B	99.5	91.5	95.8	12.2				
	C	99.5	88.4	92.6	11.8				
	D	99.5	92.5	96.8	12.4				
	SYSTEM	99.5	90.5	94.7	12.1	744	99	90	12.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS TAKEN OFF LINE ON OCTOBER 5 FOR A FIVE WEEK SCHEDULED OUTAGE.

AN IN-LINE SPOT CHECK PERFORMED ON OCTOBER 4 INDICATED THAT THE FGD SYSTEM WAS ACHIEVING A 66.2% SO2 REMOVAL EFFICIENCY. THE STACK OPACITY WAS MEASURED AT 5.7%.

11/80	A	69.4	61.7	66.0	27.5				
	B	.0	.0	.0	.0				
	C	70.8	71.0	76.0	31.6				
	D	72.2	89.7	96.0	40.0				
	SYSTEM	70.8	74.1	79.3	33.0	720	321		38.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS RETURNED TO SERVICE ON NOVEMBER 10 AFTER A FIVE WEEK SCHEDULED MAINTENANCE OUTAGE.

MODULE B WAS TAKEN OFF LINE DURING NOVEMBER DUE TO BOOSTER FAN PROBLEMS.

12/80	A	43.0	57.5	58.7	42.6				
	B	.0	.0	.0	.0				
	C	53.8	69.3	70.7	51.3				
	D	60.5	78.4	80.0	58.1				
	SYSTEM	52.4	68.4	69.8	50.7	744	551	377	54.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B REMAINED OFF LINE DURING DECEMBER DUE TO BOOSTER FAN BLADE PITCH PROBLEMS.

1/81	A	67.2	66.0	66.2	65.9				
	B	.0	.0	.0	.0				
	C	79.8	78.2	78.4	77.9				
	D	89.2	88.9	89.2	88.7				
	SYSTEM	78.7	77.7	77.9	77.5	744	742	414	85.5

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY MODULE B REMAINED OUT OF SERVICE DUE TO BOOSTER FAN BLADE PITCH PROBLEMS AND PROBLEMS WITH THE SYSTEM INTERLOCKS.

2/81	A	32.7	32.1	32.2	32.1				
	B	65.5	64.3	64.5	64.3				
	C	.0	.0	.0	.0				
	D	100.0	100.0	99.8	100.0				
	SYSTEM	66.1	65.5	65.7	65.5	672	672		90.1

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WERE ENCOUNTERED DURING THE MONTH WITH OPENING THE MODULE A, B, AND C DAMPERS.

DURING FEBRUARY MODULE A ALSO ENCOUNTERED PLUGGAGE IN THE MOISTURE SEPARATOR.

3/81	A	68.5	69.8	70.1	67.9				
	B	80.6	82.3	82.8	80.1				
	C	.0	.0	.0	.0				
	D	52.4	53.2	53.5	51.7				
	SYSTEM	52.4	53.2	53.5	51.7	744	724	385	85.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH MODULES C AND D EXPERIENCED PROBLEMS WITH THE MIST ELIMINATOR PLUGGING.

ADDITIONAL OUTAGE TIME OF MODULE C WAS DUE TO OPERATIONAL PROBLEMS OF THE DAMPERS.

4/81	SYSTEM	.0	.0	.0	.0	720	596	0	59.3
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM DID NOT OPERATE DURING APRIL BECAUSE OF PLUGGED MIST ELIMINATORS. THE MIST ELIMINATORS ARE BEING CLEANED.

5/81	SYSTEM	.0	.0	.0	.0	744	744	0	
6/81	SYSTEM	.0	.0	.0	.0	720	717	0	78.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY AND JUNE THE SYSTEM WAS OUT OF SERVICE DUE TO DAMAGED MIST ELIMINATOR PADS AND PLUGGING OF THE MIST ELIMINATOR.

7/81	SYSTEM	.0	.0	.0	.0	744	686	0	61.6
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** PROBLEMS/SOLUTIONS/COMMENTS

ALL MODULES REMAINED OUT OF SERVICE DURING JULY AS A RESULT OF THE BROKEN MIST ELIMINATOR TRAYS.

8/81	A	.0	.0	.0	.0				
	B	.0	.0	.0	.0				
	C	59.7	61.0	61.8	59.4				
	D	39.5	40.5	41.0	39.4				
	SYSTEM	33.1	33.8	34.3	32.9	744	724	297	73.2

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND B REMAINED DOWN DURING AUGUST AS THE UTILITY WAS WAITING FOR NEW MIST ELIMINATOR TRAYS.

MODULE D WAS UNAVAILABLE FOR PART OF THE MONTH AS A RESULT OF PROBLEMS WITH DAMPERS.

9/81	A	18.1	18.4	18.6	17.8				
	B	40.3	40.9	41.4	39.6				
	C	81.9	83.6	84.5	80.8				
	D	13.9	13.4	13.5	12.9				
	SYSTEM	51.4	52.1	52.7	50.4	720	696	538	81.5

** PROBLEMS/SOLUTIONS/COMMENTS

ALL FOUR MODULES BECAME OPERABLE TOWARD THE END OF THE MONTH. MODULE D HAD BEEN OUT OF SERVICE AS A RESULT OF OUTLET DAMPER PROBLEMS. MODULE A WAS PUT IN SERVICE THE THIRD WEEK OF THE MONTH AFTER HAVING THE MIST ELIMINATORS REPLACED. THE MODULES ARE NOW BEING SHUT DOWN ON A REGULAR BASIS TO CLEAN THE MIST ELIMINATORS.

10/81	A	83.9	83.7	83.8	83.7				
	B	44.6	44.3	44.4	44.3				
	C	85.2	84.9	85.1	84.9				
	D	85.3	84.9	85.1	84.9				
	SYSTEM	99.7	99.3	99.5	99.3	744	744	739	85.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MODULE B EXPERIENCED BOOSTER FAN BEARING PROBLEMS.

PROBLEMS WITH INSTRUMENTATION HINDERED ALL FOUR MODULES DURING THE MONTH.

11/81	A	19.3	43.8	48.4	19.2				
	B	1.9	4.1	4.6	1.8				
	C	11.8	26.7	29.5	11.7				
	D	29.6	67.3	74.4	29.4				
	SYSTEM	20.8	47.3	52.3	20.7	720	315	149	32.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUT DOWN FROM NOVEMBER 8 THRU NOVEMBER 23 FOR SCHEDULED MAINTENANCE.

A PROBLEM WITH MANY OF THE VALVES STICKING AT STARTUP WAS RESOLVED BY FLUSHING.

LIMESTONE BALL MILL PLUGGING PROBLEMS WERE ENCOUNTERED DURING DECEMBER.

12/81	A	33.2	33.3	33.8	32.9				
	B	32.9	33.1	33.6	32.7				
	C	88.0	88.7	89.9	87.6				
	D	51.6	51.9	52.6	51.3				
	SYSTEM	68.5	69.0	70.0	68.1	744	735	507	82.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER PROBLEMS WERE ENCOUNTERED WITH THE BOOSTER FAN BEARING.

MODULE D EXPERIENCED PROBLEMS WITH A BINDING OUTLET DAMPER.

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
1/82	A	81.3	83.9	84.9	81.0				
	B	75.0	77.5	78.4	74.8				
	C	77.1	79.8	80.7	77.0				
	D	83.3	86.1	87.1	83.1				
	SYSTEM	100.0	100.0	100.0	100.0		744	718	744 88.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE MIST ELIMINATORS WERE CLEANED WEEKLY.

ROCKS IN THE LIMESTONE HAS CAUSED PLUGGING OF THE BALL MILL. THE SUPPLIER IS WORKING ON THE PROBLEM.

2/82	A	86.0	86.8	87.5	85.9				
	B	86.5	87.2	87.9	86.3				
	C	54.3	54.7	55.1	54.2				
	D	30.9	31.1	31.4	30.8				
	SYSTEM	86.0	86.7	85.9	85.9		672	665	577 85.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY MODULE D WAS OFF-LINE FOR 464 HOURS DUE TO A BROKEN RECYCLE PUMP SHAFT.

PROBLEMS WITH THE THICKENER UNDERFLOW PUMP CONTROLLERS WAS ALSO ENCOUNTERED DURING FEBRUARY.

3/82	A	62.6	62.5	62.5	62.5				
	B	68.5	68.3	68.3	68.3				
	C	69.9	69.7	69.7	69.7				
	D	41.5	41.3	41.3	41.3				
	SYSTEM	80.9	80.6	80.6	80.6		744	744	600 80.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE RECYCLE PUMP SHAFT ON THE D MODULE WAS REPAIRED AND THE MODULE RETURNED TO SERVICE.

4/82	A	60.7	64.6	68.9	60.6				
	B	56.5	60.3	64.2	56.5				
	C	56.0	59.6	63.5	55.8				
	D	34.2	36.4	38.8	34.1				
	SYSTEM	69.1	73.6	78.5	69.0		720	674	497 69.8

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE D EXPERIENCED SOME OUTLET DAMPER PROBLEMS DURING APRIL.

5/82	A	1.8	1.7	2.0	1.7				
	B	4.6	4.5	5.4	4.5				
	C	.0	.0	.0	.0				
	D	14.1	14.0	16.7	14.0				
	SYSTEM	6.8	6.7	8.0	6.7		744	744	50 60.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE SYSTEM WAS DOWN MOST OF THE TIME DUE TO THICKENER REPAIRS.

6/82	A	48.1	50.4	51.8	47.9				
	B	.0	.0	.0	.0				
	C	54.6	57.5	59.0	54.6				
	D	84.0	88.4	90.7	84.0				
	SYSTEM	62.2	65.4	67.2	62.2		720	684	447 59.5

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS OFF-LINE DURING JUNE DUE TO DAMAGED TURNING VANES.

MODULES A, C, AND D WERE TAKEN DOWN FOR CLEANING AND REPAIR OF THE MIST ELIMINATOR DURING PART OF THE MONTH.

7/82	A	67.9	67.7	69.4	67.7				
	B	47.2	47.2	48.3	47.2				
	C	74.1	74.0	75.8	74.0				
	D	43.8	43.7	44.8	43.7				
	SYSTEM	77.6	77.5	79.4	77.5	744	744	577	79.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY THE UNIT EXPERIENCED NUMEROUS INSTRUMENT FAILURES AS A RESULT OF EXCESSIVE MOISTURE IN THE INSTRUMENT AIR SUPPLY.

8/82	A	56.3	57.3	63.2	56.2				
	B	.0	.0	.0	.0				
	C	85.5	87.1	96.1	85.4				
	D	29.5	29.9	33.0	29.4				
	SYSTEM	57.1	58.1	64.1	57.0	744	730	424	68.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST MODULES B AND D WERE DOWN DUE TO INOPERABLE OUTLET DAMPERS. MODULE D WAS REPAIRED BY THE END OF THE MONTH, HOWEVER REPAIRS CONTINUED ON MODULE B.

9/82	A	.0	.0	.0	.0				
	B	.0	.0	.0	.0				
	C	36.7	65.3	79.5	36.5				
	D	27.6	49.1	59.8	27.5				
	SYSTEM	21.4	38.1	46.4	21.3	720	403	153	36.9

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS OUT OF SERVICE DURING SEPTEMBER DUE TO ABSORBER LINER DAMAGE.

MODULE B WAS DOWN DURING SEPTEMBER DUE TO OUTLET DAMPER PROBLEMS.

DUCTWORK PROBLEMS WERE ALSO EXPERIENCED BY MODULE B DURING THE MONTH.

THE UNIT WAS TAKEN OUT OF SERVICE ON SEPTEMBER 18 FOR AN ANNUAL OUTAGE LASTING THE REMAINDER OF THE MONTH.

10/82	A	.0	.0	.0	.0				
	B	.0	.0	.0	.0				
	C	50.9	57.3	94.0	50.8				
	D	25.0	28.1	46.1	24.9				
	SYSTEM	25.3	28.5	46.7	25.2	744	659	187	65.1

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND B WERE DOWN DURING OCTOBER AWAITING ABSORBER LINER REPAIRS.

MODULE D DEVELOPED A BOOSTER FAN OIL LEAK DURING THE MONTH. THE PROBLEM OCCURRED FOLLOWING THE UNIT OUTAGE AND FORCED THE MODULE OUT OF SERVICE FOR REPAIRS.

11/82	A	.0	.0	.0	.0				
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COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	.0	.0	.0	.0					
	C	63.6	63.5	63.7	63.5					
	D	93.8	93.6	94.0	93.6					
	SYSTEM	52.5	52.4	52.6	52.4		720	720	377	71.3

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND B REMAINED OUT OF SERVICE DURING NOVEMBER AWAITING ABSORBER LINER REPAIRS.

12/82	A	.0	.0	.0	.0					
	B	.0	.0	.0	.0					
	C	93.8	93.7	93.7	93.7					
	D	18.5	18.5	18.5	18.5					
	SYSTEM	37.5	37.4	37.4	37.4		744	744	278	69.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND B REMAINED OUT OF SERVICE DURING DECEMBER AWAITING ABSORBER LINER REPAIRS.

MODULE D DEVELOPED A BOOSTER FAN LUBE OIL LEAK DURING DECEMBER.

1/83	A	.0	.0	.0	.0					
	B	45.8	46.0	46.6	45.7					
	C	62.2	62.5	63.4	62.1					
	D	.0	.0	.0	.0					
	SYSTEM	36.0	36.1	36.7	35.9		744	740	267	64.1

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN THE ENTIRE MONTH FOR ABSORBER LINER REPAIRS.

MODULE D WAS DOWN DURING JANUARY DUE TO A BOOSTER FAN OVERHAUL. MODULES B AND C ALSO EXPERIENCED FAN PROBLEMS DURING THE MONTH.

MODULES B AND C EXPERIENCED DAMPER PROBLEMS IN JANUARY.

2/83	A	.0	.0	.0	.0					
	B	40.7	40.9	41.3	40.7					
	C	57.5	57.8	58.3	57.5					
	D	.0	.0	.0	.0					
	SYSTEM	32.7	32.9	33.2	32.7		672	668	220	67.5

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND C WERE DOWN DURING FEBRUARY FOR ABSORBER LINER REPAIRS.

MODULE B WAS DOWN DURING THE MONTH FOR REPAIRS ON THE INLET DAMPER.

MODULES B AND D WERE DOWN DURING FEBRUARY FOR BOOSTER FAN REPAIRS.

3/83	A	34.8	36.2	37.8	34.8					
	B	49.4	51.4	53.6	49.4					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	28.1	29.2	30.5	28.1		744	715	209	68.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE C WAS DOWN DURING MARCH FOR ABSORBER LINER REPAIRS.

4/83	A	42.2	85.0	97.4	42.2					
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-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	.0	.0	.0	.0						
	C	.0	.0	.0	.0						
	D	.0	.0	.0	.0						
	SYSTEM	14.0	28.3	24.3	14.0			720	357	102	34.3

** PROBLEMS/SOLUTIONS/COMMENTS

ON APRIL 15, THE UNIT WAS TAKEN DOWN FOR AN ANNUAL OUTAGE.

MODULES B AND C WERE UNDERGOING LINER REPAIR WORK DURING THE MONTH.

MODULE D WAS DOWN IN APRIL AWAITING THE RETURN OF A BOOSTER FAN FROM THE MANUFACTURER.

5/83	A	35.1	48.0	54.4	35.1					
	B	.0	.0	.0	.0					
	C	.0	.0	.0	.0					
	D	.0	.0	.0	.0					
	SYSTEM	11.7	16.0	18.1	11.7		744	544	87	49.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN MOST OF MAY FOR AN ANNUAL OUTAGE.

6/83	A	70.1	70.6	72.7	70.1					
	B	9.0	7.9	8.2	7.9					
	C	65.8	66.3	68.3	65.8					
	D	.0	.0	.0	.0					
	SYSTEM	48.3	48.3	49.7	47.9		720	715	345	69.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS DOWN DURING MOST OF JUNE DUE TO PROBLEMS WITH A BOOSTER FAN BLADE PITCH CONTROL.

DAMPER PROBLEMS ALSO ACCOUNTED FOR THE MODULE B OUTAGE IN JUNE.

MODULE D WAS DOWN DURING JUNE AWAITING THE RETURN OF A BOOSTER FAN FROM THE MANUFACTURER.

7/83	A	72.6	72.7	73.2	72.6					
	B	92.2	37.4	37.7	37.4					
	C	49.9	52.7	53.1	52.6					
	D	.0	.0	.0	.0					
	SYSTEM	71.6	54.3	54.7	54.2		744	742	403	73.7

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS DOWN DURING PART OF JULY FOR MIST ELIMINATOR CLEANING.

MODULE C WAS DOWN DURING PART OF THE MONTH FOR RECYCLE PUMP REPAIRS.

MODULE D WAS OUT OF SERVICE DURING JULY AWAITING DELIVERY OF A BOOSTER FAN.

8/83	A	75.8	75.8	75.8	75.8					
	B	12.0	88.1	88.0	88.0					
	C	74.2	25.8	25.8	25.8					
	D	.0	.0	.0	.0					
	SYSTEM	54.0	63.3	63.2	63.2		744	744	470	

COLORADO UTE ELECTRIC: CRAIG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE D WAS DOWN DURING AUGUST DUE TO BOOSTER FAN REPAIRS.

9/83	A	95.3	95.6	100.0	95.3				
	B	43.1	57.1	59.9	56.9				
	C	32.8	67.4	70.7	67.2				
	D	.0	.0		.0				
	SYSTEM	57.1	73.4	76.9	73.2	720	718	527	75.8

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING SEPTEMBER.

10/83	A	96.8	100.0	100.0	96.8				
	B	94.4	.8	.8	.8				
	C	.0	.0		.0				
	D	.0	.0		.0				
	SYSTEM	63.7	33.6	50.4	32.5	744	718	242	81.3

11/83	A	99.9		99.9	99.9				
	B	89.9		89.9	89.9				
	C	.0		.0	.0				
	D	.0			.0				
	SYSTEM	63.3		63.3	63.3	720		456	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING OCTOBER AND NOVEMBER 1983.

12/83	A	64.0	68.5	67.1	64.0				
	B	72.2	77.3	75.7	72.2				
	C	78.2	83.7	82.0	78.2				
	D	.0	.0		.0				
	SYSTEM	71.4	76.5	75.0	71.4	744	695	532	98.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED A UNIT TRIP ON DECEMBER 14 AND 15, 1983.

1/84	A	86.0	89.6	94.8	86.0				
	B	72.8	75.9	80.3	72.8				
	C	50.3	52.4	55.4	50.3				
	D	.0	.0		.0				
	SYSTEM	69.7	72.6	76.8	69.7	744	714	519	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT SUFFERED A UNIT-TRIP AND SPENT 10 HOURS OUT OF SERVICE.

THE UNIT LOST HOURS ON JUNE 27-29 DUE TO REPAIRS TO THE THICKENER.

2/84	SYSTEM					696			
3/84	SYSTEM					744			
4/84	SYSTEM					720			

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF FEBRUARY THROUGH APRIL 1984.

5/84	A	50.7	77.6	77.6	41.0			
	B	51.8	98.1	98.1	51.8			
	C	.0	.0		.0			
	D	.0	.0	.0	.0			
	SYSTEM	34.2	58.6	58.6	30.9	744	393	.230

** PROBLEMS/SOLUTIONS/COMMENTS

THE RECYCLE TANK AGITATOR WAS OUT OF SERVICE DURING MAY.

THE MIST ELIMINATOR PAD ON MODULE C WAS CLEANED DURING MAY.

6/84	A	86.2	87.0	96.3	86.2			
	B	87.1	62.3	69.0	61.7			
	C	.0	.0		.0			
	D	75.6	74.4	82.3	73.7			
	SYSTEM	83.0	74.6	82.5	73.8	720	713	532

7/84	A	91.7	98.4	100.0	90.5			
	B	86.7	94.3	100.0	86.7			
	C	.0	.0	.0	.0			
	D	91.8	99.9	100.0	91.8			
	SYSTEM	90.1	97.5	100.0	89.7	744	684	667

8/84	A	100.0	86.3	100.0	86.3			
	B	100.0	100.0	100.0	100.0			
	C	.0	.0		.0			
	D	100.0	86.0	146.1	86.0			
	SYSTEM	100.0	90.8	100.0	90.8	744	744	675

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING THE PERIOD OF JUNE THROUGH AUGUST.

9/84	SYSTEM					720		
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COLORADO UTE ELECTRIC	
PLANT NAME	CRAIG	
UNIT NUMBER	3	
CITY	CRAIG	
STATE	COLORADO	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	13.	(.030 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	86.	(.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	900	
GROSS UNIT GENERATING CAPACITY - MW	447	
NET UNIT GENERATING CAPACITY W/FGD - MW	424	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	447	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	722.29	(1530600 ACFM)
BOILER FLUE GAS TEMPERATURE - C	*****	(**** F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	*****	(***** FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		9100-10300
AVERAGE ASH CONTENT - %	8.00	
RANGE ASH CONTENT - %	10.0-12.0	
AVERAGE MOISTURE CONTENT - %	14.00	
RANGE MOISTURE CONTENT - %	10.0-12.0	
AVERAGE SULFUR CONTENT - %	.45	
RANGE SULFUR CONTENT - %	0.4-0.5	
AVERAGE CHLORIDE CONTENT - %	.10	
RANGE CHLORIDE CONTENT - %	0.05-0.10	

*** PARTICLE CONTROL

** FABRIC FILTER

NUMBER	1	
PRESSURE DROP - KPA	1.5	(6.0 IN-H2O)
TYPICAL GAS/CLOTH RATIO - M/MIN	.7	(2.3 FT/MIN)

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	SPRAY DRYING
PROCESS TYPE	LIME/SPRAY DRYING
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	STANLEY CONSULTANTS
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.80
UNIT DESIGN SO2 REMOVAL EFFICIENCY %	85.00

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLORADO UTE ELECTRIC: CRAIG 3 (CONT.)

CURRENT STATUS	1	
COMMERCIAL START-UP	2/85	
INITIAL START-UP	6/84	
CONTRACT AWARDED	4/80	
 ** DESIGN AND OPERATING PARAMETERS		
 ** QUENCHER/PRESATURATOR		
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
 ** ABSORBER		
NUMBER	4	
GENERIC TYPE	SPRAY DRYER	
SPECIFIC TYPE	NR	
TRADE NAME/COMMON TYPE	HYDRAULIC PRESSURE NOZZLE	
SHELL GENERIC MATERIAL	NR	
SHELL SPECIFIC MATERIAL	NR	
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR	
LINER GENERIC MATERIAL	NR	
LINER SPECIFIC MATERIAL	NR	
LINER MATERIAL TRADE NAME/COMMON TYPE	NR	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	2	
INLET GAS FLOW - CU. M/S	528.29	(1119490 ACFM)
INLET GAS TEMPERATURE - C	83.3	(182 F)
SO2 REMOVAL EFFICIENCY - %	90.0	
PARTICLE REMOVAL EFFICIENCY - %	99.8	
 ** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	NONE	
GENERIC TYPE	N/A	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
 ** REHEATER		
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
TRADE NAME/COMMON TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
 ** FANS		
DESIGN	NR	
FUNCTION	NR	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
 ** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
 ** DUCTWORK		
SHELL GENERIC MATERIAL TYPE	NR	
SHELL SPECIFIC MATERIAL TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
 ** REAGENT PREPARATION EQUIPMENT		
FUNCTION	SLAKER	
DEVICE	NR	
DEVICE TYPE	NR	

COLORADO UTE ELECTRIC: CRAIG 3 (CONT.)

** TANKS	
SERVICE	NUMBER
-----	-----
NR	****
** PUMPS	
SERVICE	NUMBER
-----	-----
NR	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	N/A
*** SLUDGE	
** TREATMENT	
METHOD	N/A
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
SITE TREATMENT	NONE
** WATER BALANCE	

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/84	SYSTEM							720		
7/84	SYSTEM							744		
8/84	SYSTEM							744		
9/84	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT INITIAL START UP COMMENCED IN JUNE 1984.
COMMERCIAL START UP IS SCHEDULED FOR FEBRUARY 1985.

THE SPRAY DRYER SYSTEM AT CRAIG 3 IS THE SECOND BABCOCK AND WILCOX
LIME/SPRAY DRYING PROCESS IN OPERATION TO DATE. THE UTILITY REPORTED
THAT MODIFICATIONS ARE BEING MADE BASED ON PROBLEMS EXPERIENCED AT THE
FIRST BABCOCK AND WILCOX INSTALLATION (LARAMIE RIVER 3).

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COLUMBUS & SOUTHERN OHIO ELEC	
PLANT NAME	CONESVILLE	
UNIT NUMBER	5	
CITY	CONESVILLE	
STATE	OHIO	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1890	
GROSS UNIT GENERATING CAPACITY - MW	405	
NET UNIT GENERATING CAPACITY W/FGD - MW	373	
NET UNIT GENERATING CAPACITY WO/FGD - MW	380	
EQUIVALENT SCRUBBED CAPACITY - MW	350	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	CYCLING	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	596.95	(1265000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	146.7	(296 F)
STACK HEIGHT - M	244.	(800 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.9	(26.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25237.	(10850 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10000-12000
AVERAGE ASH CONTENT - %	14.90	
RANGE ASH CONTENT - %	10.0-24.0	
AVERAGE MOISTURE CONTENT - %	7.50	
RANGE MOISTURE CONTENT - %	5.0-18.0	
AVERAGE SULFUR CONTENT - %	4.50	
RANGE SULFUR CONTENT - %	4.2-5.1	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	0.01-0.11	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY - CU.M/S	657.8	(1393893 ACFM)
INLET FLUE GAS TEMPERATURE - C	146.7	(296 F)
PRESSURE DROP - KPA	.5	(2. IN-H ₂ O)
PARTICLE REMOVAL EFFICIENCY - %	99.6	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	MAG
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.65
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	89.50
ENERGY CONSUMPTION - %	1.7
CURRENT STATUS	1
COMMERCIAL START-UP	2/77
INITIAL START-UP	1/77
CONTRACT AWARDED	10/74

** DESIGN AND OPERATING PARAMETERS

OPER. & MAINT. REQUIREMENT - MANHR/DAY	280.0
--	-------

** QUENCHER/PRESATURATOR

NUMBER	2
TYPE	SPRAY CHAMBER
SUPPLIER	AIR CORRECTION DIVISION, UOP
INLET GAS TEMPERATURE - C	141.1 (286 F)
L/G RATIO - L/CU. M	.1 (.6 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	IRON BASE/NICKEL-CHROMIUM-COPPER-MOLYBDENUM

** ABSORBER

NUMBER	2
NUMBER OF SPARES	0
GENERIC TYPE	PACKED TOWER
SPECIFIC TYPE	MOBILE BED PACKING
TRADE NAME/COMMON TYPE	TURBULENT CONTACT ABSORBER
SUPPLIER	AIR CORRECTION DIVISION, UOP
DIMENSIONS - FT	45.0 X 17.5 X 79.5
SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A
LINER GENERIC MATERIAL	ORGANIC
LINER SPECIFIC MATERIAL	SYNTHETIC RUBBER
LINER MATERIAL TRADE NAME/COMMON TYPE	NEOPRENE LS-576
GAS CONTACTING DEVICE TYPE	GRID CAGES
NUMBER OF CONTACTING ZONES	1
LIQUID RECIRCULATION RATE - LITER/S	1988. (31560 GPM)
L/G RATIO - L/CU.M	6.6 (49.3 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.0 (8.1 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	4.0 (13.1 FT/S)
INLET GAS FLOW - CU. M/S	301.81 (639568 ACFM)
INLET GAS TEMPERATURE - C	51.7 (125 F)
SO2 REMOVAL EFFICIENCY - %	92.0
PARTICLE REMOVAL EFFICIENCY - %	99.6

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	2
NUMBER OF PASSES PER STAGE	4
FREEBOARD DISTANCE - M	3.05 (10.0 FT)
DISTANCE BETWEEN STAGES - CM	11.43 (4.5 IN)
DISTANCE BETWEEN VANES CM	5.1 (2.00 IN)
VANE ANGLES - DEGREES	90
PRESSURE DROP - KPA	.5 (1.9 IN-H2O)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	RECLAIMED	
WASH FREQUENCY	CONTINUOUS	
WASH RATE - L/S	63.1	(1000 GAL/MIN)
** REHEATER		
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
CONSTRUCTION MATERIAL GENERIC TYPE	NONE	
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	GREEN FAN	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	401.11	(850000 ACFM)
FLUE GAS TEMPERATURE - C	146.7	(296 F)
PRESSURE DROP - KPA	.6	(2.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	CONTROL	
GENERIC TYPE	GUILLOTINE & LOUVER	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	INLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	OUTLET TO DAMPER	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER	
** DUCTWORK		
LOCATION	OUTLET BEYOND DAMPER	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

SHELL SPECIFIC MATERIAL TYPE
 LINER GENERIC MATERIAL TYPE
 LINER SPECIFIC MATERIAL TYPE

HIGH STRENGTH LOW ALLOY [HSLA]
 INORGANIC
 CHEMICALLY-BONDED CONCRETE

** DUCTWORK

LOCATION

SHELL GENERIC MATERIAL TYPE
 SHELL SPECIFIC MATERIAL TYPE
 LINER GENERIC MATERIAL TYPE
 LINER SPECIFIC MATERIAL TYPE

BYPASS

CARBON STEEL
 HIGH STRENGTH LOW ALLOY [HSLA]
 NONE
 N/A

** REAGENT PREPARATION EQUIPMENT

FUNCTION

DEVICE

DEVICE TYPE

MANUFACTURER

NUMBER

SLAKER

PASTE

N/A

WALLACE & TIERNAN

5

** TANKS

SERVICE

ABSORBER RECYCLE
 RECLAIMED WATER
 REAGENT PREP PRODUCT
 MIST ELIMINATOR WASH

NUMBER

2
 1
 2
 2

** PUMPS

SERVICE

ABSORBER RECIRCULATION
 LIME SLURRY TRANSFER
 SLURRY MAKEUP
 RECYCLE TANK DRAFF
 MIST ELIMINATOR WASH
 RECLAIM WATER
 THICKENER UNDERFLOW

NUMBER

10
 2
 3
 4
 4
 2

** SOLIDS CONCENTRATING/DEWATERING

DEVICE

NUMBER

NUMBER OF SPARES

SHELL GENERIC MATERIAL TYPE

SHELL SPECIFIC MATERIAL TYPE

BELT GENERIC MATERIAL TYPE

BELT SPECIFIC MATERIAL TYPE

FEED STREAM SOURCE

FEED STREAM CHARACTERISTICS

OUTLET STREAM CHARACTERISTICS

OUTLET STREAM DISPOSITION

OVERFLOW STREAM DISPOSITION

VACUUM FILTER

3

1

CARBON STEEL

AISI 1110

ORGANIC

POLYPROPYLENE

THICKENER UNDERFLOW

30% SOLIDS

50% SOLIDS

TO IUCS PROCESS

TO RECLAIMED WATER TANK

** SOLIDS CONCENTRATING/DEWATERING

DEVICE

NUMBER

NUMBER OF SPARES

DIMENSIONS - FT

SHELL GENERIC MATERIAL TYPE

SHELL SPECIFIC MATERIAL TYPE

LINER GENERIC MATERIAL TYPE

LINER SPECIFIC MATERIAL TYPE

FEED STREAM SOURCE

FEED STREAM CHARACTERISTICS

OUTLET STREAM CHARACTERISTICS

OUTLET STREAM DISPOSITION

OVERFLOW STREAM DISPOSITION

THICKENER

2

0

145.0 DIA X 16.0

CARBON STEEL

AISI 1110

ORGANIC

EPOXY

ABSORBER BLEED

7-12% SOLIDS

30% SOLIDS

TO IUCS THICKENER & THEN TO VACUUM FILTER

TO RECLAIMED WATER TANK

*** SLUDGE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-O-TEC]
INLET QUALITY - %	50.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE/CONVEYED
SITE TREATMENT	NONE
SITE DIMENSIONS	80 ACRES/50 FT
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	RECYCLE TANK LEVEL
CONTROL LEVELS	OUTLET PH 5.5-6.3; RECYCLE PH 7.0-7.5
MONITOR LOCATION	SLURRY DISCHARGE FROM MODULE
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
MAKEUP WATER ADDITION - LITERS/S	31.5 (500 GPM)
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIME
PRINCIPAL CONSTITUENT	90-95% CAO, 3-8% MGO
SOURCE/SUPPLIER	DRAVO
CONSUMPTION	16 TPH
UTILIZATION %	90.0
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
ABSORBER %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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12/76 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

A MAJOR FIRE IN MODULE A DELAYED THE UNIT START-UP. THE FIRE CAUSED \$2.1 MILLION DAMAGE. THE UTILITY'S INSURANCE COVERED THE DAMAGE AND A NEW SCRUBBER MODULE WILL BE PURCHASED FROM AND INSTALLED BY UOP.

THE UTILITY IS CURRENTLY CONDUCTING AIR AND WATER TESTS ON MODULE B.

1/77 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL START-UP FOR DEBUGGING AND COMMISSIONING PURPOSES OCCURRED IN EARLY JANUARY. COMMERCIAL AVAILABILITY FOR SERVICE OCCURRED ON JANUARY 27.

EARLY OPERATIONS WERE MARKED BY COLD WEATHER RELATED PROBLEMS SUCH AS FROZEN LINES AND GEARS, CRACKED FLANGES, A FROZEN LIME BELT CONVEYOR, AND A FROZEN PIPELINE FROM THE THICKENER TO THE IUCS FACILITY.

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

2/77 B 43.0 43.0
 SYSTEM 672 668

** PROBLEMS/SOLUTIONS/COMMENTS

COMMERCIAL START-UP OF MODULE B OCCURRED ON FEBRUARY 13, 1977. THE LONG-EST PERIOD OF CONTINUOUS OPERATION WAS 132 HOURS.

THE UTILITY REPORTED THAT THE ESP OPERATED SATISFACTORILY.

PRESSURE SURGES OCCURRED IN THE PRESATURATOR PIPING.

THE CONTINUOUS SO2 ANALYZERS OPERATED UNSATISFACTORILY.

MODULE B EXPERIENCED POOR VELOCITY DISTRIBUTION THROUGH THE TCA BEDS.

SCRUBBING LIQUOR WAS CARRYING OVER INTO THE MIST ELIMINATOR SECTION.

3/77 B 72.9 50.9
 SYSTEM 744 520

4/77 B 41.8 40.0 40.5 37.4
 SYSTEM 720 685

** PROBLEMS/SOLUTIONS/COMMENTS

A STACK OUTLET TEMPERATURE OF 200 F IS BEING MAINTAINED IN ORDER TO MINIMIZE ACID RAINOUT AND STACK CORROSION PROBLEMS.

THE 316 SS PRESATURATOR AREA HAS EXPERIENCED CORROSION.

THE RUBBER LINER IN THE RECYCLE TANK HAS BEEN PEELING AWAY. THE PROBLEM APPEARED TO BE APPLICATION-RELATED.

SOME PLUGGING HAS OCCURRED IN THE TUBE THICKENERS.

THE QUALITY OF THE LIME SLURRY HAS BEEN A PROBLEM AREA. ROCKS UP TO FIVE INCHES IN DIAMETER HAVE BEEN DETECTED. THIS HAS PROMPTED DRAVO TO INSTALL MECHANICAL SEPARATORS AND METAL DETECTORS AT THE LIME SHIPMENT FACILITY.

5/77 B 58.0 50.0 51.0 48.0
 SYSTEM 744 712

6/77 B 66.0 59.0 60.0 58.0
 SYSTEM 720 713

7/77 B .0 .0 .0 .0
 SYSTEM 744 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE B-SIDE MODULE DID NOT OPERATE THE ENTIRE MONTH PENDING COMPLETION OF A NUMBER OF NECESSARY MODIFICATIONS AND REPAIRS.

MODIFICATIONS WERE MADE TO THE UNIT PROCESS CONTROL SYSTEM.

MODIFICATIONS WERE MADE TO THE UNIT INSTRUMENTATION SYSTEM.

REPAIRS WERE MADE TO THE ABSORBER LINER.

REPAIRS WERE MADE TO THE PIPING BETWEEN THE THICKENER AND IUCS BUILDING.

THE UTILITY IS CURRENTLY PLANNING TO CONDUCT A PARTICULATE DROP TEST

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

SCHEDULED FOR SEPTEMBER 1977.

THE REPLACEMENT A-SIDE TCA MODULE REPLACING THE ORIGINAL MODULE DESTROYED BY FIRE IN DECEMBER 1976 IS EXPECTED TO BE AVAILABLE FOR COMMERCIAL SERVICE IN JANUARY 1978.

8/77	B	.0	.0	.0	.0				
	SYSTEM					744	613		
9/77	B	52.9	39.9	46.9	26.0				
	SYSTEM					720	469		

** PROBLEMS/SOLUTIONS/COMMENTS

THE PARTICULATE DROP TEST SCHEDULED FOR SEPTEMBER 1977 WAS PUSHED BACK TO THE WEEK OF OCTOBER 24 1977.

THE SCRUBBER WAS NOT OPERATED THE ENTIRE MONTH OF AUGUST. REPAIRS AND MODIFICATIONS CONTINUED UNTIL SEPTEMBER 13. THERE WERE SOME WEATHER-RELATED DELAYS.

10/77	B	32.0	24.0	25.0	18.0				
	SYSTEM					744	559		
11/77	A	10.0	4.0	4.0	4.0				
	B	33.0	33.0	33.0	33.0				
	SYSTEM	21.5	18.5	18.5	18.5	720	715	133	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WENT ON LINE NOVEMBER 21. DURING LOW LOAD PERIODS SOLIDS BUILD UP TENDED TO CAUSE PLUGGING BECAUSE OF LOW FLOW RATES. DURING THE LOW LOAD PERIODS ALL GAS WAS DUCTED THROUGH ONE MODULE WHILE THE OTHER WAS SHUT DOWN.

THE SCRUBBER WAS DOWN FROM OCTOBER 10 TO NOVEMBER 10 FOR RELINING WITH NEOPRENE RUBBER.

12/77	A	93.0	64.0	62.0	22.0				
	B	97.0	79.0	76.0	27.0				
	SYSTEM	95.0	71.5	69.0	24.5	744	252	180	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WENT DOWN DECEMBER 12 FOR A 3-MONTH SCHEDULED OUTAGE. MODULE A BEGAN COMMERCIAL OPERATIONS DECEMBER 3 OPERATING AS MUCH AS POSSIBLE THROUGH DECEMBER 12. MODULE B OPERATED DECEMBER 1 THROUGH 12. DURING THE SHUTDOWN THE UTILITY WILL DECIDE IF THE SYSTEM SUPPLIERS HAVE MET SPECS ON THE BOILER AND TURBINES. THE UNIT IS SCHEDULED TO BE BACK ON LINE IN MID-MARCH BUT THIS MAY BE PUSHED BACK TO APRIL 1.

DURING THE DECEMBER TO MARCH 1978 SHUTDOWN THE CARBON STEEL FLUE WILL BE REPLACED WITH AN ACID-BRICK LINING.

1/78	SYSTEM	.0		.0		744	0	0	.0
2/78	SYSTEM	.0		.0		672	0	0	.0
3/78	A	20.0	19.0	64.0	10.0				
	B	20.0	15.8	54.0	8.0				
	SYSTEM	20.0	17.4	59.0	9.0	744	379	66	

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT STARTED UP AGAIN ON MARCH 16.

PH CONTROLS AND SO2 ANALYZERS HAVE EXPERIENCED OPERATIONAL PROBLEMS.

IMPURITIES IN THE LIME HAVE CAUSED PLUGGING PROBLEMS.

4/78	A	67.0	58.0	61.0	58.0			
	B	65.0	59.0	63.0	59.0			
	SYSTEM	66.0	58.5	62.0	58.5	720	716	421

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS DOWN DUE TO AN EXCESS OF FLOCCULANT IN THE THICKENER.

EXCESS FLOCCULANT IN THE THICKENER YIELDED A HIGH SOLIDS LEVEL IN THE OVERFLOW AND RESULTED IN PLUGGING PROBLEMS IN THE ABSORBER MODULES.

5/78	A	52.0	45.0	45.0	44.0			
	B	54.0	50.0	51.0	69.0			
	SYSTEM	53.0	47.5	48.0	56.5	744	720	420

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS TAKEN OUT OF SERVICE BECAUSE OF CONTINUED PROBLEMS WITH THE FLOCCULANT FEED SYSTEM. THE THICKENER WAS EMPTIED TO RESTORE PROPER FLOCCULANT BALANCE.

6/78	A	48.0	37.0	37.0	37.0			
	B	30.0	30.0	30.0	30.0			
	SYSTEM	39.0	33.5	33.5	33.5	720	720	243

** PROBLEMS/SOLUTIONS/COMMENTS

AN FRP PIPING FAILURE IN THE MIST ELIMINATOR WASH SYSTEM OCCURRED.

7/78	A	66.0	66.0	66.0	64.0			
	B	43.0	33.0	33.0	32.0			
	SYSTEM	54.5	49.5	49.5	49.0	744	727	359

** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGE TIME WAS DUE TO PLUGGING IN THE MIST ELIMINATOR AND SCRUBBER BALL REGIONS.

8/78	A	18.0	20.0	20.0	18.0			
	B	18.0	21.0	21.0	18.0			
	SYSTEM	18.0	20.5	20.5	18.0	744	667	135

** PROBLEMS/SOLUTIONS/COMMENTS

THE FORCED OUTAGE TIME WAS DUE, IN PART, TO TIME REQUIRED TO REMOVE SCALE FROM THE MIST ELIMINATOR.

THE FORCED OUTAGE TIME WAS DUE, IN PART, TO TIME REQUIRED TO REPLACE SOME OF THE PING PONG BALLS IN THE MODULES.

THE UTILITY EXPERIENCED BYPASS DAMPER PROBLEMS DURING THE PERIOD.

PROBLEMS OCCURRED RELATED TO BROKEN SLUDGE LINES AND PLUGGING IN THE LIME SLURRY FEED LINES.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/78	A	61.0	46.0	55.0	45.0					
	B	54.0	44.0	53.0	43.0					
	SYSTEM	57.5	45.0	54.0	44.0		720	707	316	
10/78	A	72.0	37.0	38.0	36.0					
	B	82.0	46.0	47.0	45.0					
	SYSTEM	77.0	41.5	42.5	40.5		744	713	301	

** PROBLEMS/SOLUTIONS/COMMENTS

DAMPER DRIVE PROBLEMS WERE REPORTED BY THE UTILITY.

MINIMAL RUBBER LINER FAILURE WAS OBSERVED AT THE TOP OF ONE OF THE SCRUBBER MODULES AND JUST AFTER THE PRESATURATOR.

11/78	A	43.0	29.0	29.0	25.0					
	B	84.0	74.0	75.0	66.0					
	SYSTEM	63.5	51.5	52.0	45.5		720	642	331	
12/78	A	6.6	.3	.3	.3					
	B	33.1	36.3	36.6	30.0					
	SYSTEM	19.8	18.3	18.4	15.1		744	609	112	

** PROBLEMS/SOLUTIONS/COMMENTS

THE LOW HOURS FOR THIS PERIOD ARE ATTRIBUTED TO FREEZE UPS.

1/79	SYSTEM	.0	.0	.0	.0		744	602	0	
2/79	SYSTEM	.0	.0	.0	.0		672	629	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS UNAVAILABLE DURING JANUARY AND FEBRUARY BECAUSE OF SEVERE WINTER WEATHER.

3/79	A	50.0	49.0	50.0	43.0					
	B	.0	.0	.0	.0					
	SYSTEM	25.0	24.5	25.0	21.5		744	652	160	
4/79	A	17.0	58.0	73.0	12.0					
	B	.0	.0	.0	.0					
	SYSTEM	8.5	29.0	36.5	6.0		720	149	43	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B DID NOT OPERATE DURING MARCH AND APRIL BECAUSE OF SEVERE CORROSION AT THE PRESATURATOR INLET DUCT WHICH IS BEING REPAIRED BY UOP.

5/79	SYSTEM	.0	.0	.0	.0		744	744	0	
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** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS WERE MADE TO THE SEAL BETWEEN THE THICKENER BASE AND SIDEWALL.

THE FGD SYSTEM WAS DOWN DURING MAY FOR AN ANNUAL OUTAGE.

6/79	A	69.0	35.0	36.0	33.0					
	B	50.0	21.0	22.0	20.0					
	SYSTEM	59.5	28.0	29.0	26.5		720	670	191	

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGED PH LINES WERE A PROBLEM DURING MAY AND JUNE.

FLYASH CONVEYING PROBLEMS RESULTED IN ABOUT A TWO DAY OUTAGE.

OUTLET DAMPER PROBLEMS WERE REPORTED BY THE UTILITY.

7/79	A	75.3	76.3	77.6	69.0				
	B	93.4	89.8	90.8	80.6				
	SYSTEM	84.4	82.8	84.2	74.8	744	672	557	
8/79	A	86.6	24.7	25.0	10.1				
	B	85.6	22.7	23.0	9.3				
	SYSTEM	86.1	23.7	24.0	9.7	744	305	72	
9/79	A	89.3	52.6	59.5	27.9				
	B	95.9	51.3	58.0	27.2				
	SYSTEM	92.6	51.9	58.8	27.6	720	383	199	
10/79	A	53.2	76.3	77.0	45.4				
	B	47.8	77.4	78.1	46.1				
	SYSTEM	50.5	76.9	77.6	45.8	744	443	341	
11/79	A	74.0	90.0	91.0	52.0				
	B	70.0	88.0	89.0	51.0				
	SYSTEM	72.0	89.0	90.0	51.2	720	414	369	
12/79	SYSTEM	.0			.0	744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE LAST HALF OF 1979 THE UNIT EXPERIENCED PROBLEMS WITH THE LIME BLOWER COMPRESSOR MOTOR.

CAVITATION WAS SITED IN THE SLUDGE PUMP.

THE FLYASH CONVEYOR SYSTEM CAUSED PROBLEMS DURING THE LATTER HALF OF THE YEAR.

PLUGGING IN THE REAGENT CIRCULATION SYSTEMS WAS ENCOUNTERED.

THERE WERE PROBLEMS WITH THE GUIDE BARS AND SEALS IN THE INLET DAMPER DURING THE LAST HALF OF 1979.

1/80	A	89.0	38.0	45.0	13.0				
	B	93.0	50.0	59.0	17.0				
	SYSTEM	91.0	44.0	52.0	15.0	744	257	113	21.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY A BOILER OUTAGE OCCURRED FROM THE FIRST OF THE MONTH TO JANUARY 20, DURING WHICH TIME MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.

2/80	A	90.0	63.0	77.0	31.0				
	B	93.0	69.0	84.0	34.0				
	SYSTEM	92.0	66.0	81.0	33.0	696	343	226	31.4

** PROBLEMS/SOLUTIONS/COMMENTS

A BOILER OUTAGE LASTING APPROXIMATELY 17 DAYS ALSO OCCURRED DURING FEBRUARY.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

IN FEBRUARY, MIST ELIMINATOR NOZZLE PLUGGING OCCURRED CAUSING SOME FGD SYSTEM OUTAGE TIME.

3/80	A	88.0	82.0	82.0	82.0				
	B	88.0	81.0	82.0	81.0				
	SYSTEM	88.0	82.0	82.0	82.0	744	744	606	75.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH PROBLEMS WERE EXPERIENCED WITH THE IUCS SLUDGE STABILIZATION PROCESS AND SOME OUTAGE TIME RESULTED. ALSO DURING MARCH SOME GRID RODS REQUIRED REPLACING AND SOME RUBBER LINER FAILURES OCCURRED.

THE MAJORITY OF THE MARCH FGD SYSTEM OUTAGE TIME WAS DUE TO CONTINUING PROBLEMS WITH THE MIST ELIMINATOR NOZZLES.

4/80	A	94.6	84.4	87.7	78.9				
	B	74.9	65.8	68.4	61.5				
	SYSTEM	84.7	75.2	78.0	70.3	720	673	506	63.1

** PROBLEMS/SOLUTIONS/COMMENTS

CONTINUAL PROBLEMS WITH THE DAMPERS, PRESATURATOR HOSES, AND NOZZLES WERE THE CAUSES OF FGD SYSTEM OUTAGE TIME IN APRIL.

5/80	A	92.1	86.2	86.2	86.2				
	B	90.3	84.3	84.3	84.3				
	SYSTEM	91.3	85.2	85.2	85.2	744	744	634	69.5

** PROBLEMS/SOLUTIONS/COMMENTS

IN MAY, CONTROLS AND INSTRUMENTATION DEVELOPED PROBLEMS THAT CAUSED SOME OUTAGE TIME.

6/80	A	89.6	71.0	71.0	70.7				
	B	94.3	74.8	74.8	74.4				
	SYSTEM	91.9	72.9	72.9	72.6	720	717	523	65.1

** PROBLEMS/SOLUTIONS/COMMENTS

EXTERNAL CAUSES (IUCS DISPOSAL FACILITY, LOW UNIT DEMAND, SERVICE WATER PROBLEMS, ETC.) WERE RESPONSIBLE FOR THE MAJORITY OF THE JUNE OUTAGES.

7/80	A	90.6	70.7	72.4	43.8				
	B	88.8	82.0	84.0	50.8				
	SYSTEM	89.7	76.4	78.2	47.3	744	461	352	36.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE PRESATURATOR HOSES AND NOZZLES PLUGGED CAUSING THE UNIT TO SHUT DOWN FOR PART OF JULY.

8/80	A	98.0	83.5	84.9	48.5				
	B	95.4	88.8	90.4	51.6				
	SYSTEM	96.7	86.2	87.6	50.1	744	432	373	40.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT PROBLEMS WITH THE RECLAIM WATER SYSTEM OCCURRED IN AUGUST CAUSING SOME OUTAGE TIME.

9/80	A	87.6	73.4	74.4	73.1				
	B	88.8	85.1	86.3	82.0				
	SYSTEM	88.2	79.2	80.3	78.9	720	717	568	71.5

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE JULY-SEPTEMBER PERIOD INLET DAMPER SEAL LEAKING WAS A MAJOR PROBLEM.

THE PRESATURATOR PROBLEMS CONTINUED IN SEPTEMBER CAUSING ADDITIONAL OUTAGE TIME FOR THE FGD SYSTEM.

10/80	A	92.7	77.8	80.8	75.7				
	B	89.2	80.0	82.9	77.7				
	SYSTEM	91.0	78.9	81.9	76.7	744	723	571	59.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MINOR OUTAGES WERE THE RESULT OF DAMPER AND AGITATOR MOTOR PROBLEMS.

11/80	A	79.0	35.7	36.9	31.3				
	B	86.1	64.6	66.8	56.5				
	SYSTEM	82.6	50.1	51.9	43.9	720	630	316	35.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE LOW SYSTEM AVAILABILITY DURING THE MONTH OF NOVEMBER WAS A DIRECT RESULT OF A 28 HOUR OUTAGE ATTRIBUTED TO LIME SLURRY TRANSFER TANK AND AGITATOR MOTOR PROBLEMS.

ADDITIONAL MINOR PROBLEMS WERE ENCOUNTERED WITH THE PRESATURATOR HOSES, TEMPERATURE PROBES, THICKENERS AND SERVICE WATER DURING THE MONTH OF NOVEMBER.

12/80	A	93.1	88.8	89.2	82.2				
	B	90.9	86.6	85.3	80.2				
	SYSTEM	92.0	87.7	87.2	81.2	744	689	604	72.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

1/81	A	90.6	85.7	87.4	77.4				
	B	90.5	86.0	84.9	77.2				
	SYSTEM	90.5	86.0	84.9	77.2	744	672	575	71.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

2/81	A	93.2	89.9	91.2	83.4				
	B	95.4	94.9	93.6	88.1				
	SYSTEM	94.2	92.3	92.4	85.7	672	624	576	100.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

3/81	A	3.7	15.7	21.0	.5				
	B	4.0	23.5	31.0	.9				
	SYSTEM	3.9	19.6	26.0	.7	744	26	5	1.6

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MOST OF MARCH THE BOILER AND FGD SYSTEM WERE OFF LINE FOR SCHEDULED MAINTENANCE.

4/81	A	98.9	83.7	90.1	64.5					
	B	94.3	78.6	84.5	60.6					
	SYSTEM	96.6	81.1	87.3	63.8	720	555	450		
5/81	A	99.7	100.0	100.0	95.0					
	B	99.7	100.0	100.0	95.0					
	SYSTEM	99.7	100.0	100.0	95.0	744	707	707		
6/81	A	99.4	100.0	100.0	96.4					
	B	98.5	100.0	100.0	96.9					
	SYSTEM	99.0	100.0	100.0	96.9	720	698	698		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR OPERATIONAL PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1981.

7/81	A	99.8	100.0	100.0	55.4					
	B	100.0	100.0	100.0	55.4					
	SYSTEM	99.9	100.0	100.0	55.4	744	412	412		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY, THE BOILER ONLY OPERATED 412 HOURS AS A RESULT OF FAILURE OF A BOILER FEED PUMP.

8/81	A	99.0	76.0	95.0	43.0					
	B	99.0	30.0	88.0	39.0					
	SYSTEM	99.0	53.0	91.5	41.0	744	422	305		
9/81	A	100.0	59.0	100.0	6.0					
	B	87.0	48.0	81.0	5.0					
	SYSTEM	93.5	53.5	90.5	5.5	720	69	41		

** PROBLEMS/SOLUTIONS/COMMENTS

SEVERE OUTLET DUCT CORROSION HAS OCCURRED ON UNIT 5. THE GUNITE LINER HAS FAILED DUE TO INADEQUATE STRENGTH OF THE SUPPORTING MESH. THE UTILITY IS LOOKING INTO INCONEL OR FRP AS A REPLACEMENT LINER.

UNIT 5 WAS REMOVED FROM SERVICE ON SEPTEMBER 19 AS A RESULT OF LOW DEMAND. THE UNIT IS NOT EXPECTED TO BE BROUGHT BACK ON LINE UNTIL DECEMBER. THIS OUTAGE PERIOD WILL BE UTILIZED FOR OUTLET DUCTWORK REPAIRS.

10/81	A	100.0	.0	.0	.0					
	B	100.0	.0	.0	.0					
	SYSTEM	100.0	.0	.0	.0	744		0		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MAJOR MODIFICATIONS WERE BEING PERFORMED ON THE BOILER DUCTWORK. THIS INCLUDED REPAIRING THE CORRODED INNER SUPPORTS AND REPLACING THE GUNITE.

11/81	A	27.0	.0	.0	.0					
	B	27.0	.0	.0	.0					
	SYSTEM	27.0	.0	.0	.0	720		0		

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER MAJOR MODIFICATION TO THE FGD SYSTEM DUCTWORK WAS PERFORMED. THIS WORK INCLUDED REPAIRING THE CORRODED SUPPORTS AND RECOATING WITH GUNITE.

ADDITIONAL OUTAGE TIME DURING THE MONTH WAS DUE TO GENERAL FGD MAINTENANCE.

12/81	A	84.0	82.0	86.0	77.0			
	B	84.0	82.0	86.0	77.0			
	SYSTEM	84.0	82.0	86.0	77.0	744	699	573

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER TEST WERE CONDUCTED ON THE ESP.

ADDITIONAL OUTAGE TIME DURING THE MONTH WAS DUE TO HIGH THICKENER SOLIDS AND PROBLEMS WITH THE FLYASH HANDLING SYSTEM.

1/82	A	97.0	83.0	87.0	69.0			
	B	88.0	81.0	85.0	67.0			
	SYSTEM	92.5	82.0	86.0	68.0	744	617	506
2/82	A	99.0	80.0	89.0	64.0			
	B	98.0	76.0	84.0	60.0			
	SYSTEM	98.5	78.0	86.5	62.0	672	535	417
3/82	A	100.0	89.0	95.0	76.0			
	B	93.0	90.0	96.0	77.0			
	SYSTEM	96.5	89.5	95.5	76.5	744	636	569

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER OF 1982.

4/82	A	98.0	81.0	89.0	50.0			
	B	67.0	62.0	67.0	38.0			
	SYSTEM	82.5	71.5	78.0	44.0	720	443	317
5/82	A	100.0	83.0	98.0	48.0			
	B	100.0	78.0	92.0	46.0			
	SYSTEM	100.0	80.5	95.0	47.0	744	434	350
6/82	A	100.0	77.0	93.0	17.0			
	B	98.0	64.0	77.0	14.0			
	SYSTEM	99.0	70.5	85.0	15.5	720	158	112

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.

7/82	5A	94.6	93.7	96.5	58.1			
	5B	94.3	85.6	88.2	53.1			
	SYSTEM	94.4	89.6	92.3	55.6	744	461	414 43.9
8/82	5A	99.2	89.4	87.5	66.9			
	5B	99.5	99.1	97.0	74.1			
	SYSTEM	99.4	94.2	92.3	70.5	744	557	524 56.2
9/82	5A	96.4	89.7	92.3	55.5			

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/82	5B	97.0	83.5	85.9	51.6					
	SYSTEM	96.7	86.6	89.1	53.5		720	445	386	47.5
	5A	86.4	88.0	89.1	64.2					
	5B	86.3	86.5	87.6	63.1					
	SYSTEM	86.3	87.3	88.4	63.7		744	543	474	55.1
	** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH OCTOBER, 1982.										
11/82	5A	.0			.0					
	5B	.0			.0					
	SYSTEM	.0			.0		720	0		.0
** PROBLEMS/SOLUTIONS/COMMENTS										
UNIT 5 WAS OUT OF SERVICE DURING NOVEMBER FOR AN ANNUAL OUTAGE.										
12/82	5A	23.7			.0					
	5B	23.7			.0					
	SYSTEM	23.7			.0		744	0		.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE ANNUAL OUTAGE CONTINUED FOR UNIT 5 THROUGHOUT THE MONTH OF DECEMBER.										
1/83	5A	88.5	58.7	62.9	19.5					
	5B	92.4	70.7	75.8	23.5					
	SYSTEM	90.5	64.7	69.4	21.5		744	248	160	24.0
** PROBLEMS/SOLUTIONS/COMMENTS										
UNIT 5 WAS PLACED BACK IN SERVICE DURING JANUARY FOLLOWING THE ANNUAL OUTAGE.										
2/83	5A	91.8	89.3	89.7	87.2					
	5B	88.3	86.6	87.0	84.5					
	SYSTEM	90.0	88.0	88.3	85.8		672	656	577	60.7
** PROBLEMS/SOLUTIONS/COMMENTS										
PRIOR TO FEBRUARY 16, 1983, THE UTILITY WAS CONSIDERING FGD SYSTEM AVAILABLE TIME TO INCLUDE PERIODS WHEN SCRUBBER MAINTENANCE WAS PERFORMED DURING A UNIT OUTAGE. THE UTILITY NOW CONFORMS TO THE CORRECT DEFINITION OF AVAILABILITY AND CONSIDERS THE SCRUBBER UNAVAILABLE DURING THESE PERIODS.										
3/83	5A	92.3	93.5	94.5	78.8					
	5B	90.5	87.6	88.5	73.8					
	SYSTEM	91.4	90.5	91.5	76.3		744	627	568	55.4
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MARCH.										
4/83	5A	92.6	90.2	92.4	89.9					
	5B	95.3	93.0	95.3	92.6					
	SYSTEM	94.0	91.6	93.9	91.3		720	717	657	66.0

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY ATTRIBUTED THE VERY GOOD PERFORMANCE OF MODULES A AND B DURING APRIL TO PROPER MAINTENANCE PERFORMED AND THE COMPLETION OF ESSENTIAL CHANGES IN THE SCRUBBING SYSTEM DESIGN.

5/83	5A	82.3	78.1	78.7	60.6					
	5B	74.6	77.6	78.2	60.2					
	SYSTEM	78.4	77.8	78.4	60.4	744	578	450	49.3	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT OUTAGE TIME WAS ATTRIBUTED TO THE CLEANING OF MIST ELIMINATORS DURING MAY.

MAINTENANCE WORK ON MIST ELIMINATOR PUMPS ALSO CAUSED OUTAGE TIME IN MAY.

A 72 HOUR OUTAGE OCCURRED DUE TO A CHEMICAL IMBALANCE OF THE MAKEUP WATER POND. AIR HEATER DRAINAGE DURING A CLEANING OPERATION PRODUCED ACIDIC CONDITIONS IN THE POND.

6/83	5A	88.2	75.5	77.6	39.0					
	5B	96.5	90.9	93.4	46.9					
	SYSTEM	92.4	83.2	85.5	43.0	720	372	310	37.1	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/83	5A	87.9	83.3	84.2	63.6					
	5B	90.2	81.9	82.7	62.5					
	SYSTEM	89.0	82.6	83.5	63.0	744	568	469	54.0	

8/83	5A	94.1	83.8	88.0	67.3					
	5B	91.3	84.1	88.4	67.6					
	SYSTEM	92.7	83.9	88.2	67.5	744	598	502	46.0	

9/83	5A	99.0	97.2	98.0	47.8					
	5B	93.8	86.7	87.5	42.6					
	SYSTEM	96.4	91.9	92.7	45.2	720	354	326	34.0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER 1983.

10/83	5A	99.1	98.0	98.0	46.9					
	5B	98.1	94.7	94.7	45.3					
	SYSTEM	98.6	96.3	96.3	46.1	744	356	343	33.5	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING OCTOBER.

11/83	5A	58.6	98.2	98.2	54.4					
	5B	57.1	94.7	94.7	52.5					
	SYSTEM	57.8	96.5	96.5	53.5	720	399	385	38.7	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT ANNUAL OUTAGES OCCURRED DURING NOVEMBER FOR UNITS 5 AND 6.

12/83	A	30.2	59.2	67.1	19.5				
	B	31.3	60.8	69.0	20.0				
	SYSTEM	30.8	60.0	68.1	19.8	744	245	147	17.9

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM OUTAGE TIME DURING DECEMBER WAS DUE IN PART TO THE LOSS OF A LIME FEED LINE AND FROZEN WATER LINES ON THE SLAKERS.

THE UNAVAILABILITY OF THE SLUDGE TREATMENT FACILITY CONTRIBUTED TO FGD SYSTEM DOWN TIME DURING THE MONTH.

A LOCALIZED ABSORBER RUBBER LINER FAILURE ALSO CONTRIBUTED TO FGD SYSTEM OUTAGE TIME DURING DECEMBER.

1/84	A	94.1	87.8	89.7	46.6				
	B	98.1	95.4	97.4	50.7				
	SYSTEM	96.1	91.6	93.5	48.7	744	395	362	35.0

** PROBLEMS/SOLUTIONS/COMMENTS

ABSORBER RUBBER LININGS WERE REPAIRED DURING THE MONTH.

MIST ELIMINATOR AND RECYCLE SPRAY NOZZLES WERE CLEANED DURING JANUARY.

A POWER SUPPLY FAILURE AND COMPUTER-RELATED PROBLEMS ACCOUNTED FOR OUTAGE TIME IN JANUARY.

2/84	5A	98.9	70.4	81.3	20.5				
	5B	96.0	68.5	79.0	20.0				
	SYSTEM	97.4	69.5	80.1	20.3	696	203	141	17.5

** PROBLEMS/SOLUTIONS/COMMENTS

POOR LIME QUALITY ACCOUNTED FOR OUTAGE TIME DURING FEBRUARY.

A POWER FAILURE AT THE SLUDGE TREATMENT PLANT CONTRIBUTED TO DOWN TIME.

ABSORBER LINER FAILURE ACCOUNTED FOR ADDITIONAL OUTAGE TIME IN FEBRUARY.

3/84	A	98.3	96.4	98.0	85.8				
	B	99.6	97.9	99.5	87.1				
	SYSTEM	98.9	97.1	98.8	86.4	744	662	643	64.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OUT OF SERVICE 14 HOURS DUE TO FAULTY DAMPERS.

RECYCLE TANK AGITATOR PROBLEMS WERE REPORTED DURING MARCH.

4/84	5A	100.0	99.0	100.0	72.4				
	5B	98.5	97.0	97.9	70.8				
	SYSTEM	99.2	98.0	98.9	71.6	720	526	516	51.0
5/84	5A	99.9	99.7	99.7	79.6				
	5B	99.6	99.5	99.5	79.4				
	SYSTEM	99.7	99.6	99.6	79.5	744	594	592	58.0

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/84	5A	98.3	96.6	97.9	81.8						
	5B	99.3	97.9	99.3	82.9						
	SYSTEM	98.8	97.3	98.6	82.3			720	609	593	55.5
7/84	5A	93.5	96.7	99.3	36.4						
	5B	93.5	96.7	99.3	36.4						
	SYSTEM	93.5	96.7	99.3	36.4			744	280	271	24.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF APRIL THROUGH JULY, 1984.

8/84 SYSTEM 744

9/84 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COLUMBUS & SOUTHERN OHIO ELEC	
PLANT NAME	CONESVILLE	
UNIT NUMBER	6	
CITY	CONESVILLE	
STATE	OHIO	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1890	
GROSS UNIT GENERATING CAPACITY - MW	405	
NET UNIT GENERATING CAPACITY W/FGD - MW	373	
NET UNIT GENERATING CAPACITY WO/FGD - MW	380	
EQUIVALENT SCRUBBED CAPACITY - MW	350	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	CYCLING	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	596.95	(1265000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	146.7	(296 F)
STACK HEIGHT - M	244.	(800 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.9	(26.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25237.	(10850 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10000-12000
AVERAGE ASH CONTENT - %	14.90	
RANGE ASH CONTENT - %	10.0-24.0	
AVERAGE MOISTURE CONTENT - %	7.50	
RANGE MOISTURE CONTENT - %	5.0-18.0	
AVERAGE SULFUR CONTENT - %	4.50	
RANGE SULFUR CONTENT - %	4.2-5.1	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	0.01-0.11	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY - CU.M/S	657.8	(1393893 ACFM)
INLET FLUE GAS TEMPERATURE - C	146.7	(296 F)
PRESSURE DROP - KPA	.5	(2. IN-H ₂ O)
PARTICLE REMOVAL EFFICIENCY - %	99.6	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	MAG
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.65
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	89.50
ENERGY CONSUMPTION - %	1.7
CURRENT STATUS	1
COMMERCIAL START-UP	7/78
INITIAL START-UP	6/78
CONTRACT AWARDED	10/74

** DESIGN AND OPERATING PARAMETERS

OPER. & MAINT. REQUIREMENT - MANHR/DAY	280.0
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** QUENCHER/PRESATURATOR

NUMBER	2
TYPE	SPRAY CHAMBER
SUPPLIER	AIR CORRECTION DIVISION, UOP
INLET GAS TEMPERATURE - C	141.1 (286 F)
L/G RATIO - L/CU. M	.1 (.6 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY
CONSTRUCTION MATERIAL SPECIFIC TYPE	IRON BASE/NICKEL-CHROMIUM-COPPER-MOLYBDENUM

** ABSORBER

NUMBER	2
NUMBER OF SPARES	0
GENERIC TYPE	PACKED TOWER
SPECIFIC TYPE	MOBILE BED PACKING
TRADE NAME/COMMON TYPE	TURBULENT CONTACT ABSORBER
SUPPLIER	AIR CORRECTION DIVISION, UOP
DIMENSIONS FT	45.0 X 17.5 X 79.5
SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A
LINER GENERIC MATERIAL	ORGANIC
LINER SPECIFIC MATERIAL	SYNTHETIC RUBBER
LINER MATERIAL TRADE NAME/COMMON TYPE	NEOPRENE LS-576
GAS CONTACTING DEVICE TYPE	GRID CAGES
NUMBER OF CONTACTING ZONES	1
LIQUID RECIRCULATION RATE - LITER/S	1988. (31560 GPM)
L/G RATIO - L/CU.M	6.6 (49.3 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.0 (8.1 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	4.0 (13.1 FT/S)
INLET GAS FLOW - CU. M/S	301.81 (639568 ACFM)
INLET GAS TEMPERATURE - C	51.7 (125 F)
SO2 REMOVAL EFFICIENCY - %	92.0
PARTICLE REMOVAL EFFICIENCY - %	99.6

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	2
NUMBER OF PASSES PER STAGE	4
FREEBOARD DISTANCE - M	3.05 (10.0 FT)
DISTANCE BETWEEN STAGES - CM	11.43 (4.5 IN)
DISTANCE BETWEEN VANES - CM	5.1 (2.00 IN)
VANE ANGLES DEGREES	90
PRESSURE DROP - KPA	.5 (1.9 IN-H2O)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	RECLAIMED	
WASH FREQUENCY	CONTINUOUS	
WASH RATE L/S	63.1	(1000 GAL/MIN)
** REHEATER		
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
CONSTRUCTION MATERIAL GENERIC TYPE	NONE	
CONSTRUCTION MATERIAL SPECIFIC TYPE	N/A	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	GREEN FAN	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	401.11	(850000 ACFM)
FLUE GAS TEMPERATURE C	146.7	(296 F)
PRESSURE DROP - KPA	.6	(2.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	CONTROL	
GENERIC TYPE	GUILLOTINE & LOUVER	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	INLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	OUTLET TO DAMPER	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER	
** DUCTWORK		
LOCATION	OUTLET BEYOND DAMPER	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

SHELL SPECIFIC MATERIAL TYPE
 LINER GENERIC MATERIAL TYPE
 LINER SPECIFIC MATERIAL TYPE

HIGH STRENGTH LOW ALLOY [HSLA]
 INORGANIC
 CHEMICALLY-BONDED CONCRETE

** DUCTWORK

LOCATION

SHELL GENERIC MATERIAL TYPE
 SHELL SPECIFIC MATERIAL TYPE
 LINER GENERIC MATERIAL TYPE
 LINER SPECIFIC MATERIAL TYPE

BYPASS

CARBON STEEL
 HIGH STRENGTH LOW ALLOY [HSLA]
 NONE
 N/A

** REAGENT PREPARATION EQUIPMENT

FUNCTION

DEVICE
 DEVICE TYPE
 MANUFACTURER
 NUMBER

SLAKER

PASTE
 N/A
 WALLACE & TIERNAN
 5

** TANKS

SERVICE

ABSORBER RECYCLE
 RECLAIMED WATER
 REAGENT PREP PRODUCT
 MIST ELIMINATOR WASH

NUMBER

2
 1
 2
 2

** PUMPS

SERVICE

ABSORBER RECIRCULATION
 LIME SLURRY TRANSFER
 SLURRY MAKEUP
 RECYCLE TANK DRAFF
 MIST ELIMINATOR WASH
 RECLAIM WATER
 THICKENER UNDERFLOW

NUMBER

10
 2
 3
 4
 4
 2

** SOLIDS CONCENTRATING/DEWATERING

DEVICE

NUMBER

NUMBER OF SPARES

SHELL GENERIC MATERIAL TYPE
 SHELL SPECIFIC MATERIAL TYPE
 BELT GENERIC MATERIAL TYPE
 BELT SPECIFIC MATERIAL TYPE
 FEED STREAM SOURCE
 FEED STREAM CHARACTERISTICS
 OUTLET STREAM CHARACTERISTICS
 OUTLET STREAM DISPOSITION
 OVERFLOW STREAM DISPOSITION

VACUUM FILTER

3
 1
 CARBON STEEL
 AISI 1110
 ORGANIC
 POLYPROPYLENE
 THICKENER UNDERFLOW
 30% SOLIDS
 50% SOLIDS
 TO IUCS PROCESS
 TO RECLAIMED WATER TANK

** SOLIDS CONCENTRATING/DEWATERING

DEVICE

NUMBER

NUMBER OF SPARES

DIMENSIONS FT

SHELL GENERIC MATERIAL TYPE
 SHELL SPECIFIC MATERIAL TYPE
 LINER GENERIC MATERIAL TYPE
 LINER SPECIFIC MATERIAL TYPE
 FEED STREAM SOURCE
 FEED STREAM CHARACTERISTICS
 OUTLET STREAM CHARACTERISTICS
 OUTLET STREAM DISPOSITION
 OVERFLOW STREAM DISPOSITION

THICKENER

2
 0
 145.0 DIA X 16.0
 CARBON STEEL
 AISI 1110
 ORGANIC
 EPOXY
 ABSORBER BLEED
 7-12% SOLIDS
 30% SOLIDS
 TO IUCS THICKENER & THEN TO VACUUM FILTER
 TO RECLAIMED WATER TANK

*** SLUDGE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
INLET QUALITY - %	50.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE/CONVEYED
SITE TREATMENT	NONE
SITE DIMENSIONS	80 ACRES/50 FT
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	RECYCLE TANK LEVEL
CONTROL LEVELS	OUTLET PH 5.5-6.3; RECYCLE PH 7.0-7.5
MONITOR LOCATION	SLURRY DISCHARGE FROM MODULE
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
MAKEUP WATER ADDITION - LITERS/S	31.5 (500 GPM)
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIME
PRINCIPAL CONSTITUENT	90-95% CAO, 3-8% MGO
SOURCE/SUPPLIER	DRAVO
CONSUMPTION	16 TPH
UTILIZATION - %	90.0
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.0

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/78	A	56.0	49.0	51.0	42.0					
	B	44.0	33.0	34.0	30.0					
	SYSTEM	50.0	41.0	42.5	36.0		720	524	174	

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS OF THE CONESVILLE 6 FGD SYSTEM BEGAN IN JUNE.

CONTROL OF THE LOUVERED DAMPER OF THE BYPASS SYSTEM WAS LOST. THE RESULT WAS BACK PRESSURE BUILDUP THAT AUTOMATICALLY SHUT DOWN THE BOILER.

SCRUBBER CONTROLS WERE NOT OPERATING PROPERLY AND NEEDED ADJUSTMENT.

7/78	A	83.0	37.0	63.0	25.0					
	B	70.0	19.0	33.0	13.0					
	SYSTEM	76.5	28.0	48.0	19.0		744	502	141	

** PROBLEMS/SOLUTIONS/COMMENTS

THE LOUVERED DAMPER PROBLEM CONTINUED.

THE FRP TRANSFER LINE FROM THE THICKENER TO THE IUCS SYSTEM RUPTURED AS A

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

RESULT OF WATER HAMMER IN THE LINE AND HAD TO BE REPAIRED.

8/78	A	47.0	50.0	66.0	43.0			
	B	62.0	60.0	81.0	52.0			
	SYSTEM	54.5	55.0	73.5	47.5	744	642	354

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WERE ENCOUNTERED WITH THE SLUDGE LINE. THE UTILITY REPORTED THAT THIS IS TYPICALLY A HIGH MAINTENANCE AREA.

PROBLEMS WERE ENCOUNTERED WITH THE BYPASS CONTROL DAMPERS. THE UTILITY REPORTED THAT THIS IS TYPICALLY A HIGH MAINTENANCE AREA.

9/78	A	55.0	50.0	53.0	49.0			
	B	69.0	55.0	57.0	54.0			
	SYSTEM	62.0	52.5	55.0	51.5	720	706	372

** PROBLEMS/SOLUTIONS/COMMENTS

A PROBLEM AREA WAS THE PLUGGING OF THE LIME SLURRY FEED LINES.

BYPASS DAMPER CONTROL PROBLEMS CONTINUED THROUGH SEPTEMBER.

10/78	A	98.0	29.0	30.0	24.0			
	B	37.0	35.0	36.0	29.0			
	SYSTEM	67.5	32.0	33.0	26.5	744	603	199

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH DAMPER SEALS AND GUIDE BARS WERE ENCOUNTERED. THE UTILITY PLANS TO REPLACE THEM DURING THE NEXT BOILER OUTAGE.

11/78	A	26.0	3.0	3.0	2.0			
	B	26.0	9.0	9.0	8.0			
	SYSTEM	26.0	6.0	6.0	5.0	720	600	36

** PROBLEMS/SOLUTIONS/COMMENTS

LIME TRANSFER BAGHOUSE SHAKER PROBLEMS WERE EXPERIENCED.

THE THICKENER RAKE MOTOR BURNED OUT AND HAD TO BE REWOUND.

12/78	A	34.8	26.3	26.8	24.2			
	B	26.6	19.0	19.3	17.5			
	SYSTEM	30.7	22.6	23.0	20.8	744	672	155

1/79	A	5.0	2.0	2.0	2.0			
	B	.0	.0	.0	.0			
	SYSTEM	2.5	1.0	1.0	1.0	744	730	8

** PROBLEMS/SOLUTIONS/COMMENTS

FREEZE UPS WERE A SERIOUS PROBLEM DURING THE DECEMBER-JANUARY PERIOD.

2/79	SYSTEM	.0	.0	.0	.0	672	629	0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM DID NOT OPERATE DURING FEBRUARY DUE TO SEVERE WINTER WEATHER CAUSING SYSTEM FREEZE UPS.

3/79	A	43.0	37.0	39.0	33.0			
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

4/79	B	32.0	28.0	29.0	25.0					
	SYSTEM	37.5	32.5	34.0	29.0		744	664	216	
	A	82.0	79.0	79.0	78.0					
	B	72.0	59.0	59.0	58.0					
	SYSTEM	77.0	69.0	69.0	68.0		720	711	489	
	5/79	SYSTEM	100.0			.0		744	0	0

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS WERE MADE TO THE SEAL BETWEEN THE THICKENER BASE AND SIDEWALL.

THE BOILER DID NOT OPERATE DURING MAY DUE TO A SCHEDULED ANNUAL OUTAGE.

6/79	A	43.0	37.0	39.0	27.0					
	B	49.0	49.0	52.0	31.0					
	SYSTEM	46.0	43.0	45.5	29.0		720	433	209	

** PROBLEMS/SOLUTIONS/COMMENTS

FLYASH CONVEYING PROBLEMS RESULTED IN ABOUT A TWO DAY OUTAGE.

PLUGGED PH LINES WERE A PROBLEM DURING THIS PERIOD.

7/79	A	83.9	29.5	29.7	22.0					
	B	88.7	41.2	41.4	30.8					
	SYSTEM	86.3	35.4	35.6	26.4		744	554	196	
8/79	A	76.2	40.8	40.8	40.8					
	B	77.6	42.6	42.6	42.6					
	SYSTEM	76.9	41.7	41.7	41.7		744	744	310	
9/79	A	87.6	58.5	57.4	54.4					
	B	86.5	55.5	56.2	53.3					
	SYSTEM	87.0	57.0	56.8	53.9		720	681	388	
10/79	A	75.9	66.2	66.5	63.3					
	B	43.1	23.6	23.7	22.6					
	SYSTEM	59.5	44.9	45.1	43.0		744	713	320	
11/79	A	67.0	58.0	58.0	48.0					
	B	52.0	49.0	49.0	41.0					
	SYSTEM	59.5	53.5	53.5	44.5		720	599	320	
12/79	A	84.0	76.0	76.0	76.0					
	B	91.0	87.0	87.0	87.0					
	SYSTEM	87.5	81.5	81.5	81.5		744	744	606	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE LAST HALF OF 1979 THE UNIT EXPERIENCED PROBLEMS WITH THE LIME BLOWER COMPRESSOR MOTOR.

CAVITATION WAS SITED IN THE SLUDGE PUMP.

THE FLYASH CONVEYOR SYSTEM CAUSED PROBLEMS DURING THE LATTER HALF OF THE YEAR.

PLUGGING IN THE REAGENT CIRCULATION SYSTEMS WAS ENCOUNTERED.

THERE WERE PROBLEMS WITH THE GUIDE BARS AND SEALS IN THE INLET DAMPER DURING THE LAST HALF OF 1979.

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	88.0	74.0	74.0	74.0					
	B	89.0	78.0	78.0	78.0					
	SYSTEM	89.0	76.0	76.0	76.0		744	744	566	73.9
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD SYSTEM RELATED PROBLEMS WERE REPORTED FOR JANUARY.										
2/80	A	87.0	75.0	78.0	69.0					
	B	92.0	81.0	85.0	75.0					
	SYSTEM	90.0	78.0	82.0	72.0		696	648	503	70.8
** PROBLEMS/SOLUTIONS/COMMENTS										
IN FEBRUARY, MIST ELIMINATOR NOZZLE PLUGGING OCCURRED CAUSING SOME OUTAGE TIME.										
3/80	A	93.0	69.0	69.0	15.0					
	B	94.0	76.0	76.0	16.0					
	SYSTEM	94.0	73.0	73.0	16.0		744	160	117	17.6
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WENT DOWN ON MARCH 9 FOR A BOILER/TURBINE INSPECTION AND REMAINED OUT OF SERVICE THROUGH THE END OF THE MONTH.										
4/80	A	98.8	25.6	29.4	11.1					
	B	98.9	54.2	62.1	23.5					
	SYSTEM	98.9	40.1	45.8	17.4		720	312	125	19.8
** PROBLEMS/SOLUTIONS/COMMENTS										
CONTINUOUS PROBLEMS WITH DAMPERS, PRESATURATOR HOSES, AND NOZZLES ACCOUNTED FOR MOST OF THE APRIL FGD SYSTEM OUTAGES.										
5/80	A	96.9	58.3	63.8	55.0					
	B	96.1	33.8	37.0	31.9					
	SYSTEM	96.5	46.1	50.4	43.4		744	701	323	39.1
** PROBLEMS/SOLUTIONS/COMMENTS										
CONTROL AND INSTRUMENTATION PROBLEMS THAT DEVELOPED IN MAY WERE RESPONSIBLE FOR SOME FGD SYSTEM OUTAGE TIME.										
6/80	A	97.1	73.6	73.4	73.1					
	B	97.1	50.5	50.3	50.1					
	SYSTEM	97.1	62.1	61.9	61.7		720	715	444	52.5
** PROBLEMS/SOLUTIONS/COMMENTS										
THE MAJORITY OF THE JUNE FGD SYSTEM OUTAGES WERE A RESULT OF EXTERNAL CAUSES (IUCS DISPOSAL SYSTEM, LOW UNIT DEMAND, SERVICE WATER, ETC.).										
7/80	A	96.0	85.1	85.9	82.7					
	B	99.1	89.1	89.9	86.6					
	SYSTEM	97.5	87.1	87.9	84.6		744	722	630	61.7
** PROBLEMS/SOLUTIONS/COMMENTS										
THE FGD SYSTEM EXPERIENCED PROCESS CONTROL PROBLEMS DURING JULY.										
PROBLEMS WITH LEAKING INLET DAMPER SEALS ALSO OCCURRED DURING JULY.										

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	A	90.2	65.4	67.3	30.1					
	B	97.4	85.5	88.0	39.4					
	SYSTEM	93.8	75.5	77.6	34.7		744	343	259	28.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT PROBLEMS WERE ENCOUNTERED WITH THE RECLAIM WATER AND THE RECYCLE SLURRY SYSTEMS DURING AUGUST.

9/80	A	93.6	88.2	88.5	87.8					
	B	94.2	90.7	91.0	90.3					
	SYSTEM	93.9	89.5	89.8	89.0		720	716	641	72.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE INLET DAMPER SEAL PROBLEM CONTINUED THROUGH AUGUST AND SEPTEMBER.

EXTERNAL PROBLEMS WERE EXPERIENCED WITH THE IUCS SYSTEM.

10/80	A	89.2	72.0	72.6	64.9					
	B	94.1	87.6	88.3	78.9					
	SYSTEM	91.7	79.8	80.5	71.9		744	670	535	57.2

11/80	A	99.6	92.9	91.1	55.4					
	B	98.2	81.5	79.9	48.6					
	SYSTEM	98.9	87.3	85.5	51.9		720	429	374	43.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING OCTOBER AND NOVEMBER.

12/80	A	86.0	84.0	84.0	84.0					
	B	87.6	76.7	76.7	76.7					
	SYSTEM	86.8	80.3	80.3	80.3		744	744	744	79.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER SYSTEM AVAILABILITY WAS LOW DUE TO NECESSARY REPAIRS TO THE RECLAIM WATER TANK.

1/81	A	97.6	92.7	92.7	92.7					
	B	98.4	90.5	90.4	90.4					
	SYSTEM	97.9	92.0	91.5	91.5		744	744	681	79.0

2/81	A	89.7	81.0	81.3	74.7					
	B	95.2	89.2	89.6	82.3					
	SYSTEM	92.4	85.0	85.4	78.4		672	620	528	75.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY AND FEBRUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

3/81	A	74.7	96.6	98.0	58.9					
	B	75.0	97.5	99.0	59.4					
	SYSTEM	74.9	97.0	98.5	59.1		744	453	440	57.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE MAJORITY OF OUTAGE TIME DURING MARCH WAS THE RESULT OF LOW BOILER LOAD OR A LACK OF POWER DEMAND.

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

DURING THE MONTH SOME MINOR PROBLEMS WERE ENCOUNTERED WITH VARIOUS PIECES
 OF AUXILIARY EQUIPMENT. NO PROBLEMS WERE EXPERIENCED WITH EITHER MODULE.

4/81	A	53.3	95.0	99.1	31.9			
	B	49.4	100.0	100.0	33.6			
	SYSTEM	51.4	97.5	99.5	32.8	720	242	236

** PROBLEMS/SOLUTIONS/COMMENTS

ON MAY 1, THE UNIT WAS OUT OF SERVICE FOR A SCHEDULED OUTAGE. THE UNIT
 REMAINED OFF LINE THROUGH MAY 14.

5/81	A	99.6	100.0	100.0	83.3			
	B	99.6	100.0	100.0	83.3			
	SYSTEM	99.6	100.0	100.0	83.3	744	620	620

6/81	A	99.2	100.0	100.0	90.0			
	B	99.2	100.0	100.0	90.0			
	SYSTEM	99.2	100.0	100.0	90.0	720	648	648

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR OPERATIONAL PROBLEMS WERE ENCOUNTERED
 DURING MAY AND JUNE.

7/81	A	99.6	100.0	100.0	73.9			
	B	99.2	100.0	100.0	73.9			
	SYSTEM	99.4	100.0	100.0	73.9	744	550	550

8/81	A	99.0	90.0	94.0	74.0			
	B	98.0	89.0	92.0	73.0			
	SYSTEM	98.5	89.5	93.0	73.5	744	607	547

9/81	A	100.0	85.0	94.0	35.0			
	B	89.0	87.0	97.0	36.0			
	SYSTEM	94.5	86.0	95.5	35.5	720	297	256

** PROBLEMS/SOLUTIONS/COMMENTS

SEVERE OUTLET DUCT CORROSION HAS OCCURRED ON UNIT 6. THE GUNITE LINER HAS
 FAILED DUE TO INADEQUATE STRENGTH OF THE SUPPORTING MESH. THE UTILITY
 IS LOOKING INTO INCONEL OR FRP AS A REPLACEMENT LINER.

UNIT 6 WAS REMOVED FROM SERVICE ON SEPTEMBER 19 AS A RESULT OF LOW DEMAND.
 THE UNIT IS NOT EXPECTED TO BE BROUGHT BACK ON LINE UNTIL DECEMBER.
 THIS OUTAGE PERIOD WILL BE UTILIZED FOR OUTLET DUCTWORK REPAIRS.

10/81	A	100.0	.0	.0	.0			
	B	100.0	.0	.0	.0			
	SYSTEM	100.0	.0	.0	.0	744		0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER MAJOR MODIFICATIONS WERE BEING PERFORMED ON THE BOILER
 DUCTWORK. THIS INCLUDED REPAIRING THE CORRODED INNER SUPPORTS AND REPLAC-
 ING THE GUNITE.

11/81	A	27.0	.0	.0	.0			
	B	27.0	.0	.0	.0			
	SYSTEM	27.0	.0	.0	.0	720		0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER MAJOR MODIFICATION TO THE FGD SYSTEM DUCTWORK WAS PERFORMED. THIS WORK INCLUDED REPAIRING THE CORRODED SUPPORTS AND RECOATING WITH GUNITE.

DURING THE MONTH ADDITIONAL OUTAGE TIME WAS DUE TO GENERAL FGD MAINTENANCE.

12/81	A	88.0	83.0	93.0	66.0			
	B	88.0	83.0	93.0	66.0			
	SYSTEM	88.0	83.0	93.0	66.0	744	592	491

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER MISCELLANEOUS EQUIPMENT PROBLEMS WERE ENCOUNTERED.

ALSO DURING THE MONTH OPACITY MONITORS WERE INSTALLED AND TESTED.

1/82	A	100.0	88.0	95.0	70.0			
	B	100.0	88.0	95.0	70.0			
	SYSTEM	100.0	88.0	95.0	70.0	744	592	521
2/82	A	98.0	87.0	92.0	60.0			
	B	99.0	90.0	90.0	62.0			
	SYSTEM	98.5	88.5	94.0	61.0	672	463	410
3/82	A	99.0	88.0	91.0	80.0			
	B	99.0	92.0	95.0	83.0			
	SYSTEM	99.0	90.0	93.0	81.5	744	673	606

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER OF 1982.

4/82	A	100.0	89.0	96.0	63.0			
	B	100.0	88.0	94.0	62.0			
	SYSTEM	100.0	88.5	95.0	62.5	720	509	450
5/82	A	100.0	66.0	97.0	23.0			
	B	100.0	66.0	97.0	23.0			
	SYSTEM	100.0	66.0	97.0	23.0	744	259	171
6/82	A	100.0	86.0	96.0	46.0			
	B	100.0	89.0	99.0	47.0			
	SYSTEM	100.0	87.5	97.5	46.5	720	383	335

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.

7/82	6A	99.7	92.9	93.7	62.6			
	6B	99.9	95.9	96.8	64.7			
	SYSTEM	99.8	94.4	95.2	63.7	744	502	474 50.2
8/82	6A	99.8	93.9	97.7	72.1			
	6B	100.0	91.9	95.5	70.5			
	SYSTEM	99.9	92.9	96.6	71.3	744	571	530 56.7
9/82	6A	97.2	90.4	91.3	75.3			
	6B	96.5	91.0	91.9	75.8			
	SYSTEM	96.8	90.7	91.6	75.6	720	600	544 64.9

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER, 1982.

10/82	6A	33.3	98.4	100.0	24.7				
	6B	33.0	93.2	94.6	23.4				
	SYSTEM	33.2	95.8	97.3	24.1	744	187	179	17.8

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 6 WAS OUT OF SERVICE DURING PART OF OCTOBER FOR AN ANNUAL OUTAGE.

11/82	6A	46.3	81.5	78.3	35.7				
	6B	46.5	76.1	73.0	33.3				
	SYSTEM	46.4	78.8	75.6	34.5	720	315	248	31.9

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 6 WAS OUT OF SERVICE DURING PART OF NOVEMBER FOR THE ANNUAL OUTAGE.

12/82	6A	98.0	87.9	88.0	64.5				
	6B	96.9	87.1	87.2	63.9				
	SYSTEM	97.5	87.5	87.6	64.2	744	546	478	58.3
1/83	6A	96.7	88.5	90.6	55.6				
	6B	96.8	88.4	90.5	55.6				
	SYSTEM	96.7	88.4	90.5	55.6	744	468	414	45.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER, 1982 THROUGH JANUARY, 1983.

2/83	6A	90.9	82.4	85.2	61.5				
	6B	91.4	84.1	87.0	62.8				
	SYSTEM	91.2	83.3	86.1	62.1	672	501	418	45.0

** PROBLEMS/SOLUTIONS/COMMENTS

PRIOR TO FEBRUARY 16, 1983, THE UTILITY WAS CONSIDERING FGD SYSTEM AVAILABLE TIME TO INCLUDE PERIODS WHEN SCRUBBER MAINTENANCE WAS PERFORMED DURING A UNIT OUTAGE. THE UTILITY NOW CONFORMS TO THE CORRECT DEFINITION OF AVAILABILITY AND CONSIDERS THE SCRUBBER UNAVAILABLE DURING THESE PERIODS.

3/83	6A	88.8	86.6	87.5	80.2				
	6B	90.2	89.6	90.5	82.9				
	SYSTEM	89.5	88.1	89.0	81.6	744	689	607	61.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MARCH.

4/83	6A	80.4	79.6	80.3	79.6				
	6B	96.3	95.4	96.2	95.4				
	SYSTEM	88.3	87.5	88.2	87.5	720	720	630	67.1

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY ATTRIBUTED THE VERY GOOD PERFORMANCE OF MODULE 6B DURING APRIL TO PROPER MAINTENANCE PERFORMED AND THE COMPLETION OF ESSENTIAL CHANGES IN THE SCRUBBING SYSTEM DESIGN.

5/83	6A	94.5	80.0	82.4	22.6				
	6B	96.0	85.2	87.7	24.1				
	SYSTEM	95.2	82.6	85.0	23.3	744	210	174	17.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT OUTAGE TIME WAS ATTRIBUTED TO THE CLEANING OF MIST ELIMINATORS DURING MAY.

MAINTENANCE WORK ON MIST ELIMINATOR PUMPS ALSO CAUSED OUTAGE TIME IN MAY.

A 72 HOUR OUTAGE OCCURRED DUE TO A CHEMICAL IMBALANCE OF THE MAKEUP WATER POND. DRAINAGE FROM THE CLEANING OF AN AIR HEATER PRODUCED ACIDIC CONDITIONS IN THE POND.

6/83	6A	95.0	84.0	89.2	28.8				
	6B	96.8	86.9	92.2	29.7				
	SYSTEM	95.9	85.4	90.7	29.2	720	246	211	24.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/83	6A	94.9	86.8	88.9	39.8				
	6B	95.6	88.3	90.4	40.5				
	SYSTEM	95.2	87.5	89.6	40.1	744	341	299	32.0

8/83	6A	87.0	92.4	93.5	73.7				
	6B	91.1	95.1	96.2	75.8				
	SYSTEM	89.0	93.8	94.9	74.7	744	593	556	47.0

9/83	6A	93.3	91.3	92.0	49.6				
	6B	93.2	90.8	91.5	49.3				
	SYSTEM	93.3	91.0	91.8	49.4	720	391	356	33.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER, 1983.

10/83	6A	98.9	98.9	98.9	61.7				
	6B	99.6	99.8	99.8	62.2				
	SYSTEM	99.3	99.4	99.4	62.0	744	464	461	44.4

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING OCTOBER.

11/83	6A	76.7	96.1	96.1	51.4				
	6B	76.1	95.1	95.1	50.8				
	SYSTEM	76.4	95.6	95.6	51.1	720	385	368	33.7

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT ANNUAL OUTAGES OCCURRED DURING NOVEMBER FOR UNITS 5 AND 6.

12/83	A	38.6	69.8	75.4	31.3				
	B	41.3	75.7	81.9	34.0				
	SYSTEM	39.9	72.8	78.6	32.7	744	334	243	26.1

** PROBLEMS/SOLUTIONS/COMMENTS

LOSS OF LINE FEED DUE TO FROZEN WATER LINES ON THE SLAKERS CONTRIBUTED TO FGD SYSTEM DOWN TIME DURING DECEMBER.

A MODULE OUTAGE WAS REQUIRED TO CLEAN PLUGGED ABSORBER & MIST ELIMINATOR SPRAY NOZZLES.

THE UNAVAILABILITY OF THE SLUDGE TREATMENT FACILITY DURING DECEMBER CONTRIBUTED TO FGD SYSTEM DOWN TIME.

1/84	A	96.2	93.9	95.2	73.9				
	B	96.8	94.5	95.8	74.5				
	SYSTEM	96.5	94.2	95.5	74.2	744	586	552	54.0

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGED RECYCLE, MIST ELIMINATOR AND PRESATURATOR SPRAY NOZZLES CONTRIBUTED TO DOWN TIME IN JANUARY.

DAMPER OPERATION FAILURE OCCURRED DURING THE MONTH.

COMPUTER-RELATED PROBLEMS WERE ENCOUNTERED DURING JANUARY.

2/84	6A	95.8	73.8	84.9	23.4				
	6B	79.3	81.0	93.2	25.7				
	SYSTEM	87.6	77.4	89.1	24.6	696	221	171	18.6

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH PLUGGED SPRAY NOZZLES WERE REPORTED IN THE MIST ELIMINATOR, RECYCLE SYSTEM AND PRESATURATOR.

A POWER FAILURE AT THE SLUDGE TREATMENT PLANT OCCURRED DURING THE MONTH.

ABSORBER LINER FAILURE WAS REPORTED DURING FEBRUARY.

3/84	A	99.9	98.1	100.0	57.0				
	B	75.4	93.1	94.8	54.0				
	SYSTEM	87.6	95.6	97.4	55.5	744	432	413	40.7

** PROBLEMS/SOLUTIONS/COMMENTS

PRESATURATOR PLUGGAGE ACCOUNTED FOR 8 HOURS OF OUTAGE TIME IN MARCH.

COMPUTER-RELATED PROBLEMS WERE REPORTED DURING MARCH.

ABSORBER LINER FAILURE RESULTED IN 5 HRS. OF DOWN TIME IN MARCH.

THE UTILITY REPORTED THAT MODULE B WAS UNAVAILABLE 160 HOURS DUE TO DAMPER FAILURE.

4/84	6A	100.0	99.8	100.0	59.0				
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

	6B	100.0	99.8	100.0	59.0						
	SYSTEM	100.0	99.8	100.0	59.0			720	426	425	40.5
5/84	6A	100.0	99.0	100.0	41.9						
	6B	99.9	99.0	100.0	41.9						
	SYSTEM	99.9	99.0	100.0	41.9			744	315	312	32.0
6/84	6A	100.0	97.6	100.0	60.6						
	6B	100.0	97.6	100.0	60.6						
	SYSTEM	100.0	97.6	100.0	60.6			720	447	436	44.5
7/84	6A	99.7	97.1	99.4	57.2						
	6B	99.7	97.1	99.4	57.2						
	SYSTEM	99.7	97.1	99.4	57.2			744	438	426	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF APRIL THROUGH JULY, 1984.

8/84 SYSTEM 744

9/84 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COOPERATIVE POWER ASSOCIATION	
PLANT NAME	COAL CREEK	
UNIT NUMBER	1	
CITY	UNDERWOOD	
STATE	NORTH DAKOTA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1100	
GROSS UNIT GENERATING CAPACITY - MW	550	
NET UNIT GENERATING CAPACITY W/FGD - MW	500	
NET UNIT GENERATING CAPACITY WO/FGD - MW	501	
EQUIVALENT SCRUBBED CAPACITY - MW	327	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1038.18	(2200000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	160.0	(320 F)
STACK HEIGHT - M	201.	(658 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	6.7	(22.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	14556.	(6258 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		3068-7660
AVERAGE ASH CONTENT - %	7.14	
RANGE ASH CONTENT - %	3.9-16.0	
AVERAGE MOISTURE CONTENT - %	39.83	
RANGE MOISTURE CONTENT - %	27.8-52.6	
AVERAGE SULFUR CONTENT - %	.63	
RANGE SULFUR CONTENT - %	0.2-1.4	
AVERAGE CHLORIDE CONTENT - %	.02	
RANGE CHLORIDE CONTENT - %	0.00-0.08	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	WHEELABRATOR-FRYE
INLET FLUE GAS CAPACITY - CU.M/S	1090.1 (2310000 ACFM)
INLET FLUE GAS TEMPERATURE - C	160.6 (321 F)
PRESSURE DROP - KPA	.6 (3. IN-H2O)
PARTICLE REMOVAL EFFICENCY - %	99.5

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
A-E FIRM	BLACK & VEATCH	
DEVELOPMENT LEVEL	FULL SCALE	
NEW/RETROFIT	NEW	
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50	
UNIT DESIGN SO ₂ REMOVAL EFFICIENCY - %	54.00	
ENERGY CONSUMPTION - %	.2	
CURRENT STATUS	1	
COMMERCIAL START-UP	8/79	
INITIAL START-UP	7/79	
CONTRACT AWARDED	5/76	
** DESIGN AND OPERATING PARAMETERS		
SPACE REQUIREMENTS - SQ M	8091.6	(87100 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	72.0	
** QUENCHER/PRESATURATOR		
NUMBER	0	
** ABSORBER		
NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
DIMENSIONS - FT	21.5 WIDE X 20 DEEP X 55 HIGH	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER-OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1310.	(20790 GPM)
L/G RATIO - L/CU.M	8.0	(60.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.7	(3.0 IN-H ₂ O)
SUPERFICAL GAS VELOCITY - M/SEC	3.2	(10.6 FT/S)
INLET GAS FLOW - CU. M/S	163.51	(346500 ACFM)
INLET GAS TEMPERATURE - C	160.6	(321 F)
SO ₂ REMOVAL EFFICIENCY - %	90.0	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	4	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	2	
FREEBOARD DISTANCE - M	2.44	(8.0 FT)
DISTANCE BETWEEN STAGES - CM	76.20	(30.0 IN)
DISTANCE BETWEEN VANES - CM	7.6	(3.00 IN)
PRESSURE DROP - KPA	.1	(.5 IN-H ₂ O)
SUPERFICAL GAS VELOCITY - M/S	2.7	(8.9 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	COOLING TOWER BLOWDOWN	
WASH FREQUENCY	INTERMITTENT	
WASH RATE - L/S	37.8	(600 GAL/MIN)
** REHEATER		
NUMBER	1	
NUMBER OF SPARES	0	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

PERCENT GAS BYPASSED - AVG	40.0	
TEMPERATURE INCREASE - C	47.2	(85 F)
INLET FLUE GAS TEMPERATURE - C	57.2	(135 F)
OUTLET FLUE GAS TEMPERATURE - C	98.9	(210 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	4	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	GREEN FAN	
FUNCTION	BALANCED DRAFT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	163.51	(346500 ACFM)
FLUE GAS TEMPERATURE - C	160.6	(321 F)
PRESSURE DROP - KPA	12.8	(42.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	8	
FUNCTION	ISOLATION	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	8	
FUNCTION	ISOLATION	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	4	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	8	
FUNCTION	ISOLATION	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	OUTLET	
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	INLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	PLENUM TO STACK
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	WALLACE & TIEMAN
NUMBER	2
PRODUCT QUALITY - % SOLIDS	10.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	2
FLYASH	****
REAGENT PREP PRODUCT	****
** PUMPS	
SERVICE	NUMBER
-----	-----
BLEED STREAM	3
SLURRY FEED	2
REACTION TANK TRANSFER	6
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	NONE
DEVICE	NR
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	400 ACRES
SITE SERVICE LIFE - YRS	35
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH, SO2
PHYSICAL VARIABLES	SOLIDS, LIQUID LEVEL
MONITOR TYPE	UNILOC FOR PH, LEAR-SIEGLER FOR SO2, MOORE FOR S
MONITOR LOCATION	REACTION TANK FOR PH
** WATER BALANCE	
WATER LOOP TYPE	OPEN

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIME
PRINCIPAL CONSTITUENT	CAO
SOURCE/SUPPLIER	PETE LIEN & SONS, INC.
CONSUMPTION	RAPID CITY, SOUTH DAKOTA
POINT OF ADDITION	SLAKER

** FGD SPARE CAPACITY INDICES

ABSORBER - %	.0
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** FGD SPARE COMPONENT INDICES

ABSORBER	.0
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-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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7/79	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER BEGAN OPERATIONS IN MAY 1979. WET TEST RUNS WERE MADE WITH THE SCRUBBERS DURING THE SECOND WEEK OF JULY AND THE SYSTEM WAS OPERATED WITH LIME SLURRY DURING THE THIRD WEEK OF JULY. THE UTILITY BEGAN INITIAL FGD SYSTEM OPERATIONS AS DEFINED BY THE UTILITY (24-HOUR MINIMUM PERIOD) ON JULY 19.

8/79	SYSTEM						744		
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9/79	SYSTEM						720		
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** PROBLEMS/SOLUTIONS/COMMENTS

THIS UNIT STARTED COMMERCIAL OPERATIONS ON AUGUST 1, 1979. SOME MINOR SHAKEDOWN PROBLEMS WERE REPORTED FOR THE AUGUST-SEPTEMBER PERIOD.

10/79	SYSTEM						744	711	
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11/79	SYSTEM						720	703	
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12/79	SYSTEM						744	719	
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** PROBLEMS/SOLUTIONS/COMMENTS

SINCE STARTUP THE UNIT HAS EXPERIENCED NUMEROUS SHAKEDOWN PROBLEMS BOTH BOILER AND FGD SYSTEM-RELATED. AFTER THE NEXT SCHEDULED OUTAGE IN APRIL, THE UTILITY EXPECTS STABLE FGD OPERATIONS TO BE ESTABLISHED.

DURING DECEMBER TWO OF THE EIGHT COAL PULVERIZERS WERE OUT OF SERVICE DUE TO A PRIMARY AIR DUCT EXPLOSION. LITTLE DOWN TIME RESULTED, HOWEVER, THE UNIT HAD TO OPERATE AT A REDUCED LOAD. NO FGD SYSTEM PROBLEMS WERE REPORTED.

1/80	SYSTEM	100.0			96.1		744	715	715
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY TWO MODULES AT A TIME WERE TAKEN OFF-LINE FOR INSPECTION AND CLEANING. SOME CRACKED NOZZLES AND PLUGGING PROBLEMS WERE FOUND DURING THE INSPECTION. THE BOILER WAS OPERATED AT A REDUCED LOAD.

SOME OUTAGE TIME DURING THE MONTH WAS CAUSED BY BOILER-RELATED PROBLEMS. A BOILER TRIP WAS CAUSED BY A TURBINE ELECTRICAL RELAY ON JANUARY 13.

AN HOUR OF OUTAGE TIME RESULTED FROM A LOSS OF POWER TO THE CONTROL SYSTEM AND AN ABNORMAL BOILER DRUM LEVEL WAS ALSO ENCOUNTERED ON JANUARY

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

16.

A THREE TO FOUR HOUR OUTAGE WAS SCHEDULED ON JANUARY 27 TO MAKE REPAIRS ON FGD SYSTEM EQUIPMENT.

2/80	SYSTEM			99.9		696	695		
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** PROBLEMS/SOLUTIONS/COMMENTS

WHILE THE BOILER WAS OUT OF SERVICE DUE TO ID FAN PROBLEMS CAUSED BY ELECTRICAL GROUNDING, TWO MODULES WERE TAKEN OUT OF SERVICE SO CALIBRATIONS COULD BE DONE.

3/80	SYSTEM		100.0	96.1		744	715	715	
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** PROBLEMS/SOLUTIONS/COMMENTS

BOILER TRIPS OCCURRED THREE TIMES DURING THE MONTH. ONE TRIP WAS DUE TO THE CUT DOWN OF TRANSMISSION POWER ON MARCH 12.

THE FGD SYSTEM WAS SHUTDOWN WITH THE BOILER FOR FOUR HOURS TO CLEAN THE FILTER ON THE BOILER STATOR COOLING PUMPS.

DURING MARCH STACK EMISSION TESTS WERE UNDERTAKEN. THE SYSTEM OPERATED WITH ONE MODULE DOWN DURING TESTING.

4/80	11	96.7	58.3	100.0	21.4				
	12	100.0	81.7	100.0	30.0				
	13	100.0	96.1	100.0	35.3				
	14	100.0	96.9	100.0	35.6				
	SYSTEM	99.2	83.3	100.0	30.6	720	264	220	26.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OFF LINE FOR APPROXIMATELY 19 DAYS FOR THE ANNUAL UNIT OUTAGE. THE SCRUBBING SYSTEM WAS AVAILABLE DURING THE BOILER OUTAGE.

5/80	11	88.3	68.8	100.0	34.4				
	12	79.3	18.6	100.0	9.3				
	13	91.9	79.6	100.0	39.8				
	14	91.3	35.5	100.0	17.7				
	SYSTEM	87.7	50.6	100.0	25.3	744	372	188	28.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE ANNUAL UNIT OUTAGE WAS COMPLETED IN THE BEGINNING OF THE MONTH. THERE WERE PROBLEMS WITH BOILER STARTUP AFTER THIS OUTAGE CAUSING LOW OPERABILITY OF THE FGD SYSTEM.

6/80	11	92.9	49.3	100.0	49.2				
	12	98.5	47.6	100.0	47.5				
	13	74.7	42.2	100.0	42.1				
	14	93.5	73.0	100.0	72.8				
	SYSTEM	89.9	53.0	100.0	52.9	720	718	381	58.5

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO MAJOR PROBLEMS REPORTED DURING JUNE. ROUTINE MAINTENANCE AND REPAIRS WERE DONE THROUGHOUT THE MONTH.

7/80	SYSTEM	100.0	100.0	100.0	87.1	744	648	648	47.1
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COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

IN JULY, NO PROBLEMS WERE ENCOUNTERED WITH THE FGD SYSTEM.

8/80	11		24.8		17.5				
	12		43.5		30.6				
	13		42.7		30.1				
	14		78.9		55.6				
	SYSTEM		47.5		33.5	744	525	249	31.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.

9/80	SYSTEM		.0		.0	720	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT DID NOT OPERATE DURING SEPTEMBER DUE TO A TURBINE BEARING FAILURE.

10/80	11		65.6		13.2				
	12		80.3		16.1				
	13		2.7		.0				
	14		36.1		7.3				
	SYSTEM		46.2		9.3	744	149	69	12.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MOST OF OCTOBER THE UNIT DID NOT OPERATE DUE TO THE REPAIRS BEING PERFORMED ON THE TURBINE BEARINGS. THE UNIT OPERATED APPROXIMATELY 150 HOURS DURING THE MONTH.

11/80	11		46.7		45.8				
	12		48.1		47.2				
	13		33.7		33.1				
	14		45.0		44.2				
	SYSTEM		43.4		42.6	720	707	307	30.8

12/80	11		60.6		60.2				
	12		30.3		30.1				
	13		85.0		84.4				
	14		10.0		9.9				
	SYSTEM		46.6		46.2	744	739	344	72.2

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS WERE ENCOUNTERED DURING NOVEMBER AND DECEMBER.

1/81	11	100.0	45.2		45.2				
	12	100.0	46.8		46.8				
	13	100.0	38.7		38.7				
	14	100.0	44.6		44.6				
	SYSTEM	100.0	43.8		43.8	744	744	326	58.3

2/81	11	82.5	57.4		47.5				
	12	82.5	79.1		65.2				
	13	82.5	71.8		59.2				
	14	82.5	1.8		1.5				
	SYSTEM	82.5	52.5		43.3	672	554	291	45.6

3/81	11	47.4	50.4		23.9				
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
 COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	12	47.4	73.7		34.9					
	13	47.4	57.8		27.4					
	14	47.4	58.4		29.0					
	SYSTEM	47.4	60.9		28.8		744	353	215	30.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1981 VIBRATION PROBLEMS WERE EXPERIENCED CAUSING FAILURE OF THE REACTION TANK BLADES.

4/81	11	100.0	64.7	100.0	64.7					
	12	100.0	94.7	100.0	94.7					
	13	100.0	36.7	100.0	36.7					
	14	100.0	87.2	100.0	87.2					
	SYSTEM	100.0	70.8	100.0	70.8		720	720	510	68.6
5/81	11	100.0	62.9	100.0	62.9					
	12	100.0	65.6	100.0	65.6					
	13	100.0	31.5	100.0	31.5					
	14	100.0	39.0	100.0	39.0					
	SYSTEM	100.0	49.7	100.0	49.7		744	744	370	68.3
6/81	11	100.0	51.3	100.0	47.2					
	12	100.0	76.9	100.0	70.8					
	13	100.0	15.7	100.0	14.4					
	14	100.0	10.6	100.0	9.7					
	SYSTEM	100.0	38.6	100.0	35.6		720	663	256	57.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER 1981 THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

7/81	11		34.3		34.1					
	12		49.9		49.7					
	13		8.9		8.9					
	14		54.8		54.6					
	SYSTEM		37.0		36.8		744	741	274	55.3
8/81	11		41.5		33.3					
	12		46.6		37.4					
	13		8.0		6.5					
	14		84.4		67.7					
	SYSTEM		45.2		36.3		744	597	270	62.9
9/81	SYSTEM				.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED FOR THE MONTHS OF JULY AND AUGUST. THE UNIT WAS TAKEN OFF LINE IN SEPTEMBER FOR AN ANNUAL OUTAGE.

10/81	11		64.7		17.5					
	12		20.9		5.6					
	13		79.6		21.5					
	14		49.8		13.4					
	SYSTEM		53.7		14.5		744	201	108	18.4
11/81	11		42.0		34.2					
	12		59.4		48.3					
	13		52.2		42.5					
	14		76.2		61.9					
	SYSTEM		57.4		46.7		720	586	336	52.6

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE UNIT WAS SHUTDOWN UNTIL THE 24TH FOR AN ANNUAL INSPEC-
 TION.

12/81	11		72.4		54.3				
	12		67.4		50.5				
	13		49.1		36.8				
	14		49.4		37.1				
	SYSTEM		59.5		44.7	744	558	332	48.8

** PROBLEMS/SOLUTIONS/COMMENTS

GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM DURING THE FOURTH
 QUARTER. NO FGD FORCED OUTAGES WERE ENCOUNTERED.

1/82	11	100.0	66.1	100.0	65.9				
	12	100.0	58.3	100.0	58.1				
	13	100.0	73.1	100.0	72.8				
	14	100.0	92.2	100.0	91.9				
	SYSTEM	100.0	72.4	100.0	72.2	744	741	537	81.8
2/82	11	100.0	65.8	100.0	65.8				
	12	100.0	71.3	100.0	71.3				
	13	100.0	82.9	100.0	82.9				
	14	100.0	58.9	100.0	58.9				
	SYSTEM	100.0	69.7	100.0	69.7	672	672	469	76.7
3/82	11	100.0	37.9	100.0	37.9				
	12	100.0	50.0	100.0	50.0				
	13	100.0	39.9	100.0	39.9				
	14	100.0	30.6	100.0	30.6				
	SYSTEM	100.0	39.6	100.0	39.6	744	744	295	71.5

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS OR FORCED OUTAGES WERE ENCOUNTERED DURING THE FIRST
 QUARTER OF 1982.

4/82	11	100.0	17.0	100.0	16.9				
	12	100.0	15.6	100.0	15.5				
	13	88.0	88.3	100.0	74.0				
	14	72.4	64.7	100.0	64.5				
	SYSTEM	90.1	46.4	100.0	42.7	720	718	308	75.1
5/82	11	100.0	3.7	100.0	3.2				
	12	100.0	13.6	100.0	11.9				
	13	100.0	52.7	100.0	46.2				
	14	100.0	54.4	100.0	47.7				
	SYSTEM	100.0	31.1	100.0	27.2	744	653	203	55.9
6/82	11	74.2	40.6	100.0	37.4				
	12	69.6	22.0	100.0	20.3				
	13	73.3	.0	100.0	54.3				
	14	76.4	52.8	100.0	48.6				
	SYSTEM	73.4	43.6	100.0	40.1	720	663	289	92.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER 1982 GENERAL MAINTENANCE AND CLEANING OF THE
 FGD SYSTEM ACCOUNTED FOR ANY UNAVAILABLE TIME.

7/82	SYSTEM					744			
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/82	SYSTEM						744			
9/82	SYSTEM						720			
10/82	SYSTEM						744			
11/82	SYSTEM						720			
12/82	SYSTEM						744			
1/83	SYSTEM						744			
2/83	SYSTEM						672			
3/83	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH MARCH 1983.										
4/83	SYSTEM						720			
5/83	SYSTEM						744			
6/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH JUNE 1983.										
7/83	SYSTEM						744			
8/83	SYSTEM						744			
9/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE THIRD QUARTER OF 1983.										
10/83	SYSTEM						744			
11/83	SYSTEM						720			
12/83	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT THE FGD SYSTEM AT COAL CREEK 1 WAS 100 PERCENT AVAILABLE THROUGHOUT THE FOURTH QUARTER OF 1983.										
1/84	SYSTEM						744			
2/84	SYSTEM						696			
3/84	SYSTEM						744			
4/84	SYSTEM						720			
5/84	SYSTEM						744			
6/84	SYSTEM						720			

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR
7/84	SYSTEM									744
** PROBLEMS/SOLUTIONS/COMMENTS										
FGD SYSTEM AVAILABILITY FOR THE PERIOD OF JANUARY THROUGH JULY 1984 WAS REPORTED AS 100%.										
8/84	SYSTEM									744
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING THE SCHEDULED OUTAGE IN AUGUST, CORRODING REHEAT DUCTWORK WAS REPLACED WITH 316L STAINLESS STEEL.										
9/84	SYSTEM									720
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED REPLACING DETERIORATING MIST ELIMINATOR FIBERGLASS LININGS DURING THE FIRST THREE QUARTERS OF 1984.										

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COOPERATIVE POWER ASSOCIATION	
PLANT NAME	COAL CREEK	
UNIT NUMBER	2	
CITY	UNDERWOOD	
STATE	NORTH DAKOTA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1100	
GROSS UNIT GENERATING CAPACITY - MW	550	
NET UNIT GENERATING CAPACITY W/FGD - MW	500	
NET UNIT GENERATING CAPACITY WO/FGD - MW	501	
EQUIVALENT SCRUBBED CAPACITY - MW	327	
** UNIT DATA - BOILER AND STACK	COMBUSTION ENGINEERING	
BOILER SUPPLIER	PULVERIZED COAL	
BOILER TYPE	BASE	
BOILER SERVICE LOAD		
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1038.18	(2200000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	160.0	(320 F)
STACK HEIGHT - M	201.	(658 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	6.7	(22.0 FT)
** FUEL DATA	COAL	
FUEL TYPE	LIGNITE	
FUEL GRADE	14556.	(6258 BTU/LB)
AVERAGE HEAT CONTENT - J/G		3068-7660
RANGE HEAT CONTENT - BTU/LB		
AVERAGE ASH CONTENT - %	7.14	
RANGE ASH CONTENT - %	3.9-16.0	
AVERAGE MOISTURE CONTENT - %	39.83	
RANGE MOISTURE CONTENT - %	27.8-52.6	
AVERAGE SULFUR CONTENT - %	.63	
RANGE SULFUR CONTENT - %	0.2-1.4	
AVERAGE CHLORIDE CONTENT - %	.02	
RANGE CHLORIDE CONTENT - %	0.00-0.08	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	1	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	WHEELABRATOR-FRYE	
INLET FLUE GAS CAPACITY - CU.M/S	1090.1	(2310000 ACFM)
INLET FLUE GAS TEMPERATURE - C	160.6	(321 F)
PRESSURE DROP - KPA	.6	(3. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.5	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
*** FGD SYSTEM		

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	54.00
ENERGY CONSUMPTION - %	.2
CURRENT STATUS	1
COMMERCIAL START-UP	9/80
INITIAL START-UP	7/80
CONTRACT AWARDED	5/76

** DESIGN AND OPERATING PARAMETERS

SPACE REQUIREMENTS - SQ M	8091.6	(87100 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	72.0	

** QUENCHER/PRESATURATOR
NUMBER

0

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
DIMENSIONS - FT	21.5 WIDE X 20 DEEP X 55 HIGH	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1310.	(20790 GPM)
L/G RATIO - L/CU.M	8.0	(60.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.7	(3.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.2	(10.6 FT/S)
INLET GAS FLOW - CU. M/S	163.51	(346500 ACFM)
INLET GAS TEMPERATURE - C	160.6	(321 F)
SO2 REMOVAL EFFICIENCY - %	90.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	4	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	2	
FREEBOARD DISTANCE M	2.44	(8.0 FT)
DISTANCE BETWEEN STAGES - CM	76.20	(30.0 IN)
DISTANCE BETWEEN VANES - CM	7.6	(3.00 IN)
PRESSURE DROP - KPA	.1	(.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	2.7	(8.9 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	COOLING TOWER BLOWDOWN	
WASH FREQUENCY	INTERMITTENT	
WASH RATE L/S	37.8	(600 GAL/MIN)

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

** REHEATER	
NUMBER	1
NUMBER OF SPARES	0
GENERIC TYPE	BYPASS
SPECIFIC TYPE	COLD SIDE
TRADE NAME/COMMON TYPE	N/A
PERCENT GAS BYPASSED - AVG	40.0
TEMPERATURE INCREASE - C	47.2 (85 F)
INLET FLUE GAS TEMPERATURE - C	57.2 (135 F)
OUTLET FLUE GAS TEMPERATURE - C	98.9 (210 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
NUMBER	4
DESIGN	CENTRIFUGAL
SUPPLIER	GREEN FAN
FUNCTION	BALANCED DRAFT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	163.51 (346500 ACFM)
FLUE GAS TEMPERATURE - C	160.6 (321 F)
PRESSURE DROP - KPA	12.8 (42.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	8
FUNCTION	ISOLATION
GENERIC TYPE	LOUVER
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	8
FUNCTION	ISOLATION
GENERIC TYPE	LOUVER
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	8
FUNCTION	ISOLATION
GENERIC TYPE	LOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

** DUCTWORK	
LOCATION	INLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	PLENUM TO STACK
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	WALLACE & TIEMAN
NUMBER	2
PRODUCT QUALITY - % SOLIDS	10.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	2
FLYASH	****
REAGENT PREP PRODUCT	****
** PUMPS	
SERVICE	NUMBER
-----	-----
BLEED STREAM	3
SLURRY FEED	2
REACTION TANK TRANSFER	6
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	NONE
DEVICE	NR
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	400 ACRES
SITE SERVICE LIFE - YRS	35
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH, SO2
PHYSICAL VARIABLES	SOLIDS, LIQUID LEVEL
MONITOR TYPE	UNILOC FOR PH, LEAR-SIEGLER FOR SO2, MOORE FOR S
MONITOR LOCATION	REACTION TANK FOR PH

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

** WATER BALANCE
WATER LOOP TYPE

OPEN

** CHEMICALS AND CONSUMPTION

FUNCTION

ABSORBENT

NAME

LIME

PRINCIPAL CONSTITUENT

CAO

SOURCE/SUPPLIER

PETE LIEN & SONS, INC.

CONSUMPTION

RAPID CITY, SOUTH DAKOTA

POINT OF ADDITION

SLAKER

** FGD SPARE CAPACITY INDICES

ABSORBER - %

.0

** FGD SPARE COMPONENT INDICES

ABSORBER

.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

7/80	21		61.8		52.4				
	22		18.7		15.9				
	23		25.0		21.2				
	24		52.9		44.9				
	SYSTEM		39.6		33.6	744	631	250	34.5

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATION OF THE FGD SYSTEM BEGAN IN JULY 1980. NO MAJOR START UP
 PROBLEMS WERE REPORTED.

8/80	21		15.5		11.8				
	22		29.7		22.6				
	23		25.4		19.4				
	24		46.3		35.2				
	SYSTEM		58.5		44.5	744	566	331	36.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM HAS BEEN EXPERIENCING PROBLEMS WITH THE LIME HANDLING CONVEYOR
 BELT. THIS HAS NOT RESTRICTED OPERATION OF THE SYSTEM; HOWEVER THE
 UTILITY HAS PLANS TO INSTALL A VIBRATOR CONVEYOR IN JANUARY.

9/80	21		80.2		80.0				
	22		56.8		56.7				
	23		49.0		48.9				
	24		76.9		76.7				
	SYSTEM		65.7		65.6	720	718	472	59.1
10/80	21		92.0		91.7				
	22		86.3		86.0				
	23		22.1		22.0				
	24		70.4		70.2				
	SYSTEM					744	742		70.0
11/80	21		63.1		44.2				
	22		77.0		53.9				
	23		25.0		17.5				
	24		77.8		54.4				
	SYSTEM					720	504		41.0
12/80	21		58.7		57.5				
	22		51.3		50.3				
	23		22.2		21.8				
	24		89.4		87.6				
	SYSTEM		55.4		54.3	744	730	404	65.2

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS HAVE BEEN ENCOUNTERED FOR THE MONTHS OF SEPTEMBER THROUGH DECEMBER.

1/81	21	99.8	75.7	75.5				
	22	99.8	37.6	37.5				
	23	99.8	46.3	46.2				
	24	99.8	68.9	68.8				
	SYSTEM	99.8	57.1	57.0	744	743	424	57.2
2/81	21	99.7	72.5	72.5				
	22	99.7	37.9	37.8				
	23	99.7	32.8	32.7				
	24	99.7	82.6	82.4				
	SYSTEM	99.7	56.5	56.4	672	670	379	57.6
3/81	21	55.4	56.3	31.2				
	22	55.4	44.7	24.7				
	23	55.4	27.7	15.3				
	24	55.4	91.3	50.5				
	SYSTEM	55.4	55.1	30.5	744	412	227	39.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1981 THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

ON MARCH 17 THE BOILER WAS TAKEN OUT OF SERVICE FOR A BOILER/TURBINE OVERHAUL, MAINTENANCE AND MODIFICATIONS. THE UNIT WILL BE OUT OF SERVICE FOR APPROXIMATELY TEN WEEKS.

4/81	21	100.0		.0				
	22	100.0		.0				
	23	100.0		.0				
	24	100.0		.0				
	SYSTEM	100.0		.0	720	0	0	.0
5/81	21	100.0		.0				
	22	100.0		.0				
	23	100.0		.0				
	24	100.0		.0				
	SYSTEM	100.0		.0	744	0	0	.0
6/81	21	100.0	26.5	100.0	10.3			
	22	100.0	10.0	100.0	3.9			
	23	100.0	56.6	100.0	21.9			
	24	100.0	18.6	100.0	7.2			
	SYSTEM	100.0	27.9	100.0	10.8	720	279	78

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT WAS OFF-LINE DUE TO BOILER/TURBINE WARRANTY INSPECTION DURING THE MONTHS OF APRIL, MAY, AND PART OF JUNE.

DURING THE SECOND QUARTER 1981 THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

7/81	21		72.5	63.7				
	22		9.5	8.3				
	23		60.6	53.2				
	24		23.9	21.0				
	SYSTEM		41.6	36.6	744	654	272	53.3

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

8/81	21		44.9		35.5				
	22		34.7		27.4				
	23		55.8		44.1				
	24		38.4		30.4				
	SYSTEM		43.5		34.4	744	588	256	51.0
9/81	21		16.6		16.4				
	22		91.8		90.6				
	23		50.1		49.4				
	24		82.8		81.7				
	SYSTEM		60.4		59.6	720	710	429	69.8

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD-RELATED PROBLEMS WERE REPORTED FOR THE THREE MONTH PERIOD.

10/81	21		54.6		54.6				
	22		86.8		86.8				
	23		76.6		76.6				
	24		85.7		85.7				
	SYSTEM		75.9		75.9	744	744	565	83.6
11/81	21		26.4		26.4				
	22		91.9		91.9				
	23		68.1		68.1				
	24		80.3		80.3				
	SYSTEM		66.7		66.7	720	720	480	67.4
12/81	21		77.2		77.1				
	22		56.2		56.1				
	23		70.8		70.7				
	24		63.3		63.2				
	SYSTEM		66.9		66.8	744	743	497	68.8

** PROBLEMS/SOLUTIONS/COMMENTS

GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM DURING THE FOURTH QUARTER. NO FGD FORCED OUTAGES WERE ENCOUNTERED.

1/82	21	100.0	82.4	100.0	82.3				
	22	100.0	54.9	100.0	54.8				
	23	100.0	92.9	100.0	92.7				
	24	100.0	63.0	100.0	62.9				
	SYSTEM	100.0	73.3	100.0	73.2	744	743	545	79.4
2/82	21	100.0	85.9	100.0	85.6				
	22	100.0	65.9	100.0	65.6				
	23	100.0	93.5	100.0	93.2				
	24	100.0	86.2	100.0	85.9				
	SYSTEM	100.0	82.9	100.0	82.6	672	670	555	73.8
3/82	21	100.0	93.6	100.0	88.3				
	22	100.0	61.5	100.0	58.1				
	23	100.0	46.0	100.0	43.4				
	24	100.0	54.3	100.0	51.2				
	SYSTEM	100.0	63.9	100.0	60.3	744	702	448	65.3

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS OR FORCED OUTAGES WERE ENCOUNTERED DURING THE FIRST QUARTER OF 1982.

4/82	21	60.3	60.3	100.0	60.3				
------	----	------	------	-------	------	--	--	--	--

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

	22	43.5	42.6	100.0	42.6					
	23	95.6	83.2	100.0	83.2					
	24	99.7	86.7	100.0	86.7					
	SYSTEM	74.8	68.2	100.0	68.2			720	720	491 73.1
5/82	21	98.6	72.0	100.0	71.9					
	22	87.2	32.7	100.0	32.7					
	23	64.5	28.0	100.0	27.9					
	24	36.3	7.0	100.0	7.0					
	SYSTEM	71.6	34.9	100.0	34.9			744	743	260 64.9
6/82	21	87.8	39.4	100.0	39.3					
	22	90.3	47.5	100.0	47.4					
	23	100.0	87.3	100.0	87.1					
	24	96.4	53.9	100.0	53.7					
	SYSTEM	93.6	57.0	100.0	56.9			720	718	409 64.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER 1982 GENERAL MAINTENANCE AND CLEANING OF THE
FGD SYSTEM ACCOUNTED FOR ANY UNAVAILABLE TIME.

7/82	SYSTEM	744
8/82	SYSTEM	744
9/82	SYSTEM	720
10/82	SYSTEM	744
11/82	SYSTEM	720
12/82	SYSTEM	744
1/83	SYSTEM	744
2/83	SYSTEM	672
3/83	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH MARCH 1983.

4/83	SYSTEM	720
5/83	SYSTEM	744
6/83	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH JUNE 1983.

7/83	SYSTEM	744
8/83	SYSTEM	744
9/83	SYSTEM	720

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
 COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE THIRD QUARTER OF 1983.

10/83	SYSTEM								744	
11/83	SYSTEM								720	
12/83	SYSTEM								744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM AT COAL CREEK 2 WAS 100 PERCENT AVAILABLE THROUGHOUT THE FOURTH QUARTER OF 1983.

1/84	SYSTEM								744	
2/84	SYSTEM								696	
3/84	SYSTEM								744	
4/84	SYSTEM								720	
5/84	SYSTEM								744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SCHEDULED OUTAGE IN MAY, CORRODING REHEAT DUCTWORK WAS REPLACED WITH STAINLESS STEEL.

6/84	SYSTEM								720	
7/84	SYSTEM								744	

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM AVAILABILITY DURING THE PERIOD OF JANUARY THROUGH JULY WAS REPORTED AS 100%.

8/84	SYSTEM								744	
9/84	SYSTEM								720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED REPLACING DETERIORATING MIST ELIMINATOR FIBERGLASS LININGS DURING THE FIRST THREE QUARTERS OF 1984.

SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                DELMARVA POWER & LIGHT
PLANT NAME                  DELAWARE CITY
UNIT NUMBER                 1
CITY                        DELAWARE CITY
STATE                       DELAWARE
REGULATORY CLASSIFICATION   E
PARTICULATE EMISSION LIMITATION - NG/J      129.          ( .300 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J             *****      (***** LB/MMBTU)
NOX EMISSION LIMITATION - NG/J             *****      (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW          180
GROSS UNIT GENERATING CAPACITY - MW         60
NET UNIT GENERATING CAPACITY W/FGD - MW     495
NET UNIT GENERATING CAPACITY WO/FGD - MW    495
EQUIVALENT SCRUBBED CAPACITY - MW          60

** UNIT DATA - BOILER AND STACK
    BOILER SUPPLIER          RILEY STOKER
    BOILER TYPE              PULVERIZED COAL
    BOILER SERVICE LOAD      BASE
    DESIGN BOILER FLUE GAS FLOW CU.M/S      139.21        ( 295000 ACFM)
    BOILER FLUE GAS TEMPERATURE - C         215.6         ( 420 F)
    STACK HEIGHT - M          152.              ( 500 FT)
    STACK SHELL               CONCRETE
    STACK TOP DIAMETER - M     6.1              ( 20.0 FT)

** FUEL DATA
    FUEL TYPE                 COKE
    FUEL GRADE                BITUMINOUS
    AVERAGE HEAT CONTENT - J/G      32564.         ( 14000 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB          13500-14500
    AVERAGE ASH CONTENT - %          .50
    RANGE ASH CONTENT - %            0.3-0.7
    AVERAGE MOISTURE CONTENT - %          .70
    RANGE MOISTURE CONTENT - %         0.5-1.2
    AVERAGE SULFUR CONTENT - %          7.00
    RANGE SULFUR CONTENT - %          5.0-8.0
    AVERAGE CHLORIDE CONTENT - %        *****
    RANGE CHLORIDE CONTENT - %        *****

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR
    NUMBER                    3
    TYPE                      TUBULAR
    SUPPLIER                  PRAT-DANIEL
    PARTICLE REMOVAL EFFICIENCY -%      92.0

** FABRIC FILTER
    NUMBER                    0
    TYPE                      NONE
    TYPICAL GAS/CLOTH RATIO - M/MIN      .6          ( 2.0 FT/MIN)

** ESP
    NUMBER                    3
    TYPE                      COLD SIDE
    SUPPLIER                  WESTERN PREC. DIVISION, JOY
    INLET FLUE GAS CAPACITY - CU.M/S      34.8          ( 73700 ACFM)
    INLET FLUE GAS TEMPERATURE - C        54.4          ( 130 F)
    PRESSURE DROP - KPA             .2              ( 1. IN-H2O)
    PARTICLE REMOVAL EFFICIENCY - %      95.0

** PARTICLE SCRUBBER
    NUMBER                    3
    INITIAL START-UP DATE          4/80
    GENERIC TYPE                  VENTURI TOWER
    SPECIFIC TYPE                 VARIABLE-THROAT/BOTTOM-ENTRY PLUMB BOB
    TRADE NAME/COMMON NAME        N/A
    SUPPLIER                      AIRPOL
    DIMENSIONS - FT               20 DIA X 70.0

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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
LINER GENERIC MATERIAL	ORGANIC; INORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER; PREFIRED BRICK/SHA	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	315.0	(5000 GPM)
L/G RATIO - LITER/CU.M	6.8	(50.9 GAL/1000ACF)
PRESSURE DROP - KPA	.5	(2.0 IN-H2O)
INLET GAS FLOW RATE - CU.M/S	46.4	(98300 ACFM)
INLET GAS TEMPERATURE - C	221.1	(430 F)
SO2 REMOVAL EFFICIENCY - %	.0	
PARTICLE REMOVAL EFFICIENCY - %	81.5	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	SALEABLE PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	WELLMAN LORD
SYSTEM SUPPLIER	DAVY MCKEE
A-E FIRM	DAVY MCKEE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	90.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
CURRENT STATUS	1
COMMERCIAL START-UP	5/80
INITIAL START-UP	5/80
CONTRACT AWARDED	9/77

** DESIGN AND OPERATING PARAMETERS

SPACE REQUIREMENTS - SQ M	24280.3	(261360 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	144.0	

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	3	
NUMBER OF SPARES	0	
GENERIC TYPE	TRAY TOWER	
SPECIFIC TYPE	VALVE TRAY	
TRADE NAME/COMMON TYPE	BUBBLE CAP TRAY TOWER	
SUPPLIER	DAVY MCKEE	
DIMENSIONS FT	20.0 X 20.0	
SHELL GENERIC MATERIAL	INORGANIC	
SHELL SPECIFIC MATERIAL	HYDRAULICALLY-BONDED CONCRETE	
SHELL MATERIAL TRADE NAME/COMMON TYPE	PORTLAND CEMENT	
LINER GENERIC MATERIAL	INORGANIC	
LINER SPECIFIC MATERIAL	PREFIRED BRICK/SHAPES	
LINER MATERIAL TRADE NAME/COMMON TYPE	NR	
GAS CONTACTING DEVICE TYPE	VALVE TRAY	
NUMBER OF CONTACTING ZONES	4	
LIQUID RECIRCULATION RATE - LITER/S	25.	(400 GPM)
L/G RATIO L/CU.M	.7	(5.5 GAL/1000 ACF)
INLET GAS FLOW - CU. M/S	34.59	(73300 ACFM)
INLET GAS TEMPERATURE - C	54.4	(130 F)
PARTICLE REMOVAL EFFICIENCY - %	.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	3	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	1	
FREEBOARD DISTANCE M	1.83	(6.0 FT)

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

DISTANCE BETWEEN STAGES - CM	19.05	(7.5 IN)
PRESSURE DROP - KPA	.1	(.3 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	COOLED CONDENSATE	
WASH FREQUENCY	INTERMITTENT	
WASH RATE - L/S	3.2	(50 GAL/MIN)
** REHEATER		
NUMBER	3	
GENERIC TYPE	DIRECT COMBUSTION	
SPECIFIC TYPE	EXTERNAL COMBUSTION CHAMBER	
TRADE NAME/COMMON TYPE	NATURAL GAS	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	108.54	(230000 ACFM)
INLET FLUE GAS TEMPERATURE - C	54.4	(130 F)
OUTLET FLUE GAS TEMPERATURE - C	85.0	(185 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	3	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	ROBINSON	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	139.21	(295000 ACFM)
FLUE GAS TEMPERATURE - C	215.6	(420 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
DIMENSIONS	8.0 X 8.0	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	FIBER-REINFORCED POLYESTER	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	MIX TANK	
DEVICE	N/A	
DEVICE TYPE	AGITATED TANK	
** TANKS		
SERVICE	NUMBER	
-----	-----	
NR	****	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECIRCULATION	****	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE	NONE	
*** SALEABLE BYPRODUCTS		
NATURE	SULFURIC ACID	
FULL LOAD QUANTITY - M T/H	11.34	(12.50 TPH)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

QUALITY %
DISPOSITION 93.0
MARKETED

*** SLUDGE

** TREATMENT
METHOD N/A
DEVICE N/A
PROPRIETARY PROCESS N/A

** DISPOSAL
NATURE FINAL
TYPE POND
SITE TREATMENT CLAY LINING

** PROCESS CONTROL AND INSTRUMENTATION
CHEMICAL PARAMETERS PH, SOLIDS, SP.G., CONC.
MONITOR LOCATION GAS OUTLET, SOLUTION OUTLET
PROCESS CONTROL MANNER AUTOMATIC
PROCESS CHEMISTRY MODE FEEDBACK

** WATER BALANCE
WATER LOOP TYPE CLOSED

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS HOURS FACTOR

5/80 SYSTEM 100.0 100.0 100.0 32.3 744 240 240

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM BEGAN INITIAL AND COMMERCIAL OPERATIONS ON MAY 22, 1980.
NO MAJOR PROBLEMS WERE ENCOUNTERED FROM STARTUP THROUGH THE END OF
THE MONTH.

6/80 SYSTEM 98.9 98.9 98.9 98.9 720 720 712

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/80 SYSTEM 97.2 97.0 97.0 90.7 744 696 675

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS DOWN FOR PART OF THE MONTH IN JULY TO REPAIR A LEAK IN
THE MIST ELIMINATOR.

8/80 SYSTEM 99.9 99.9 99.9 99.9 744 744 743

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD-RELATED PROBLEMS WERE REPORTED DURING AUGUST.

9/80 SYSTEM 78.3 78.3 78.3 78.3 720 720 564

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OFF LINE DURING SEPTEMBER DUE TO NECESSARY REPAIR OF
THE CIRCULATING PUMPS AND THE MIST ELIMINATOR.

FGD SYSTEM OUTAGE TIME OCCURRED DUE TO INLET DUCT EXPANSION JOINT REPAIRS.

10/80 SYSTEM 66.1 66.1 66.1 66.1 744 744 492

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER SOME OF THE OUTAGE TIME WAS DUE TO PLUGGED SPRAY HEADERS ON THE MIST ELIMINATOR.

PROBLEMS WITH LEAKING CIRCULATING PUMPS OCCURRED IN OCTOBER.

OTHER OUTAGE TIME WAS DUE TO THE FAILURE OF ESP DISTRIBUTOR BAFFLES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
11/80	SYSTEM	93.8	96.0	96.0	93.8		720	704	676

** PROBLEMS/SOLUTIONS/COMMENTS

FAILURE OF PRESCRUBBER RECIRCULATION PUMPS CAUSED OUTAGE TIME IN NOVEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
12/80	SYSTEM	33.9	55.9	55.9	30.6		744	408	228

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER THE BOILER WAS OUT OF SERVICE DUE TO A SCHEDULED MAINTENANCE OVERHAUL FOR APPROXIMATELY 360 HOURS. START-UP OF THE FGD SYSTEM WAS DELAYED ABOUT FIVE DAYS DUE TO MATERIAL DELIVERY PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
1/81	SYSTEM	90.0	90.0	90.0	90.0		744	744	670

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
2/81	SYSTEM	86.0	84.0	84.0	76.0		672	607	512

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY OUTAGE TIME WAS DUE TO LEAKS IN THE MIST ELIMINATOR AND FAILURE OF THE PRESCRUBBER SPRAY NOZZLES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
3/81	SYSTEM	95.6	95.6	95.6	95.4		744	743	710

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
4/81	SYSTEM	74.0	83.0	83.0	74.0		720	643	531

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL SOME OUTAGE TIME WAS CAUSED BY THE REPAIRS TO THE MIST ELIMINATOR SHELL AND INTERNALS.

ADDITIONAL OUTAGE TIME WAS DUE TO THE REPLACEMENT OF THE BOOSTER BLOWER DISCHARGE DUCT EXPANSION JOINT.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
5/81	SYSTEM	98.1	98.1	98.1	98.1		744	744	730

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY REPAIRS WERE PERFORMED ON THE MIST ELIMINATOR SHELL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
6/81	SYSTEM	100.0	100.0	100.0	100.0		720	720	720

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/81	SYSTEM	99.2	99.2	99.2	99.2	744	744	738
8/81	SYSTEM	77.4	77.4	77.4	46.9	744	451	349

** PROBLEMS/SOLUTIONS/COMMENTS

EXTENSIVE REPAIRS WERE MADE TO THE VENTURI PRESCRUBBER BRICK WORK DURING A SCHEDULED AUGUST BOILER OUTAGE.

9/81	SYSTEM	95.1	95.1	95.1	95.0	720	719	684
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS DOWN FOR PART OF SEPTEMBER FOR REPAIRS TO THE PRESCRUBBER MIST ELIMINATOR.

10/81	SYSTEM	29.9	57.4	71.1	22.8	744	296	170
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** PROBLEMS/SOLUTIONS/COMMENTS

ON OCTOBER 1 THE UNIT WAS SHUTDOWN FOR AN OVERHAUL.

11/81	SYSTEM	70.1	70.1	70.1	70.1	720	720	505
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER AND NOVEMBER CONTINUAL PROBLEMS WERE ENCOUNTERED WITH THE PRESCRUBBER CIRCULATING PUMPS. THIS PROBLEM RESULTED FROM PUMP PLUGGING RELATED TO INADEQUATE SCRUBBING OF THE GAS. THIS ULTIMATELY WAS THE RESULT OF AN INSUFFICIENT NUMBER OF PUMPS.

12/81	SYSTEM	72.6	67.6	68.4	59.4	744	654	442
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** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGE TIME FOR THE BOILER DURING DECEMBER WAS DUE TO SUPERHEATER TUBE LEAKS.

CONTINUED PROBLEMS WITH THE PRESATURATOR CIRCULATING PUMPS AND PLUGGING OF THE PRESATURATOR AND ESP'S CAUSED THE SYSTEM UNAVAILABLE TIME.

1/82	SYSTEM	68.5	69.4	69.5	68.5	744	735	510
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE SYSTEM WAS OFF-LINE PART OF THE MONTH DUE TO NECESSARY CLEANING OF THE MODULES AND TO REPLACE THE PRESATURATOR NOZZLE.

2/82	SYSTEM	91.5	91.5	91.5	91.5	672	672	615
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY AND FEBRUARY LEAKS IN THE PRESATURATOR PIPING ACCOUNTED FOR SOME OF THE DOWN TIME.

PURGE LINE PLUGGING CAUSED ADDITIONAL OUTAGE TIME IN FEBRUARY.

3/82	SYSTEM	64.9	64.9	64.9	64.9	744	744	483
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DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WERE ENCOUNTERED WITH THE REGENERATING SECTION OF THE SYSTEM DURING MARCH.

4/82	SYSTEM	100.0	100.0	100.0	100.0	720	720	720
5/82	SYSTEM	92.2	92.2	92.2	92.2	744	744	686

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL AND MAY NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

6/82	SYSTEM	82.5	82.5	82.5	82.5	720	720	594
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE SYSTEM WAS SHUT DOWN PART OF THE TIME TO REPAIR THE BRICK LINING IN THE PRESATURATOR.

7/82	SYSTEM	63.8	63.8	63.8	63.8	744	744	475
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** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGE TIME OCCURRED DURING JULY DUE TO A HIGH PRESSURE DROP IN THE PRESATURATOR. THE DROP WAS CAUSED BY COKE CARRYOVER TO THE ESP SEAL POTS.

EVAPORATOR PROBLEMS ACCOUNTED FOR AN OUTAGE DURING THE MONTH.

8/82	SYSTEM	90.2	90.2	90.2	90.2	744	744	671
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** PROBLEMS/SOLUTIONS/COMMENTS

PART OF THE OUTAGE TIME DURING AUGUST WAS DUE TO LEAKS IN THE PRESATURATOR CIRCULATION PIPING.

FAILURE OF THE PRESATURATOR SPRAY NOZZLE TIP ALSO RESULTED IN DOWN TIME DURING THE MONTH.

9/82	SYSTEM	28.3	77.3	77.3	28.3	720	264	204
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN DURING PART OF SEPTEMBER FOR AN ANNUAL INSPECTION.

LEAKS IN THE PRESATURATOR RECIRCULATION PIPING CREATED DOWN TIME FOR THE FGD SYSTEM IN SEPTEMBER.

ADDITIONAL OUTAGE TIME RESULTED FROM LEAKS IN THE DUCTWORK EXPANSION JOINTS.

AN OUTAGE OCCURRED DURING SEPTEMBER FOR COKE SLAG BURN OUT.

10/82	SYSTEM	98.9	98.9	98.9	98.9	744	744	736
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING OCTOBER.

11/82	SYSTEM	97.9	97.9	97.9	97.9	720	720	705
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED BY THE UTILITY
 DURING NOVEMBER.

12/82	SYSTEM	81.6	81.6	81.6	81.6	744	744	607
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER THE UNIT WAS DOWN FOR 45 HOURS TO CLEAN PLUGGED SCREENS
 ON THE PRESATURATOR CIRCULATION PUMPS.

THE REMAINDER OF DOWN TIME DURING THE MONTH WAS DUE TO PROBLEMS WITH THE
 ACID PLANTS.

1/83	SYSTEM	89.9	74.7	74.7	74.7	744	744	556
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** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGE TIME OCCURRED DURING JANUARY DUE TO THE BALANCING OF A BOOSTER FAN.

THE CLEANING OF A SUCTION SCREEN ON THE PRESATURATOR PRODUCED ADDITIONAL
 OUTAGE TIME IN JANUARY.

THE UNIT WAS DOWN DURING JANUARY TO PERMIT REPAIR WORK ON THE ACID PLANT.

2/83	SYSTEM	97.3	69.3	69.3	69.3	672	672	466
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** PROBLEMS/SOLUTIONS/COMMENTS

REPAIR WORK ON THE ESP CAUSED AN OUTAGE DURING FEBRUARY.

THE UNIT WAS DOWN DURING FEBRUARY TO PERMIT REPAIR WORK ON THE ACID PLANT
 TAIL GAS LINE.

3/83	SYSTEM	95.6	95.6	95.6	95.6	744	744	711
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING MARCH.

4/83	SYSTEM	94.7	94.7	94.7	94.7	720	720	682
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5/83	SYSTEM	98.9	98.9	98.9	98.9	744	744	736
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING APRIL AND MAY.

6/83	SYSTEM	84.7	84.7	84.7	84.7	720	720	610
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** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS ON THE BRICK LINING IN THE PRESATURATOR CAUSED A FORCED OUTAGE
 DURING JUNE.

7/83	SYSTEM	100.0	100.0	100.0	100.0	744	744	744
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8/83	SYSTEM	96.0	96.0	100.0	96.0	744	744	714
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DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY AND AUGUST.										
9/83	SYSTEM	71.3	92.8	92.8	71.3		720	553	513	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS SHUT DOWN ON SEPTEMBER 24 FOR AN ANNUAL INSPECTION AND MAINTENANCE.										
10/83	SYSTEM	50.7	86.9	86.9	50.7		744	434	377	
** PROBLEMS/SOLUTIONS/COMMENTS										
UNIT 1 WAS OUT OF SERVICE FROM SEPTEMBER 24 TO OCTOBER 14, 1983 FOR A SCHEDULED OUTAGE. DURING THIS PERIOD AN ANNUAL BOILER INSPECTION AND FGD SYSTEM MAINTENANCE WAS CONDUCTED.										
THE FGD SYSTEM WAS DOWN DURING PART OF OCTOBER DUE TO A LACK OF SODIUM SULFITE ABSORBING SOLUTION.										
11/83	SYSTEM	94.2	94.2	94.2	94.2		720	720	678	
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING NOVEMBER.										
12/83	SYSTEM	82.8	82.8	82.8	82.8		744	744	616	
** PROBLEMS/SOLUTIONS/COMMENTS										
FGD SYSTEM OUTAGE TIME DURING DECEMBER WAS DUE IN PART TO EXTREME COLD WEATHER CONDITIONS.										
BRIEF OUTAGES OCCURRED DURING THE MONTH DUE TO MIST ELIMINATOR LEAKS.										
1/84	SYSTEM	98.9	98.9	98.9	98.9		744	744	736	
** PROBLEMS/SOLUTIONS/COMMENTS										
A LACK OF ABSORBING SOLUTION DUE TO EVAPORATOR CIRCULATING PUMP PROBLEMS AND PLUGGED EVAPORATOR SOLUTION HEADERS LIMITED THE BURNING OF HIGH SULFUR COKE DURING JANUARY.										
2/84	SYSTEM	84.5	84.5	84.5	84.5		696	696	588	
** PROBLEMS/SOLUTIONS/COMMENTS										
PRESATURATOR CLEANING CONTRIBUTED TO OUTAGE TIME DURING FEBRUARY.										
THE UTILITY REPORTED REPLACING FALLEN ACID BRICK DURING FEBRUARY.										
MIST ELIMINATOR REPAIRS ACCOUNTED FOR ADDITIONAL DOWN TIME DURING THE MONTH.										
PRESATURATOR RECIRCULATING PROBLEMS WERE REPORTED DURING FEBRUARY.										
3/84	SYSTEM	98.4	98.4	98.4	98.4		744	744	732	
4/84	SYSTEM	99.6	99.6	99.6	99.6		720	720	717	
5/84	SYSTEM	97.2	97.2	97.2	97.2		744	744	723	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING MARCH THROUGH MAY.

6/84	SYSTEM							720		
7/84	SYSTEM							744		
8/84	SYSTEM							744		
9/84	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JUNE THROUGH SEPTEMBER 1984.

SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DELMARVA POWER & LIGHT
PLANT NAME	DELAWARE CITY
UNIT NUMBER	2
CITY	DELAWARE CITY
STATE	DELAWARE
REGULATORY CLASSIFICATION	E
PARTICULATE EMISSION LIMITATION - NG/J	129. (.300 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	180
GROSS UNIT GENERATING CAPACITY - MW	60
NET UNIT GENERATING CAPACITY W/FGD - MW	495
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	60
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	RILEY STOKER
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	139.21 (295000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	215.6 (420 F)
STACK HEIGHT - M	152. (500 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	6.1 (20.0 FT)
** FUEL DATA	
FUEL TYPE	COKE
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	32564. (14000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	13500-14500
AVERAGE ASH CONTENT - %	.50
RANGE ASH CONTENT - %	0.3-0.7
AVERAGE MOISTURE CONTENT - %	.70
RANGE MOISTURE CONTENT - %	0.5-1.2
AVERAGE SULFUR CONTENT - %	7.00
RANGE SULFUR CONTENT - %	5.0-8.0
AVERAGE CHLORIDE CONTENT - %	*****
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	3
TYPE	TUBULAR
SUPPLIER	PRAT-DANIEL
PARTICLE REMOVAL EFFICENCY -%	92.0
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
TYPICAL GAS/CLOTH RATIO - M/MIN	.6 (2.0 FT/MIN)
** ESP	
NUMBER	3
TYPE	COLD SIDE
SUPPLIER	WESTERN PREC. DIVISION, JOY
INLET FLUE GAS CAPACITY - CU.M/S	34.8 (73700 ACFM)
INLET FLUE GAS TEMPERATURE - C	54.4 (130 F)
PRESSURE DROP - KPA	.2 (1. IN-H2O)
PARTICLE REMOVAL EFFICENCY - %	95.0
** PARTICLE SCRUBBER	
NUMBER	3
INITIAL START-UP DATE	4/80
GENERIC TYPE	VENTURI TOWER
SPECIFIC TYPE	VARIABLE-THROAT/BOTTOM-ENTRY PLUMB BOB
TRADE NAME/COMMON NAME	N/A
SUPPLIER	AIRPOL
DIMENSIONS - FT	20 DIA X 70.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
LINER GENERIC MATERIAL	ORGANIC; INORGANIC
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER; PREFIRED BRICK/SHA
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	1
LIQUID RECIRCULATION RATE - LITER/S	315.0 (5000 GPM)
L/G RATIO - LITER/CU.M	6.8 (50.9 GAL/1000ACF)
PRESSURE DROP - KPA	.5 (2.0 IN-H2O)
INLET GAS FLOW RATE - CU.M/S	46.4 (98300 ACFM)
INLET GAS TEMPERATURE - C	221.1 (430 F)
SO2 REMOVAL EFFICIENCY - %	.0
PARTICLE REMOVAL EFFICIENCY - %	81.5

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	SALEABLE PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	WELLMAN LORD
SYSTEM SUPPLIER	DAVY MCKEE
A-E FIRM	DAVY MCKEE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	90.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
CURRENT STATUS	1
COMMERCIAL START-UP	5/80
INITIAL START-UP	5/80
CONTRACT AWARDED	9/77

** DESIGN AND OPERATING PARAMETERS

SPACE REQUIREMENTS - SQ M	24280.3 (261360 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	144.0

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	3
NUMBER OF SPARES	0
GENERIC TYPE	TRAY TOWER
SPECIFIC TYPE	VALVE TRAY
TRADE NAME/COMMON TYPE	BUBBLE CAP TRAY TOWER
SUPPLIER	DAVY MCKEE
DIMENSIONS - FT	20.0 X 20.0
SHELL GENERIC MATERIAL	INORGANIC
SHELL SPECIFIC MATERIAL	HYDRAULICALLY-BONDED CONCRETE
SHELL MATERIAL TRADE NAME/COMMON TYPE	PORTLAND CEMENT
LINER GENERIC MATERIAL	INORGANIC
LINER SPECIFIC MATERIAL	PREFIRED BRICK/SHAPES
LINER MATERIAL TRADE NAME/COMMON TYPE	NR
GAS CONTACTING DEVICE TYPE	VALVE TRAY
NUMBER OF CONTACTING ZONES	4
LIQUID RECIRCULATION RATE LITER/S	25. (400 GPM)
L/G RATIO - L/CU.M	.7 (5.5 GAL/1000 ACF)
INLET GAS FLOW - CU. M/S	34.59 (73300 ACFM)
INLET GAS TEMPERATURE - C	54.4 (130 F)
PARTICLE REMOVAL EFFICIENCY - %	.0

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	3
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	1
FREEBOARD DISTANCE - M	1.83 (6.0 FT)

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

DISTANCE BETWEEN STAGES - CM	19.05	(7.5 IN)
PRESSURE DROP - KPA	.1	(.3 IN-H ₂ O)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	COOLED CONDENSATE	
WASH FREQUENCY	INTERMITTENT	
WASH RATE - L/S	3.2	(50 GAL/MIN)
** REHEATER		
NUMBER	3	
GENERIC TYPE	DIRECT COMBUSTION	
SPECIFIC TYPE	EXTERNAL COMBUSTION CHAMBER	
TRADE NAME/COMMON TYPE	NATURAL GAS	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	108.54	(230000 ACFM)
INLET FLUE GAS TEMPERATURE - C	54.4	(130 F)
OUTLET FLUE GAS TEMPERATURE - C	85.0	(185 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	3	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	ROBINSON	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE CU.M/S	139.21	(295000 ACFM)
FLUE GAS TEMPERATURE - C	215.6	(420 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
DIMENSIONS	8.0 X 8.0	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	FIBER-REINFORCED POLYESTER	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	MIX TANK	
DEVICE	N/A	
DEVICE TYPE	AGITATED TANK	
** TANKS		
SERVICE	NUMBER	
-----	-----	
NR	****	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECIRCULATION	****	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE	NONE	
*** SALEABLE BYPRODUCTS		
NATURE	SULFURIC ACID	
FULL LOAD QUANTITY - M T/H	11.34	(12.50 TPH)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

QUALITY - %
DISPOSITION

93.0
MARKETED

*** SLUDGE

** TREATMENT
METHOD
DEVICE
PROPRIETARY PROCESS

N/A
N/A
N/A

** DISPOSAL
NATURE
TYPE
SITE TREATMENT

FINAL
POND
CLAY LINING

** PROCESS CONTROL AND INSTRUMENTATION
CHEMICAL PARAMETERS
MONITOR LOCATION
PROCESS CONTROL MANNER
PROCESS CHEMISTRY MODE

PH, SOLIDS, SP.G., CONC.
GAS OUTLET, SOLUTION OUTLET
AUTOMATIC
FEEDBACK

** WATER BALANCE
WATER LOOP TYPE

CLOSED

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS FACTOR

5/80 SYSTEM 100.0 100.0 100.0 32.3 744 240 240

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM BEGAN INITIAL AND COMMERCIAL OPERATIONS ON MAY 22, 1980.
NO MAJOR PROBLEMS WERE ENCOUNTERED DURING STARTUP OR THROUGH THE REST OF
THE MONTH.

6/80 SYSTEM 80.4 80.4 80.4 80.4 720 720 579

** PROBLEMS/SOLUTIONS/COMMENTS

THE CHEVRON PACKING IN THE MIST ELIMINATOR FAILED CAUSING SOME FGD SYSTEM
OUTAGE TIME DURING JUNE.

FAILURE OF THE CIRCULATION PUMPS ALSO CAUSED OUTAGE TIME DURING THE MONTH.

7/80 SYSTEM 50.1 50.1 50.1 50.1 744 744 373

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS DOWN FOR PART OF THE MONTH TO REPAIR A LEAK IN THE MIST
ELIMINATOR. IT WAS ALSO DOWN TO REBUILD THE CHEVRON PACKING.

8/80 SYSTEM 92.9 92.9 92.9 92.9 744 744 691

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS WERE MADE TO THE ESP DURING AUGUST.

9/80 SYSTEM 78.2 78.2 78.2 78.2 720 720 563

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OFF LINE DURING SEPTEMBER DUE TO NECESSARY REPAIR OF
THE CIRCULATING PUMPS AND THE MIST ELIMINATOR.

FGD SYSTEM OUTAGE TIME OCCURRED DUE TO INLET DUCT EXPANSION JOINT REPAIRS.

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/80	SYSTEM	60.0	60.0	60.0	60.0		744	743	445	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING OCTOBER THE MAJORITY OF DOWN TIME WAS DUE TO THE ACID PLANT BEING DOWN. IT WAS UNABLE TO PROCESS SO2 FROM THE WELLMAN LORD SOLUTION REGENERATION SECTION.										
11/80	SYSTEM	98.3	98.3	98.3	98.3		720	720	708	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING NOVEMBER OUTAGE TIME WAS REQUIRED TO REPAIR LEAKS IN THE PRE-SCRUBBER.										
12/80	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED NO FGD-RELATED PROBLEMS DURING THE MONTH OF DECEMBER.										
1/81	SYSTEM	93.0	93.0	93.0	93.0		744	744	692	
2/81	SYSTEM	96.0	96.0	96.0	96.0		672	672	648	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JANUARY AND FEBRUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.										
3/81	SYSTEM	57.5	89.0	89.0	57.5		744	481	428	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MARCH THE BOILER WAS OUT OF SERVICE FOR PART OF THE MONTH DUE TO AN OVERHAUL.										
REPAIRS TO A LEAK IN THE MIST ELIMINATOR CAUSED SOME OUTAGE TIME.										
4/81	SYSTEM	64.0	84.0	84.0	64.0		720	553	464	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WAS OUT OF SERVICE APPROXIMATELY 167 HOURS DURING APRIL DUE TO A SCHEDULED MAINTENANCE OUTAGE.										
THE FGD SYSTEM WAS UNAVAILABLE APPROXIMATELY 256 HOURS DUE TO THE REPLACEMENT OF THE PRESATURATOR MIST ELIMINATOR INTERNALS AND THE BRICK LINING.										
5/81	SYSTEM	97.5	97.5	97.5	97.5		744	744	726	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MAY REPAIRS WERE PERFORMED ON THE BOOSTER BLOWER INSPECTION DOOR.										
6/81	SYSTEM	75.8	75.8	75.8	75.8		720	720	546	
** PROBLEMS/SOLUTIONS/COMMENTS										
ON JUNE 23 THE SYSTEM WAS SHUT DOWN DUE TO A HIGH PRESSURE DROP. ON INSPECTION, IT WAS DISCOVERED THAT THE PRESATURATOR NOZZLE HAD FAILED, THERE WAS A CONSIDERABLE COKE BUILDUP IN THE PRESATURATOR MIST ELIMINATOR BOX, THE MIST ELIMINATOR CHEVRONS HAD FAILED, THERE WAS A LARGE COKE BUILDUP IN THE										

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

ESP INLET SEAL POT AND A HIGH SOLIDS BUILDUP IN THE BOTTOM OF THE SO2 ABSORBER. REPAIRS CONSISTED OF REPLACING THE PRESATURATOR NOZZLE TIP AND CLEANING THE BUILDUP.										
7/81	SYSTEM	76.9	76.9	76.9	76.9		744	744	572	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JULY, THE ACID BRICK LINING ON THE INLET TO THE PRESCRUBBER FAILED. IN ADDITION, PROBLEMS WERE ENCOUNTERED WITH THE PRESCRUBBER NOZZLE TIP.										
8/81	SYSTEM	97.8	97.8	97.8	97.8		744	744	728	
9/81	SYSTEM	99.2	96.3	96.3	86.7		720	648	624	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING SEPTEMBER, THE BOILER WAS OFF LINE FOR 72 HOURS TO REPAIR A SUPER-HEATER TUBE LEAK.										
10/81	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	
11/81	SYSTEM	89.2	89.2	89.2	89.2		720	720	642	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING NOVEMBER THE FGD SYSTEM WAS DOWN 62 HOURS TO CLEAN THE ESP SEAL POT AND TO REPLACE THE TIP OF A PRESATURATOR SPRAY NOZZLE.										
12/81	SYSTEM	98.9	98.9	98.9	98.9		744	744	736	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER.										
1/82	SYSTEM	78.5	78.5	78.5	78.5		744	744	584	
** PROBLEMS/SOLUTIONS/COMMENTS										
SOME OF THE OUTAGE TIME IN JANUARY WAS DUE TO A STEAM SHORTAGE.										
2/82	SYSTEM	79.7	79.7	79.7	79.7		672	672	536	
** PROBLEMS/SOLUTIONS/COMMENTS										
SOME OF THE OUTAGE TIME IN JANUARY AND FEBRUARY WAS DUE TO THE REPLACEMENT OF A BOOSTER BLOWER BEARING.										
THE SYSTEM WAS OFF-LINE PART OF THE MONTH TO REPAIR A PRESATURATOR CIRCULATING PUMP.										
OUTAGE TIME WAS NECESSARY TO UNPLUG THE PURGE LINE IN FEBRUARY.										
3/82	SYSTEM	46.4	75.3	75.3	46.4		744	458	345	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MARCH THE BOILER WAS OFF-LINE PART OF THE TIME FOR THE ANNUAL OVER-HAUL.										
THE SYSTEM WAS UNAVAILABLE PART OF THE MONTH DUE TO PROBLEMS WITH THE SCRUBBING SOLUTION SECTION.										
4/82	SYSTEM	69.7	97.8	97.8	69.7		720	513	502	

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OFF-LINE DURING APRIL DUE TO THE ANNUAL OVERHAUL WHICH
 STARTED IN MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
5/82	SYSTEM	96.0	96.0	96.0	96.0		744	744	714

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
6/82	SYSTEM	96.6	96.6	96.6	96.6		720	720	696

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE EXPERIENCED
 DURING JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
7/82	SYSTEM	89.9	89.9	89.9	89.9		744	744	669

** PROBLEMS/SOLUTIONS/COMMENTS

A LACK OF SOLUTION DUE TO EVAPORATOR PROBLEMS ACCOUNTED FOR OUTAGE TIME
 DURING JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
8/82	SYSTEM	94.2	95.0	95.0	94.2		744	738	701

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED BY THE UTILITY
 DURING AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
9/82	SYSTEM	93.9	93.9	93.9	93.9		720	720	676

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING SEPTEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
10/82	SYSTEM	98.4	98.4	98.4	98.4		744	744	732

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
11/82	SYSTEM	97.2	97.2	97.2	97.2		720	720	700

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
12/82	SYSTEM	97.7	97.7	97.7	97.7		744	744	727

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING THE OCTOBER - DECEMBER PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
1/83	SYSTEM	98.7	98.7	98.7	98.7		744	744	734

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING JANUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
2/83	SYSTEM	97.5	97.5	97.5	97.5		672	672	655

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED BY THE UTILITY
 DURING FEBRUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/83	SYSTEM	32.0	88.8	88.8	32.0		744	268	238	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN FROM MARCH 12 TO MARCH 31 FOR AN ANNUAL OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/83	SYSTEM	96.8	96.8	96.8	96.8		720	720	697	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/83	SYSTEM	91.7	91.7	91.7	91.7		744	744	682	

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS TO THE ESP CAUSED A FORCED OUTAGE DURING MAY.

BOOSTER FAN REPAIRS ALSO CAUSED DOWN TIME DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/83	SYSTEM	81.0	81.0	81.0	81.0		720	720	583	

** PROBLEMS/SOLUTIONS/COMMENTS

DOWN TIME OCCURRED DURING JUNE DUE TO REPAIRS ON A BOOSTER FAN.

REPAIRS ON A PRESATURATOR SPRAY NOZZLE ALSO FORCED THE SYSTEM OUT OF SER-
 VICE DURING PART OF JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/83	SYSTEM	86.6	86.6	86.6	86.6		744	744	644	

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 2 WAS DOWN DURING PART OF JULY TO REMOVE A SOLIDS BUILD UP IN THE PRE-
 SCRUBBER AND PRESCRUBBER INLET DUCT. SOME PRESCRUBBER SPRAY NOZZLES WERE
 REPLACED DURING THIS PERIOD.

BOOSTER FAN REPAIRS WERE MADE AT UNIT 2 DURING JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/83	SYSTEM	98.0	98.0	100.0	98.0		744	744	729	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/83	SYSTEM	81.8	81.8	81.8	81.8		720	720	589	

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 2 WAS DOWN DURING PART OF SEPTEMBER TO REPAIR BRICKWORK AT THE INLET
 TO THE PRESCRUBBER AND TO CLEAN THE PRESCRUBBER.

THE UNIT WAS DOWN DURING PART OF THE MONTH TO CLEAN THE ESP INLET SEAL
 POTS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/83	SYSTEM	98.7	98.7	98.7	98.7		744	744	734	

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING OCTOBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/83	SYSTEM	82.2	82.2	82.2	82.2		720	720	592	

** PROBLEMS/SOLUTIONS/COMMENTS

PRESCRUBBER SPRAY NOZZLES WERE REPLACED DURING NOVEMBER.

MIST ELIMINATOR LEAKS WERE REPAIRED DURING NOVEMBER.

THE PRESCRUBBER WAS CLEANED DURING THE MONTH CONTRIBUTING TO FGD SYSTEM DOWN TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/83	SYSTEM	92.2	92.2	92.2	92.2		744	744	686	

** PROBLEMS/SOLUTIONS/COMMENTS

MIST ELIMINATOR LEAKS RESULTED IN FGD SYSTEM OUTAGES DURING THE MONTH.

LEAKS IN THE PRESCRUBBER CIRCULATION PIPING ALSO CONTRIBUTED TO DOWN TIME DURING DECEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/84	SYSTEM	81.7	81.7	81.7	81.7		744	744	608	

** PROBLEMS/SOLUTIONS/COMMENTS

A LACK OF ABSORBING SOLUTION DUE TO EVAPORATOR CIRCULATING PUMP PROBLEMS AND PLUGGED EVAPORATOR SOLUTION HEADERS LIMITED THE BURNING OF HIGH SULFUR COKE DURING JANUARY.

THE UTILITY REPORTED THAT BOOSTER FAN REPAIRS WERE MADE DURING JANUARY.

THE REPAIR OF BROKEN WIRES IN THE ESP'S RESULTED IN OUTAGE TIME DURING THE MONTH.

THE FAILURE OF PRESATURATOR CIRCULATING PUMPS ACCOUNTED FOR ADDITIONAL DOWN TIME DURING JANUARY.

THE REMOVAL OF COKE BUILD UP IN THE ESP'S CONTRIBUTED TO FGD SYSTEM DOWN TIME DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/84	SYSTEM	93.8	93.8	93.8	93.8		696	696	653	

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/84	SYSTEM	96.4	96.4	96.4	96.4		744	744	717	

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/84	SYSTEM	98.2	98.2	98.2	98.2		720	720	707	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING FEBRUARY THROUGH APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/84	SYSTEM	23.1	53.1	56.1	21.0		744	294	156	

** PROBLEMS/SOLUTIONS/COMMENTS

THE ABSORBER WAS DOWN FOR MAINTENANCE DURING THE ANNUAL BOILER OUTAGE IN MAY.

PROBLEMS WITH PLUGGING OF THE PRESATURATOR WERE REPORTED DURING MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/84	SYSTEM						720			

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/84	SYSTEM						744			
8/84	SYSTEM						744			
9/84	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JUNE THROUGH SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DELMARVA POWER & LIGHT
PLANT NAME	DELAWARE CITY
UNIT NUMBER	3
CITY	DELAWARE CITY
STATE	DELAWARE
REGULATORY CLASSIFICATION	E
PARTICULATE EMISSION LIMITATION - NG/J	129. (.300 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	180
GROSS UNIT GENERATING CAPACITY - MW	60
NET UNIT GENERATING CAPACITY W/FGD - MW	495
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	60
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	RILEY STOKER
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	139.21 (295000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	215.6 (420 F)
STACK HEIGHT - M	152. (500 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	6.1 (20.0 FT)
** FUEL DATA	
FUEL TYPE	COKE
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	32564. (14000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	13500-14500
AVERAGE ASH CONTENT - %	.50
RANGE ASH CONTENT - %	0.3-0.7
AVERAGE MOISTURE CONTENT - %	.70
RANGE MOISTURE CONTENT - %	0.5-1.2
AVERAGE SULFUR CONTENT - %	7.00
RANGE SULFUR CONTENT - %	5.0-8.0
AVERAGE CHLORIDE CONTENT - %	*****
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	3
TYPE	TUBULAR
SUPPLIER	PRAT-DANIEL
PARTICLE REMOVAL EFFICIENCY - %	92.0
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
TYPICAL GAS/CLOTH RATIO - M/MIN	.6 (2.0 FT/MIN)
** ESP	
NUMBER	3
TYPE	COLD SIDE
SUPPLIER	WESTERN PREC. DIVISION, JOY
INLET FLUE GAS CAPACITY - CU.M/S	34.8 (73700 ACFM)
INLET FLUE GAS TEMPERATURE - C	54.4 (130 F)
PRESSURE DROP - KPA	.2 (1. IN-H ₂ O)
PARTICLE REMOVAL EFFICIENCY - %	95.0
** PARTICLE SCRUBBER	
NUMBER	3
INITIAL START-UP DATE	4/80
GENERIC TYPE	VENTURI TOWER
SPECIFIC TYPE	VARIABLE-THROAT/BOTTOM-ENTRY PLUMB BOB
TRADE NAME/COMMON NAME	N/A
SUPPLIER	AIRPOL
DIMENSIONS FT	20 DIA X 70.0

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
LINER GENERIC MATERIAL	ORGANIC; INORGANIC
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER; PREFIRED BRICK/SHA
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	1
LIQUID RECIRCULATION RATE - LITER/S	315.0 (5000 GPM)
L/G RATIO - LITER/CU.M	6.8 (50.9 GAL/1000ACF)
PRESSURE DROP - KPA	.5 (2.0 IN-H2O)
INLET GAS FLOW RATE - CU.M/S	46.4 (98300 ACFM)
INLET GAS TEMPERATURE - C	221.1 (430 F)
SO2 REMOVAL EFFICIENCY - %	.0
PARTICLE REMOVAL EFFICIENCY - %	81.5

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	SALEABLE PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	WELLMAN LORD
SYSTEM SUPPLIER	DAVY MCKEE
A-E FIRM	DAVY MCKEE
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	90.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
CURRENT STATUS	1
COMMERCIAL START-UP	5/80
INITIAL START-UP	5/80
CONTRACT AWARDED	9/77

** DESIGN AND OPERATING PARAMETERS

SPACE REQUIREMENTS - SQ M	24280.3 (261360 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	144.0

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	3
NUMBER OF SPARES	0
GENERIC TYPE	TRAY TOWER
SPECIFIC TYPE	VALVE TRAY
TRADE NAME/COMMON TYPE	BUBBLE CAP TRAY TOWER
SUPPLIER	DAVY MCKEE
DIMENSIONS - FT	20.0 X 20.0
SHELL GENERIC MATERIAL	INORGANIC
SHELL SPECIFIC MATERIAL	HYDRAULICALLY-BONDED CONCRETE
SHELL MATERIAL TRADE NAME/COMMON TYPE	PORTLAND CEMENT
LINER GENERIC MATERIAL	INORGANIC
LINER SPECIFIC MATERIAL	PREFIRED BRICK/SHAPES
LINER MATERIAL TRADE NAME/COMMON TYPE	NR
GAS CONTACTING DEVICE TYPE	VALVE TRAY
NUMBER OF CONTACTING ZONES	4
LIQUID RECIRCULATION RATE - LITER/S	25. (400 GPM)
L/G RATIO L/CU.M	.7 (5.5 GAL/1000 ACF)
INLET GAS FLOW - CU. M/S	34.59 (73300 ACFM)
INLET GAS TEMPERATURE - C	54.4 (130 F)
PARTICLE REMOVAL EFFICIENCY - %	.0

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	3
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	1
FREEBOARD DISTANCE - M	1.83 (6.0 FT)

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

DISTANCE BETWEEN STAGES - CM	19.05	(7.5 IN)
PRESSURE DROP - KPA	.1	(.3 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	COOLED CONDENSATE	
WASH FREQUENCY	INTERMITTENT	
WASH RATE - L/S	3.2	(50 GAL/MIN)
** REHEATER		
NUMBER	3	
GENERIC TYPE	DIRECT COMBUSTION	
SPECIFIC TYPE	EXTERNAL COMBUSTION CHAMBER	
TRADE NAME/COMMON TYPE	NATURAL GAS	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	108.54	(230000 ACFM)
INLET FLUE GAS TEMPERATURE - C	54.4	(130 F)
OUTLET FLUE GAS TEMPERATURE - C	85.0	(185 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	3	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	ROBINSON	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	139.21	(295000 ACFM)
FLUE GAS TEMPERATURE - C	215.6	(420 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
DIMENSIONS	8.0 X 8.0	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	FIBER-REINFORCED POLYESTER	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	MIX TANK	
DEVICE	N/A	
DEVICE TYPE	AGITATED TANK	
** TANKS		
SERVICE	NUMBER	
-----	-----	
NR	****	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECIRCULATION	****	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE	NONE	
*** SALEABLE BYPRODUCTS		
NATURE	SULFURIC ACID	
FULL LOAD QUANTITY - M T/H	11.34	(12.50 TPH)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

QUALITY - %
DISPOSITION 93.0
MARKETED

*** SLUDGE

** TREATMENT
METHOD N/A
DEVICE N/A
PROPRIETARY PROCESS N/A

** DISPOSAL
NATURE FINAL
TYPE POND
SITE TREATMENT CLAY LINING

** PROCESS CONTROL AND INSTRUMENTATION
CHEMICAL PARAMETERS PH, SOLIDS, SP.G., CONC.
MONITOR LOCATION GAS OUTLET, SOLUTION OUTLET
PROCESS CONTROL MANNER AUTOMATIC
PROCESS CHEMISTRY MODE FEEDBACK

** WATER BALANCE
WATER LOOP TYPE CLOSED

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS FACTOR

5/80 SYSTEM 100.0 100.0 100.0 32.3 744 240 240

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM BEGAN INITIAL AND COMMERCIAL OPERATIONS ON MAY 22, 1980.
NO MAJOR PROBLEMS WERE ENCOUNTERED DURING STARTUP OR THROUGH THE REST OF
THE MONTH.

6/80 SYSTEM 86.4 86.4 86.4 86.4 720 720 622

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS WERE MADE TO A LEAK AND DAMAGED CHEVRON PACKING IN THE MIST ELIM-
INATOR DURING JUNE.

7/80 SYSTEM 95.3 95.3 95.3 95.3 744 744 709

** PROBLEMS/SOLUTIONS/COMMENTS

SOME FGD SYSTEM OUTAGE TIME DURING THE MONTH WAS CAUSED BY LEAKS IN THE
MIST ELIMINATOR THAT NEEDED REPAIR.

AN ELECTRICAL FAILURE IN THE SHUTDOWN INSTRUMENTATION CAUSED THE FGD SYSTEM
TO BE OUT OF SERVICE PART OF THE MONTH.

8/80 SYSTEM 73.3 73.3 73.3 73.3 744 744 545

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OUT OF SERVICE FOR PART OF THE MONTH TO REPAIR THE
PRESCRUBBER MIST ELIMINATOR.

9/80 SYSTEM 46.4 46.4 46.4 46.4 720 720 334

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM OUTAGE TIME OCCURRED DUE TO THE NECESSARY REPAIR OF THE INLET EXPANSION JOINTS DURING SEPTEMBER.

PROBLEMS WERE ENCOUNTERED WITH THE PRE-MIST ELIMINATOR CAUSING ADDITIONAL OUTAGE TIME.

ADDITIONAL OUTAGE TIME WAS NECESSARY TO MAKE REPAIRS TO THE BOOSTER BLOWER ROTOR.

10/80	SYSTEM	44.2	44.2	44.2	44.2		744	744	329
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER SOME OF THE OUTAGE TIME WAS DUE TO REPAIRS OF THE BOOSTER BLOWER ROTOR.

REPAIR WORK ON THE DUCT EXPANSION JOINTS ALSO CAUSED SOME OUTAGE TIME DURING THE MONTH.

DURING OCTOBER PROBLEMS WERE ENCOUNTERED WITH THE MIST ELIMINATORS.

11/80	SYSTEM	.0	.0	.0	.0		720	279	0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE FOR APPROXIMATELY 465 HOURS FOR AN ANNUAL SCHEDULED MAINTENANCE OVERHAUL DURING NOVEMBER. START-UP OF THE FGD SYSTEM WAS DELAYED DUE TO THE LATE DELIVERY OF PIECES OF THE MIST ELIMINATOR INTERNALS.

12/80	SYSTEM	82.4	79.2	79.2	79.2		744	744	589
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** PROBLEMS/SOLUTIONS/COMMENTS

APPROXIMATELY 107 HOURS OF OUTAGE TIME IN DECEMBER WERE DUE TO LEAKS IN THE PRESATURATOR CIRCULATING PIPING.

1/81	SYSTEM	64.0	64.0	64.0	64.0		744	744	479
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY PROBLEMS WERE ENCOUNTERED WITH LEAKS IN THE RECIRCULATION PIPES AND THE MIST ELIMINATOR CAUSING OUTAGE TIME.

2/81	SYSTEM	88.0	88.0	88.0	88.0		672	672	590
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** PROBLEMS/SOLUTIONS/COMMENTS

FAILURE OF THE RECIRCULATION PUMPS CAUSED SOME OUTAGE TIME DURING FEBRUARY.

LEAKS IN THE RECIRCULATION PIPES CAUSED ADDITIONAL OUTAGE TIME DURING THE MONTH.

3/81	SYSTEM	83.3	83.3	83.3	83.3		744	744	620
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH DOWNTIME WAS EXPERIENCED DUE TO CONTINUING REPAIRS TO THE RECIRCULATION PIPES.

ADDITIONAL OUTAGE TIME WAS DUE TO THE REPAIRS TO THE MIST ELIMINATOR.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/81	SYSTEM	93.0	93.0	93.0	93.0		720	720	669	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING APRIL SOME OUTAGE TIME WAS DUE TO REPAIRS ON A HOLE IN THE ESP CELL.										
ADDITIONAL OUTAGE TIME WAS DUE TO THE REPLACEMENT OF A PRESATURATOR SPRAY NOZZLE.										
5/81	SYSTEM	76.1	76.1	76.1	76.1		744	744	566	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MAY THE PRESATURATOR SHELL MATERIAL FAILED AND AN OUTAGE WAS NECESSARY TO REPAIR THE HOLE.										
THE PRESATURATOR SPRAY NOZZLE FAILED ACCOUNTING FOR ADDITIONAL OUTAGE TIME.										
6/81	SYSTEM	100.0	100.0	100.0	100.0		720	720	720	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO PROBLEMS WERE ENCOUNTERED DURING JUNE.										
7/81	SYSTEM	98.9	98.9	98.9	98.9		744	744	736	
8/81	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	
9/81	SYSTEM	89.9	90.0	90.0	89.9		720	719	647	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE FGD SYSTEM WAS OFF LINE FOR PART OF SEPTEMBER TO REPAIR THE ABSORBER MIST ELIMINATOR.										
10/81	SYSTEM	78.2	86.3	86.4	78.2		744	674	582	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING OCTOBER SOME OUTAGE TIME WAS REQUIRED FOR MIST ELIMINATOR REPAIR. THE MIST ELIMINATOR WAS DAMAGED BY HEAT FROM THE REHEATER DURING AN ELECTRICAL SHUTDOWN IN SEPTEMBER.										
CARRYOVER INTO THE OVERHEAD DUCT CAUSED A SYSTEM SHUTDOWN FOR CLEANING.										
THE UNIT WAS SHUTDOWN ON OCTOBER 27 FOR AN OVERHAUL.										
11/81	SYSTEM	42.2	88.9	88.9	42.2		720	342	304	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT OVERHAUL CONTINUED INTO NOVEMBER. FOLLOWING STARTUP IT WAS NECESSARY TO TAKE TWO SHORT SHUTDOWNS TO UNPLUG A WATER LINE.										
12/81	SYSTEM	95.3	95.3	95.3	95.3		744	744	709	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING DECEMBER NO MAJOR PROBLEMS WERE ENCOUNTERED WITH EITHER THE BOILER OR THE FGD SYSTEM.										
1/82	SYSTEM	84.8	84.8	84.8	84.8		744	744	631	

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY SOME OUTAGE TIME WAS DUE TO A STEAM SHORTAGE.

THE ESP DRAIN LINES WERE CLEANED DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
2/82	SYSTEM	97.2	97.2	97.2	97.2		672	672	653

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE PURGE LINE WAS REPAIRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
3/82	SYSTEM	56.8	56.8	56.8	56.8		744	744	423

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH PROBLEMS WITH THE SOLUTION REGENERATION SECTION HINDERED THE FGD SYSTEM OPERATION PART OF THE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
4/82	SYSTEM	78.9	78.9	78.9	78.9		720	720	568

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE SYSTEM WAS SHUT DOWN FOR 152 HOURS TO BALANCE THE BOOSTER BLOWER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
5/82	SYSTEM	96.4	96.4	96.4	96.4		744	744	717

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE FGD SYSTEM OPERATED WITH NO MAJOR PROBLEMS BEING ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
6/82	SYSTEM	99.4	99.4	99.4	99.4		720	720	716

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE EXPERIENCED DURING JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
7/82	SYSTEM	90.7	90.7	90.7	90.7		744	744	675

** PROBLEMS/SOLUTIONS/COMMENTS

A LACK OF SOLUTION DUE TO EVAPORATOR PROBLEMS ACCOUNTED FOR OUTAGE TIME DURING JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
8/82	SYSTEM	100.0	100.0	100.0	100.0		744	744	744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
9/82	SYSTEM	65.7	65.7	65.7	65.7		720	720	473

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH BOOSTER FAN VIBRATIONS RESULTED IN OUTAGE TIME DURING SEPTEMBER.

A PLUGGAGE PROBLEM IN THE ESP SEAL POTS ALSO CONTRIBUTED TO OUTAGE TIME DURING THE MONTH.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

ADDITIONAL OUTAGE TIME WAS ATTRIBUTED TO LEAKS IN THE PRESATURATOR CIRCULATION PIPING.										
10/82	SYSTEM	44.6	92.0	92.0	44.6		744	361	332	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING OCTOBER THE UNIT WAS DOWN FOR AN ANNUAL INSPECTION.										
11/82	SYSTEM	78.9	97.9	97.9	78.9		720	580	568	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING NOVEMBER THE UNIT WAS DOWN FOR AN ANNUAL INSPECTION.										
12/82	SYSTEM	98.7	98.7	98.7	98.7		744	744	734	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER.										
1/83	SYSTEM	93.4	93.0	93.0	88.0		744	704	655	
** PROBLEMS/SOLUTIONS/COMMENTS										
AN OUTAGE OCCURRED DURING THE MONTH DUE TO THE CLEANING OF THE PRESATURATOR SUCTION SCREENS.										
THE REPAIR OF A CRACKED NOZZLE ON THE PRESATURATOR CAUSED ADDITIONAL DOWN TIME DURING JANUARY.										
2/83	SYSTEM	100.0	100.0	100.0	100.0		672	672	672	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING FEBRUARY.										
3/83	SYSTEM	94.8	94.8	94.8	94.8		744	744	705	
** PROBLEMS/SOLUTIONS/COMMENTS										
AN OUTAGE OCCURRED DURING MARCH DUE TO THE CLEANING OF A PRESATURATOR CIRCULATION PUMP SUCTION SCREEN.										
THE REPAIR OF BROKEN WIRE IN AN ESP ALSO RESULTED IN DOWN TIME DURING MARCH.										
4/83	SYSTEM	99.3	99.3	99.3	99.3		720	720	715	
5/83	SYSTEM	99.3	99.3	99.3	99.3		744	744	739	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING APRIL AND MAY.										
6/83	SYSTEM	100.0	100.0	100.0	100.0		720	720	720	

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/83	SYSTEM	92.5	92.5	92.5	92.5		744	744	688	

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 3 WAS DOWN DURING PART OF JULY FOR ESP REPAIRS.

THE UNIT WAS DOWN DURING THE MONTH FOR REMOVAL OF SOLIDS BUILD UP IN THE PRESCRUBBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/83	SYSTEM	93.0	93.0	100.0	93.0		744	744	692	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/83	SYSTEM	86.3	86.3	86.3	86.3		720	720	621	

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 3 WAS DOWN DURING PART OF SEPTEMBER TO REPAIR LEAKS ON THE PRESCRUBBER SPRAY NOZZLE FLANGE. IN ADDITION, A CERAMIC SPRAY NOZZLE TIP FAILED TWICE DURING THIS PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/83	SYSTEM	100.0	97.4	97.4	84.1		744	643	626	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING OCTOBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/83	SYSTEM	58.6	89.4	89.4	53.8		720	433	387	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT AN ANNUAL BOILER OUTAGE TOOK PLACE DURING NOVEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/83	SYSTEM	58.7	78.7	78.7	58.7		744	555	437	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN DURING PART OF DECEMBER FOR AN ANNUAL OUTAGE.

FGD SYSTEM OUTAGE TIME DURING DECEMBER WAS DUE IN PART TO A LACK OF SODIUM SULFITE ABSORBING SOLUTION RESULTING FROM EVAPORATOR PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/84	SYSTEM	95.6	95.6	95.6	95.6		744	744	711	

** PROBLEMS/SOLUTIONS/COMMENTS

A LACK OF ABSORBING SOLUTION DUE TO EVAPORATOR CIRCULATING PUMP PROBLEMS AND PLUGGED EVAPORATOR SOLUTION HEADERS LIMITED THE BURNING OF HIGH SULFUR COKE DURING JANUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/84	SYSTEM	97.6	97.6	97.6	97.6		696	696	679	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING FEBRUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
3/84	SYSTEM	84.5	84.5	84.5	84.5		744	744	629		

** PROBLEMS/SOLUTIONS/COMMENTS

PRESATURATOR CLEANING ACCOUNTED FOR OUTAGE TIME DURING THE MONTH.

PRESATURATOR CIRCULATION PUMP REPAIRS WERE MADE DURING MARCH.

FGD SYSTEM OUTAGE TIME DURING MARCH WAS DUE IN PART TO THE REPAIR OF A
BROKEN INSULATOR ON THE ESP.

4/84	SYSTEM	89.0	79.9	87.1	74.0		720	667	533		
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** PROBLEMS/SOLUTIONS/COMMENTS

LEAKS IN THE MIST ELIMINATOR SHELL WERE REPAIRED DURING APRIL.

LEAKS IN THE BOOSTER FAN DISCHARGE DUCTWORK WERE REPAIRED DURING APRIL.

THE FGD SYSTEM WAS DOWN DURING PART OF THE MONTH TO CLEAN THE PRESATURATOR.

A BOILER TUBE LEAK ACCOUNTED FOR 108 HOURS OF DOWN TIME DURING APRIL.

5/84	SYSTEM	86.8	86.8	86.8	86.8		744	744	646		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FAILURE OF A PRESATURATOR CIRCULATING PUMP MOTOR OCCURRED DURING MAY.

FAILURE OF A RUBBER LINED PIPE IN THE PRESATURATOR CIRCUIT RESULTED IN
DOWN TIME DURING MARCH.

PRESATURATOR PLUGGING PROBLEMS WERE REPORTED DURING MAY.

6/84	SYSTEM						720				
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7/84	SYSTEM						744				
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8/84	SYSTEM						744				
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9/84	SYSTEM						720				
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JUNE THROUGH SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DESERET GEN & TRANS	
PLANT NAME	BONANZA	
UNIT NUMBER	1	
CITY	VERNAL	
STATE	UTAH	
REGULATORY CLASSIFICATION	A	
PARTICULATE EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	800	
GROSS UNIT GENERATING CAPACITY - MW	410	
NET UNIT GENERATING CAPACITY W/FGD - MW	388	
NET UNIT GENERATING CAPACITY WO/FGD - MW	400	
EQUIVALENT SCRUBBED CAPACITY - MW	410	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	*****	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	*****	(***** ACFM)
BOILER FLUE GAS TEMPERATURE - C	*****	(**** F)
STACK HEIGHT - M	*****	(**** FT)
STACK SHELL	NR	
STACK TOP DIAMETER - M	*****	(**** FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	24423.	(10500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		*****
AVERAGE ASH CONTENT - %	10.00	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	8.50	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	.50	
RANGE SULFUR CONTENT - %	*****	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT - %	*****	
*** PARTICLE CONTROL		
** FABRIC FILTER		
NUMBER	1	
SUPPLIER	ECOLAIRE	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
*** FGD SYSTEM		
** GENERAL DATA		
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT	
SO2 REMOVAL MODE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
A-E FIRM	BURNS & MCDONNELL	
DEVELOPMENT LEVEL	FULL SCALE	
NEW/RETROFIT	NEW	
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60	
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	95.00	
ENERGY CONSUMPTION %	2.9	

DESERET GEN & TRANS: BONANZA 1 (CONT.)

CURRENT STATUS	1
COMMERCIAL START-UP	12/84
INITIAL START-UP	9/84
CONTRACT AWARDED	7/80

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** ABSORBER	
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
SHELL GENERIC MATERIAL	NR
SHELL SPECIFIC MATERIAL	NR
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR
LINER GENERIC MATERIAL	NR
LINER SPECIFIC MATERIAL	NR
LINER MATERIAL TRADE NAME/COMMON TYPE	NR
** MIST ELIMINATOR	
PRE-MIST ELIMINATOR/MIST ELIMINATOR	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** REHEATER	
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
DESIGN	NR
FUNCTION	NA
APPLICATION	NR
SERVICE	NA
CONSTRUCTION MATERIAL GENERIC TYPE	NA
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NA
** TANKS	
SERVICE	NUMBER
-----	-----
NR	****

DESERET GEN & TRANS: BONANZA 1 (CONT.)

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** PUMPS
  SERVICE          NUMBER
  -----          -
  NR              *****

** SOLIDS CONCENTRATING/DEWATERING
  DEVICE          THICKENER
  NUMBER          1

** SOLIDS CONCENTRATING/DEWATERING
  DEVICE          VACUUM FILTER
  NUMBER          1

*** SLUDGE

** TREATMENT
  METHOD          DEWATERED
  DEVICE          NR
  PROPRIETARY PROCESS  N/A

** DISPOSAL
  NATURE          FINAL
  TYPE            LANDFILL
  LOCATION        ON-SITE
  SITE TREATMENT  NONE

** WATER BALANCE
  WATER LOOP TYPE  CLOSED
  SOURCE OF MAKEUP WATER  COOLING TOWER BLOWDOWN

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-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS HOURS FACTOR
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9/84 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT INITIAL START-UP OF THE FGD SYSTEM COMMENCED IN
SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DUQUESNE LIGHT	
PLANT NAME	ELRAMA	
UNIT NUMBER	1-4	
CITY	ELRAMA	
STATE	PENNSYLVANIA	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	34.	(.080 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	258.	(.600 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	487	
GROSS UNIT GENERATING CAPACITY - MW	510	
NET UNIT GENERATING CAPACITY W/FGD - MW	487	
NET UNIT GENERATING CAPACITY WO/FGD - MW	494	
EQUIVALENT SCRUBBED CAPACITY - MW	510	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	972.11	(2060000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9	(300 F)
STACK HEIGHT - M	121.	(398 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.9	(26.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26907.	(11568 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		11500-12500
AVERAGE ASH CONTENT - %	16.80	
RANGE ASH CONTENT %	14.0-18.3	
AVERAGE MOISTURE CONTENT - %	5.93	
RANGE MOISTURE CONTENT %	4.30-7.06	
AVERAGE SULFUR CONTENT - %	2.05	
RANGE SULFUR CONTENT - %	1.49-2.91	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	0.03-0.05	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	4	
NUMBER OF SPARES	0	
TYPE	MULTICLONE	
SUPPLIER	RESEARCH-COTTRELL [1, 2, & 3]; JOY WESTERN [4]	
INLET FLUE GAS CAPACITY CU.M/S	972.1	(2060000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP - KPA	.7	(3. IN-H2O)
PARTICLE REMOVAL EFFICIENCY -%	95.0	
** ESP		
NUMBER	10	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH COTTRELL [1, 2, & 3]; JOY WESTERN [4]	
INLET FLUE GAS CAPACITY - CU.M/S	972.1	(2060000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP - KPA	.2	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	95.0	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	N/A	
SPECIFIC TYPE	N/A	
*** FGD SYSTEM		

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	MAGNESIUM OXIDE, SODIUM
SYSTEM SUPPLIER	GE ENVIRONMENTAL SERVICES
A-E FIRM	GIBBS & HILL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.30
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	83.00
ENERGY CONSUMPTION - %	1.4
CURRENT STATUS	1
COMMERCIAL START-UP	10/75
INITIAL START-UP	10/75
CONTRACT AWARDED	12/70

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	2.20	
DESIGN COAL HEAT CONTENT - J/G	26749.0	(11500 BTU/LB)
DESIGN COAL ASH CONTENT - %	17.00	
DESIGN MOISTURE CONTENT - %	6.00	
DESIGN CHLORIDE CONTENT %	.03	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	296.0	

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	5	
NUMBER OF SPARES	1	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/TOP-ENTRY PLUMB BOB	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	GE ENVIRONMENTAL SERVICES	
DIMENSIONS - FT	31.3 X 66.4	
SHELL GENERIC MATERIAL	CARBON STEEL; STAINLESS STEEL [ABSORBER INTERNAL	
SHELL SPECIFIC MATERIAL	AISI 1110; AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A; TYPE 316L	
LINER GENERIC MATERIAL	ORGANIC; INORGANIC	
LINER SPECIFIC MATERIAL	MAT-REINFORCED POLYESTER; GLASS FLAKE-FILLED POL	
LINER MATERIAL TRADE NAME/COMMON TYPE	CEILCRETE 2500AR; FLAKELINE 103; ACID RESISTANT	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1071.	(17000 GPM)
L/G RATIO - L/CU.M	4.4	(33.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP KPA	2.0	(8.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	45.7	(150.0 FT/S)
INLET GAS FLOW CU. M/S	243.03	(515000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
SO2 REMOVAL EFFICIENCY - %	83.0	
PARTICLE REMOVAL EFFICIENCY - %	94.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR [EXTERNAL]	
NUMBER PER SYSTEM	5	
NUMBER OF SPARES PER SYSTEM	1	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	OPEN VANE [SLAT]	
MANUFACTURER	HEIL	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	4	
DISTANCE BETWEEN VANES - CM	7.6	(3.00 IN)
VANE ANGLES DEGREES	90	
PRESSURE DROP - KPA	.0	(.2 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.4	(11.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

WASH WATER SOURCE	FRESH MAKEUP WATER OR THICKENER OVERFLOW
WASH FREQUENCY	TOP-MANUAL ONCE/WEEK
** REHEATER	
GENERIC TYPE	DIRECT COMBUSTION
SPECIFIC TYPE	IN-LINE BURNER
TRADE NAME/COMMON TYPE	OIL
TEMPERATURE INCREASE - C	16.7 (30 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
NUMBER	5
NUMBER OF SPARES	1
DESIGN	CENTRIFUGAL
SUPPLIER	GREEN FUEL ECONOMIZER
FUNCTION	BOOSTER
APPLICATION	INDUCED DRAFT
SERVICE	WET
FLUE GAS FLOW RATE - CU.M/S	259.54 (550000 ACFM)
FLUE GAS TEMPERATURE - C	54.4 (130 F)
PRESSURE DROP - KPA	7.0 (23.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY; HIGH ALLOY; STAINLESS
** DAMPERS	
NUMBER	5
FUNCTION	SHUT-OFF
GENERIC TYPE	BUTTERFLY
SPECIFIC TYPE	NR
MANUFACTURER	NR
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	300
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL/CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC; AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	5
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	ALLIS-CHALMERS
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL/CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC; AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** DAMPERS	
NUMBER	5
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	ALLIS-CHALMERS
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL/CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC; AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER OUTLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** DUCTWORK	
LOCATION	PRECOLLECTOR OUTLET
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	PASTE
DEVICE TYPE	N/A
MANUFACTURER	WALLACE & TIERNAN
NUMBER	5
NUMBER OF SPARES	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	3.6 (4 TPH)
PRODUCT QUALITY - % SOLIDS	22.5
** TANKS	
SERVICE	NUMBER
-----	-----
THICKENER OVERFLOW	1
LIME SLURRY DILUTION	1
ABSORBER EFFLUENT HOLD	5
THICKENER POLMER MIX	1
THICKENER DISTRIBUTION BOX	1
WATER STORAGE	2
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	10
LIME SLURRY FEED	5
THICKENER OVERFLOW	3
THICKENER UNDERFLOW	3
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	2
NUMBER OF SPARES	0
DIMENSIONS - FT	120 DIA X 8.5 HIGH
CAPACITY	229500
SHELL GENERIC MATERIAL TYPE	CARBON STEEL (WALLS); INORGANIC (BOTTOM)
SHELL SPECIFIC MATERIAL TYPE	AISI 1110; HYDRAULICALLY-BONDED CONCRETE
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	BITUMINOUS BASE MODIFIED ASPHALT (FLOOR); MICA F
BELT GENERIC MATERIAL TYPE	RUBBER-CLAD CARBON STEEL
FEED STREAM SOURCE	ABSORBER BLEED STREAM
FEED STREAM CHARACTERISTICS	5% SOLIDS
OUTLET STREAM CHARACTERISTICS	35-40% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	0.1%
OUTLET STREAM DISPOSITION	TO VACUUM FILTER
OVERFLOW STREAM DISPOSITION	THICKENER OVERFLOW TANK
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	1
DIMENSIONS - FT	650 SQ FT & 750 SQ FT
CAPACITY	60 TONS/HR

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
BELT GENERIC MATERIAL TYPE	ORGANIC
BELT SPECIFIC MATERIAL TYPE	NYLON
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	35-40% SOLIDS
OUTLET STREAM CHARACTERISTICS	50% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	0.1
OUTLET STREAM DISPOSITION	TO SLUDGE TREATMENT
OVERFLOW STREAM DISPOSITION	COLLECTED IN A DISTRIBUTION BOX & THEN TRANSFERR
*** SLUDGE	
% ASH - DRY	50.0
% OTHER COMPOUNDS - DRY	50.0
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
INLET QUALITY - %	37.5
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	OFF-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	NONE
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	RECIRCULATING SLURRY
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	FLOW
CONTROL LEVELS	PH 7.7
MONITOR TYPE	UNIVERSAL UNILOC
MONITOR LOCATION	INLET TANGENTIAL NOZZLE TO ABSORBER
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	OPEN
EFFLUENT WATER LOSS - LITERS/S	18.9 (300 GPM)
RECEIVING WATER STREAM	MONONGAHELA RIVER
SOURCE OF MAKEUP WATER	RIVER WATER
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	MAGNESIUM-MODIFIED LIME
PRINCIPAL CONSTITUENT	CAO, MGO
SOURCE/SUPPLIER	DRAVO
CONSUMPTION	175-200 TPD
UTILIZATION - %	90.0
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	25.0
MIST ELIMINATOR - %	25.0
FAN - %	25.0
SLAKER - %	67.0
EFFLUENT HOLD TANK - %	25.0
RECIRCULATION PUMP - %	25.0
THICKENER - %	.0
VACUUM FILTER - %	100.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	1.0
MIST ELIMINATOR	1.0
FAN	1.0
SLAKER	.8

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

EFFLUENT HOLD TANK	1.0
RECIRCULATION PUMP	1.0
THICKENER	.0
VACUUM FILTER	1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
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0/75 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

THE FIRST ELRAMA SCRUBBER WAS PLACED IN SERVICE ON OCTOBER 26, 1975. IT HAD BEEN SCHEDULED FOR AN EARLIER STARTUP DATE BUT BECAUSE OF THE SEVERITY AND NUMBER OF PROBLEMS ENCOUNTERED AT PHILLIPS, STARTUP WAS DELAYED UNTIL MANY OF THE PROBLEMS AT PHILLIPS WERE RESOLVED AND THE MODIFICATIONS COULD BE INCORPORATED AT BOTH STATIONS.

BOILER NO. 2 WAS INITIALLY CONNECTED TO THE FGD SYSTEM. THIS BOILER HAS AN EQUIVALENT CAPACITY OF APPROXIMATELY 100 MW AND THE EMISSIONS CAN BE HANDLED BY ONE SCRUBBER. HOWEVER, TO ENSURE RELIABILITY IN THE CASE OF A SCRUBBER MALFUNCTION, TWO SCRUBBERS ARE OPERATED AT PARTIAL LOAD TO PROTECT THE BOILER AND TURBINE GENERATOR AGAINST A TRIP-OFF.

THE BOILER OPERATED CONTINUOUSLY ON THE SCRUBBER SYSTEM THROUGH JANUARY 1976 WITH THE EXCEPTION OF TWO MINOR OUTAGES. ON FEBRUARY 4, 1976 A SECOND BOILER WAS COUPLED INTO THE SCRUBBER COMPLEX. PRESENTLY, TWO UNITS ARE THE MAXIMUM THAT CAN BE TIED INTO THE SCRUBBER PLANT. TO DATE, THE UTILITY HAS ENCOUNTERED THE USUAL MINOR STARTUP PROBLEMS AND SOME MAJOR PROBLEMS AS WELL. THE MAJOR PROBLEMS HAVE BEEN WITH FROZEN PIPES AND THICKENERS, THE LATTER INVOLVING HARDWARE AND DESIGN PROBLEMS ASSOCIATED WITH RECIRCULATION OF THE SLUDGE WITHIN THE THICKENERS TO ATTAIN 30 TO 40% SOLIDS CONCENTRATION.

10/75 SYSTEM

744 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBING SYSTEM BEGAN OPERATIONS WITH ONE BOILER CONNECTED TO THE SYSTEM (100 MW) DURING THE MONTH. THE SCRUBBING SYSTEM IS CURRENTLY IN THE SHAKEDOWN PHASE OF OPERATION.

11/75 SYSTEM

720 720

12/75 SYSTEM

744 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM IS STILL OPERATING WITH ONE BOILER CONNECTED. THE UTILITY IS PLANNING TO CONNECT ONE OR TWO ADDITIONAL BOILERS TO THE SYSTEM IN LATE JANUARY.

1/76 SYSTEM

744 744

** PROBLEMS/SOLUTIONS/COMMENTS

FOUR OF THE FIVE SCRUBBER VESSELS HAVE BEEN IN SERVICE IN VARIOUS COMBINATIONS, AND THE SERVICE HOURS THROUGH JANUARY 31, 1976 ARE:

NO. 1 - 69 HOURS
 NO. 2 - 1508 HOURS
 NO. 3 - 976 HOURS
 NO. 4 - 838 HOURS

THE FIFTH VESSEL HAS NOT BEEN IN SERVICE BECAUSE IT IS BEING SERVICED FOR THE TRIAL INSTALLATION OF RUBBER LINED RECYCLE PUMPS.

2/76 SYSTEM

696 696

3/76 SYSTEM

744 744

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂ PART.	PER HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
4/76	SYSTEM						720	720	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE SYSTEM OPERATED DURING MARCH AND APRIL WITH TWO BOILERS COUPLED INTO THE SCRUBBING SYSTEM. REVISIONS TO THE FIFTH SCRUBBING VESSEL HAVE BEEN COMPLETED AND OPERATIONS ARE PROCEEDING WITH TWO RUBBER-LINED RECYCLE PUMPS.									
5/76	SYSTEM						744	744	
6/76	SYSTEM						720	720	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE SYSTEM IS STILL OPERATING WITH TWO BOILERS COUPLED INTO THE SCRUBBING SYSTEM. THE IUCS SLUDGE FIXATION SYSTEM IS CONTINUING TO OPERATE AT THIS STATION.									
THE FIFTH SCRUBBING VESSEL WAS TAKEN OUT OF SERVICE FOR REPAIRS AND MODIFICATIONS REQUIRED FOR THE RUBBER-LINED RECYCLE PUMPS.									
THE UTILITY IS CURRENTLY CONDUCTING A PERFORMANCE TEST ON THE SCRUBBING SYSTEM IN THE TWO BOILER OPERATION MODE.									
7/76	SYSTEM						744	744	
8/76	SYSTEM						744	744	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE FIFTH SCRUBBING VESSEL EMPLOYING TWO RUBBER-LINED RECYCLE PUMPS WAS OPERATIONAL FOR A SHORT PERIOD OF TIME DURING THE REPORTING MONTHS. TWO BOILERS REMAIN COUPLED INTO THE SCRUBBING SYSTEM. THE CONSTRUCTION OF ADDITIONAL LIME STORAGE SILOS AND A THICKENER WILL BE REQUIRED FOR FULL SCALE OPERATION. THE UTILITY HAS SIGNED A LETTER OF INTENT WITH IUCS FOR A LONG TERM SLUDGE FIXATION SYSTEM. HIGH CALCIUM LIME IS STILL BEING EMPLOYED IN THE SCRUBBING SYSTEM.									
9/76	SYSTEM						720	720	
10/76	SYSTEM						744	744	
** PROBLEMS/SOLUTIONS/COMMENTS									
OPERATIONS AT THIS STATION DURING THE REPORT PERIOD PROCEEDED WITH TWO BOILERS COUPLED INTO THE FIVE-MODULE SCRUBBING SYSTEM. THE FIFTH SCRUBBING VESSEL WAS OPERATIONAL DURING THE REPORT PERIOD WITH THE RUBBER-LINED RECYCLE PUMPS IN SERVICE. OPERATIONS ARE STILL PROCEEDING ON AN OPEN WATER-LOOP BASIS. PART OF THE THICKENER OVERFLOW IS STILL BEING DIVERTED TO THE ASH POND AND NOT RECYCLED BACK TO THE PROCESS. BECAUSE BOTH BEAVER VALLEY AND BRUCE MANSFIELD STATIONS ARE FULLY OPERATIONAL, THIS STATION HAS BEEN RELEGATED TO PEAK LOAD OPERATIONS. GENERAL LOAD OPERATIONS ARE FULL CAPACITY IN THE DAYTIME AND 50 TO 60% REDUCTION AT NIGHT.									
TESTS WERE CONDUCTED DURING THE PERIOD TO DETERMINE PARTICULATE AND SO ₂ REMOVAL EFFICIENCIES. SO ₂ REMOVAL EFFICIENCY WAS 50%. PARTICULATE EMISSIONS WERE BEING REDUCED WELL BELOW 0.1 LB/MM BTU STANDARD (ACTUAL RESULTS: 0.04 LB/MM BTU). THESE RESULTS WERE BASED ON TWO BOILERS COUPLED INTO THE FIVE SCRUBBING MODULES WHILE BURNING MEDIUM-SULFUR (1.0 TO 2.8%) COAL. THE MECHANICAL COLLECTORS AND ESP'S WERE IN SERVICE DURING THE TESTS.									
11/76	SYSTEM						720	720	

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER BOILER PART. HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
12/76	SYSTEM						744	744	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE SCRUBBER REMAINED IN SERVICE THROUGHOUT THE REPORT PERIOD WITH TWO BOILERS COUPLED INTO THE SCRUBBING SYSTEM. A RECYCLE PUMP EVALUATION IS BEING CONDUCTED BY THE UTILITY AT BOTH PHILLIPS AND ELRAMA STATIONS.									
OBSERVATIONS OF THE RUBBER-LINED RECYCLE PUMPS INDICATE SOME SEVERE ABRASION AND GOUGING HAVE OCCURRED AFTER 1000 HOURS OF SERVICE TIME.									
1/77	SYSTEM						744	744	
2/77	SYSTEM						672	672	
3/77	SYSTEM						744	744	
** PROBLEMS/SOLUTIONS/COMMENTS									
TESTING WITH THIOSORBIC LIME WAS CONDUCTED DURING THE PERIOD.									
THE SCRUBBER PLANT CONTINUED OPERATIONS DURING JANUARY AND FEBRUARY WITH TWO BOILERS COUPLED INTO THE SYSTEM. INSTALLATION OF THE ADDITIONAL THICKENER LIME FEEDERS AND SILOS IS STILL IN PROGRESS. FULL COMPLIANCE OPERATION FOR THIS STATION IS SCHEDULED FOR EARLY 1978. THE FULL COMPLIANCE STRATEGY WILL CONSIST OF THE FOLLOWING: 83% SO2 REMOVAL FOR 2% SULFUR COAL UTILIZING THIOSORBIC LIME (6-12% MG), FIXATING THE SCRUBBER SLUDGE WITH THE IUCS POZ-O-TEC STABILIZATION METHOD AND HAULING THIS MATERIAL TO AN OFFSITE DISPOSAL/LANDFILL AREA. CURRENT SO2 AND PARTICULATE REMOVAL EFFICIENCIES ARE 50 AND 99+%, RESPECTIVELY. THE INTERIM IUCS UNIT NOW IN SERVICE CONSISTS OF THE OLD MOHAVE PROTOTYPE PLUS A VACUUM FILTER. THE STABILIZATION MATERIAL HAS BEEN UTILIZED IN A PARKING LOT CONSTRUCTION PROJECT. IUCS HAS BEEN AWARDED A 10-YEAR CONTRACT FOR THE CONTINUED USE OF THIS SYSTEM FOR FUTURE PLANT OPERATIONS.									
4/77	SYSTEM						720	720	
5/77	SYSTEM						744	744	
** PROBLEMS/SOLUTIONS/COMMENTS									
CONSTRUCTION OF TWO 120-FOOT DIAMETER THICKENERS IS CONTINUING. DUE TO THE GOUGING OF THE RUBBER-LINED RECYCLE PUMPS DURING THEIR TESTING, THEY HAVE BEEN REMOVED. THE UTILITY IS CONSIDERING TRYING ANOTHER SET OF RUBBER-LINED PUMPS. DUQUESNE LIGHT ALSO IS CONTINUING EFFORTS TO OBTAIN ALTERNATE LANDFILL AREAS FOR SLUDGE DISPOSAL.									
6/77	SYSTEM						720	720	
7/77	SYSTEM						744	744	
** PROBLEMS/SOLUTIONS/COMMENTS									
DUQUESNE LIGHT REPORTED THE FOLLOWING ITEMS FOR THE ELRAMA SCRUBBER PLANT DURING THE REPORT PERIOD:									
-TWO BOILERS (200 MW) WERE COUPLED INTO THE SCRUBBER PLANT.									
-THE INTERIM IUCS STABILIZATION UNIT (MOHAVE PROTOTYPE) CONTINUED TO FIX-ATE SCRUBBER WASTES.									
-CONSTRUCTION OF THE TWO ADDITIONAL THICKENERS CONTINUED (CONSTRUCTION IS ON SCHEDULE).									
-FULL PLANT COMPLIANCE IS PROJECTED FOR FEBRUARY 1978.									
-SO2 REMOVAL EFFICIENCY IS APPROXIMATELY 50%.									
-ELRAMA IS OPERATING IN A BASE/INTERMEDIATE LOAD MODE (FULL LOAD DAYTIME/									

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

HALF LOAD NIGHT-TIME). 1976 CAPACITY FACTOR WAS 69.5%.

8/77	SYSTEM					744	744	
9/77	SYSTEM					720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE TWO ADDITIONAL THICKENERS WERE COMPLETELY INSTALLED. THE IUCS SYSTEM WAS UPGRADED. CONSTRUCTION COMPLETION IS PROJECTED FOR FEBRUARY 1978. FULL PLANT COMPLIANCE IS PROJECTED FOR APRIL 1978.

10/77	SYSTEM					744	744	
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** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 101 WAS UNAVAILABLE ON OCTOBER 4 DUE TO A BLEED VALVE LEAK AND WAS TAKEN OUT OF SERVICE AT THE END OF THE MONTH FOR CLEANUP.

MODULE 201 WAS AVAILABLE FOR THE ENTIRE MONTH OF OCTOBER.

MODULE 301 AND 401 HAD OUTAGES IN OCTOBER RESULTING FROM A RUBBER LINING FAILURE ON AN ID FAN.

MODULE 501 EXPERIENCED RECYCLE PUMP OUTAGES IN LATE NOVEMBER.

NEW RUBBER LINED WORMEN RECYCLE PUMPS WERE INSTALLED. THE LIME HANDLING SYSTEM INSTALLATION WORK CONTINUED. THE LAST TWO BOILERS ARE EXPECTED TO BE TIED INTO THE FGD SYSTEM BY JANUARY 1978.

11/77	101	.0	.0					
	201	11.7	11.7					
	301	93.3	93.3					
	401	22.5	22.5					
	501	59.2	59.2					
	SYSTEM	46.7	46.7			720	720	336

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 101, 201 AND 401 HAVE LOW OPERATIONAL HOURS BECAUSE ONLY TWO BOILER ARE TIED INTO THE FGD SYSTEM TO DATE.

THE SLUDGE HANDLING SYSTEM IS FUNCTIONING PROPERLY AND IS NOW IN FULL SERVICE.

TUBE LEAKS FORCED A BOILER OUTAGE IN NOVEMBER.

12/77	SYSTEM					744	744	
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1/78	101	94.1	94.1					
	201	90.5	90.5					
	301	5.1	5.1					
	401	24.3	24.3					
	501	3.5	3.5					
	SYSTEM	54.4	54.4			744	744	405

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE PERIOD THE UTILITY REPORTED THAT A NEW WORMEN RECYCLE PUMP INSTALLED IN NOVEMBER EXPERIENCED JACK SHAFT BEARING PROBLEMS RESULTING IN REMOVAL OF SCRUBBER TRAIN 501 FROM SERVICE.

BOILER NO. 4 WAS CONNECTED, ADDING AN ADDITIONAL 176 MW OF FLUE GAS LOAD TO THE FGD SYSTEM.

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THE IUCS SLUDGE DISPOSAL FACILITY IS IN SERVICE PRODUCING GOOD PRODUCT.
 LOW LOAD AND A COAL STRIKE HAVE HAMPERED GOOD SCRUBBER OPERATIONS. SOME
 OUTAGE TIME HAS BEEN SCHEDULED FOR MARCH.

2/78	101		70.8		30.4			
	201		96.2		41.2			
	301		.0		.0			
	401		37.2		15.9			
	501		40.0		18.0			
	SYSTEM		61.1		26.4	672	288	177
3/78	SYSTEM		.0		.0	744	216	141

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS SHUTDOWN ON FEBRUARY 11 AS A RESULT OF A COAL SHORTAGE.
 BOILERS 1, 2 AND 4 ARE NOW COMPLETELY CONNECTED TO THE FGD SYSTEM. BOILER
 3 IS UNDERGOING AN EXTENSIVE OVERHAUL AND WILL BE CONNECTED TO THE SYSTEM
 IN LATE APRIL.

BOILER EXIT DAMPERS WERE LINED WITH 316 SS ON AREAS OF HIGH EROSION CAUSED
 BY FLYASH IMPINGEMENT DURING THE OUTAGE.

EXPANSION JOINTS IN THE UPSTREAM DUCTWORK WERE SHIELDED BY METAL PLATES
 WHICH WERE WELDED AT ONE END DURING THE FEBRUARY-MARCH PERIOD. EXPANSION
 JOINTS IN THE DOWNSTREAM DUCTWORK WERE COMPLETELY REPLACED. THE DOWN-
 STREAM DUCTWORK WAS RELINED WITH CEILCOTE.

ALSO DURING THE OUTAGE THE MODULE 401 INTERNALS WERE CLEANED AND SOME
 HOLES IN THE UPPER CONICAL REGION WERE REPAIRED.

THE SYSTEM CAME BACK ON LINE IN LATE MARCH, HOWEVER, BOILER NUMBER 3 WAS
 NOT IN SERVICE.

4/78	SYSTEM					720	720	
5/78	SYSTEM					744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE APRIL-MAY PERIOD BOILER NUMBER 3 WAS STILL BEING OVERHAULED.
 FGD SYSTEM CONSTRUCTION WAS COMPLETED AND PRELIMINARY TESTING WITH
 THIOSORBIC LIME VERIFIED A SYSTEM SO2 REMOVAL EFFICIENCY OF 83%.

6/78	SYSTEM					720	720	
7/78	101	59.9	59.9	59.9	59.9			
	201	100.0	100.0	100.0	100.0			
	301	66.5	66.5	66.5	66.5			
	401	100.0	98.9	100.0	98.9			
	501	77.1	77.1	77.1	77.1			
	SYSTEM	100.0	100.0	100.0	100.0	744	744	744

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 301 WAS PULLED OFF FOR A MAJOR CLEANING DURING THE JUNE-JULY
 PERIOD.

MIST ELIMINATOR PLUGGING WAS EXPERIENCED AS A RESULT OF LOW PH.

THE CHRONIC INABILITY TO CONTROL CHEMISTRY (PH) IS DIRECTLY RELATED TO
 GRIT BUILD-UP IN THE LIME HANDLING AND SLURRY PREPARATION SYSTEM.

THE UTILITY IS CURRENTLY STUDYING WAYS TO TIGHTEN THE WATER BALANCE BY US-

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

ING THICKENER SUPERNATANT INTERMITTENTLY WITH CLEAR SERVICE WATER FOR THE
 MIST ELIMINATORS.

8/78	101	76.9	76.9	76.9	76.9			
	201	100.0	100.0	100.0	100.0			
	301	50.7	50.7	50.7	50.7			
	401	100.0	100.0	100.0	100.0			
	501	70.9	70.9	70.9	70.9			
	SYSTEM	99.6	100.0	99.6	99.6	744	744	741

9/78	101	72.1	72.1	72.1	72.1			
	201	59.6	56.3	58.2	56.3			
	301	93.3	89.0	92.9	89.0			
	401	78.1	78.1	78.1	78.1			
	501	93.6	93.6	93.6	93.6			
	SYSTEM	99.2	100.0	98.7	97.3	720	720	700

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE AUGUST-SEPTEMBER PERIOD THE UTILITY REPORTED THAT MODULES 301
 AND 501 WERE TAKEN OFF LINE FOR CLEANING.

THE RUBBER LINING ON THREE FAN HOUSINGS REQUIRED REPAIR DURING AUGUST AND
 SEPTEMBER.

IT WAS NECESSARY TO SHUT DOWN THE LIME MIXING BASIN IN ORDER TO CLEAN OUT
 EXCESSIVE GRIT AND SOLIDS BUILD UP.

A PARTICLE EMISSION COMPLIANCE TEST WAS RUN IN DECEMBER WHICH SHOWED THE
 UNIT TO BE IN COMPLIANCE.

10/78	101	100.0	76.6	100.0	76.6			
	201	98.9	98.9	98.9	98.9			
	301	100.0	100.0	100.0	100.0			
	401	80.5	80.5	80.5	80.5			
	501	78.6	78.6	78.6	78.6			
	SYSTEM	100.0	100.0	100.0	100.0	744	744	744

11/78	101	100.0	100.0	100.0	100.0			
	201	100.0	78.4	100.0	78.4			
	301	100.0	84.2	100.0	84.2			
	401	100.0	86.8	100.0	86.8			
	501	81.1	62.5	76.8	62.5			
	SYSTEM	100.0	100.0	100.0	100.0	720	720	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE PARTICLE EMISSION TEST RUN IN AUGUST SHOWED THAT THE UNIT MET STATE
 STANDARDS. THE SO2 TEST WILL HAVE TO BE RERUN BECAUSE OF SAMPLING
 ERRORS.

THE UTILITY REPORTED DURING THE OCTOBER-NOVEMBER PERIOD THAT IT HAS HAD
 SOME PROBLEMS WITH AN INSUFFICIENT LIME SUPPLY.

12/78	101	100.0	94.7	100.0	94.7			
	201	76.3	72.7	75.4	72.7			
	301	93.0	85.6	92.5	85.6			
	401	68.0	64.8	66.9	64.8			
	501	97.9	69.5	97.0	69.5			
	SYSTEM	100.0	100.0	100.0	96.8	744	744	720

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR
** PROBLEMS/SOLUTIONS/COMMENTS									
DURING DECEMBER A SO2 EMISSION COMPLIANCE TEST WAS RUN AND THE UNIT WAS FOUND TO BE WITHIN THE ALLOWABLE STANDARD OF 0.6 LB/MM BTU.									
1/79	101	44.7	39.8	41.9	39.8				
	201	100.0	95.2	100.0	95.2				
	301	67.8	60.2	65.3	60.2				
	401	100.0	100.0	100.0	100.0				
	501	100.0	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	98.8		744	744	735
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY HAS STARTED HAULING SLUDGE OFF-SITE TO AN AREA ABOUT 10 MILES AWAY.									
2/79	101	100.0	100.0	100.0	100.0				
	201	90.2	90.2	90.2	90.2				
	301	14.1	14.1	14.1	14.1				
	401	97.8	97.3	97.8	97.3				
	501	100.0	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	100.0		672	672	672
3/79	101	98.9	95.4	98.8	95.4				
	201	100.0	91.0	100.0	91.0				
	301	77.7	73.8	76.8	73.8				
	401	54.5	39.2	46.3	39.2				
	501	70.4	65.9	69.0	65.9				
	SYSTEM	100.0	100.0	97.7	91.4		744	744	680
4/79	101	64.1	61.9	63.3	61.9				
	201	57.4	53.5	55.7	53.5				
	301	100.0	99.3	100.0	99.3				
	401	100.0	89.9	100.0	89.9				
	501	92.8	90.4	92.6	90.4				
	SYSTEM	100.0	95.6	100.0	95.6		720	720	688
5/79	101	100.0	100.0	100.0	100.0				
	201	97.8	97.8	97.8	97.8				
	301	100.0	83.1	100.0	83.1				
	401	100.0	100.0	100.0	100.0				
	501	51.6	21.4	30.6	21.4				
	SYSTEM	100.0	100.0	100.0	100.0		744	744	744
6/79	101	100.0	100.0	100.0	100.0				
	201	98.5	58.5	97.5	58.5				
	301	93.3	40.0	85.7	40.0				
	401	100.0	100.0	100.0	100.0				
	501	100.0	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	99.6		720	720	717
7/79	101	100.0	81.0	100.0	81.0				
	201	100.0	94.8	100.0	94.8				
	301	86.0	86.0	86.0	86.0				
	401	100.0	99.3	100.0	99.3				
	501	40.7	40.7	40.7	40.7				
	SYSTEM	100.0	100.0	100.0	100.0		744	744	744
8/79	101	100.0	98.7	100.0	98.7				
	201	100.0	100.0	100.0	100.0				
	301	100.0	96.5	100.0	96.5				

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
	401	41.2	33.3	36.2	33.3				
	501	72.8	72.8	72.8	72.8				
	SYSTEM	100.0	100.0	100.0	100.0		744	744	744
9/79	101	44.0	35.0	38.4	35.0				
	201	100.0	93.3	100.0	93.3				
	301	100.0	86.6	100.0	86.6				
	401	90.0	90.0	90.0	90.0				
	501	76.9	70.0	75.2	70.0				
	SYSTEM	100.0	93.8	100.0	93.8		720	720	675
10/79	101	100.0	100.0	100.0	100.0				
	201	100.0	96.1	100.0	96.1				
	301	47.8	34.6	39.1	34.6				
	401	94.4	87.3	94.0	87.3				
	501	84.4	84.5	84.4	84.5				
	SYSTEM	100.0	100.0	100.0	100.0		744	744	744
11/79	101	100.0	100.0	100.0	100.0				
	201	15.3	15.2	15.3	15.2				
	301	92.4	92.5	92.4	92.5				
	401	100.0	98.3	100.0	98.3				
	501	95.0	93.9	94.9	93.9				
	SYSTEM	100.0	100.0	100.0	100.0		720	720	720
12/79	101	100.0	51.6	100.0	48.5				
	201	100.0	90.9	100.0	85.5				
	301	100.0	100.0	96.1	100.0				
	401	88.1	68.6	84.4	64.5				
	501	100.0	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	98.7		744	700	734

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO SCRUBBER-RELATED OUTAGES DURING THE SEPTEMBER THROUGH DECEMBER PERIOD.

A NEW SO2 MONITOR, WHICH WAS INSTALLED IN OCTOBER, HAS PLUGGED ONLY ONCE SINCE INSTALLATION AND HAS REQUIRED ONLY FOUR HOURS OF MAINTENANCE PER WEEK.

1/80	101	95.8	91.2	94.8	75.2				
	201	87.1	100.0	87.1	87.1				
	301	84.6	100.0	84.6	84.6				
	401	86.4	55.6	77.1	45.8				
	501	100.0	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	98.2		744	613	528
2/80	101	100.0	85.4	100.0	60.5				
	201	100.0	100.0	100.0	96.6				
	301	100.0	100.0	100.0	100.0				
	401	100.0	100.0	100.0	70.7				
	501	77.6	56.8	64.0	40.2				
	SYSTEM	100.0	100.0	100.0	92.0		696	493	427

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEW SO2 MONITOR INSTALLED LAST OCTOBER IS STILL OPERATING WELL AND HAS LOGGED SIX MONTHS OF OPERATION.

THE HIGH AVAILABILITIES ARE DUE TO THE 5TH MODULE BEING A TRUE SPARE. AS OF FEBRUARY 1980 AND ARE STILL OPERATING WITHOUT ANY MAJOR PROBLEMS.

THE TWO RUBBER LINED WOMEN RECYCLE PUMPS HAVE NOW LOGGED 14,000 HOURS

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	101	100.0	100.0	100.0	100.0					
	201	100.0	100.0	100.0	100.0					
	301	73.7	73.7	73.7	73.7					
	401	100.0	48.4	100.0	48.4					
	501	78.1	78.1	78.1	78.1					
	SYSTEM	100.0	100.0	100.0	100.0			744	744	595

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH OF MARCH.

4/80	101	40.3	38.1	40.0	40.0					
	201	72.3	72.3	72.3	72.3					
	301	87.3	87.3	87.3	87.3					
	401	100.0	100.0	100.0	100.0					
	501	100.0	100.0	100.0	100.0					
	SYSTEM	99.4	99.4	100.0	99.4			720	720	572

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE 101 AND 201 RECYCLE PUMP IMPELLERS HAD TO BE REPLACED. THIS CAUSED EIGHT HOURS OF OUTAGE TIME FOR THESE TWO MODULES. NO OTHER FGD SYSTEM OUTAGES OCCURRED.

5/80	101	100.0	100.0	100.0	100.0					
	201	40.1	37.1	38.2	37.1					
	301	94.1	89.0	93.8	89.0					
	401	90.3	71.2	88.0	71.2					
	501	96.8	96.8	96.8	96.8					
	SYSTEM	100.0	98.5	100.0	98.5			744	744	586

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH.

6/80	101	100.0	100.0	100.0	100.0					
	201	100.0	97.8	100.0	97.8					
	301	100.0	96.7	100.0	96.7					
	401	.0	.0	.0	.0					
	501	100.0	100.0	100.0	100.0					
	SYSTEM	100.0	98.6	99.7	98.6			720	720	710 61.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE MODULE 401 WAS CLEANED AND THE CEILCOTE LINER WAS REPLACED. THIS IS THE FIRST TIME SINCE START UP (APPROXIMATELY 17,000 OPERATING HOURS) THAT ANY MODULE NEEDED RELINED.

DURING JUNE NO FGD-RELATED PROBLEMS OCCURRED ON MODULES 101, 201, 301 OR 501.

7/80	101	100.0	64.9	100.0	64.9					
	201	100.0	91.1	100.0	91.1					
	301	98.5	85.6	98.3	85.6					
	401	75.8	75.8	75.8	75.8					
	501	35.5	12.9	16.7	12.9					
	SYSTEM	100.0	82.6	97.7	82.6			744	744	615 66.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE RELINING OF MODULE 401 CONTINUED INTO PART OF JULY.

8/80	101	30.9	21.2	23.5	21.2					
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

	201	100.0	94.8	100.0	94.8						
	301	100.0	93.3	100.0	93.3						
	401	99.1	99.1	99.1	99.1						
	501	83.9	82.5	83.7	82.5						
	SYSTEM	100.0	97.7	100.0	97.7			744	744	727	65.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE RELINING WITH CEILCOTE ON MODULE 501 COMMENCED IN JULY AND CONTINUED FOR APPROXIMATELY 120 HOURS IN AUGUST.

THE RELINING OF MODULE 101 WITH CEILCOTE STARTED IN AUGUST ACCOUNTING FOR THE LOW AVAILABILITY DURING THE MONTH.

9/80	101	59.7	59.7	59.7	59.7						
	201	39.0	22.8	27.2	22.8						
	301	100.0	100.0	100.0	96.0						
	401	100.0	100.0	100.0	100.0						
	501	100.0	99.2	100.0	99.2						
	SYSTEM	99.7	95.4	96.8	94.4			720	720	680	64.5
10/80	101	97.9	95.8	97.8	95.8						
	201	32.4	23.3	25.6	23.3						
	301	98.5	98.5	98.5	98.5						
	401	90.5	72.7	88.3	72.7						
	501	98.5	96.5	98.4	96.5						
	SYSTEM	100.0	96.8	100.0	96.8			744	744	720	75.1
11/80	101	68.8	68.8	68.8	68.8						
	201	96.4	96.4	96.4	96.4						
	301	62.6	59.3	61.4	59.3						
	401	93.8	93.8	93.8	93.8						
	501	77.2	77.2	77.2	77.2						
	SYSTEM	99.8	98.9	99.4	98.9			720	720	711	79.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER-NOVEMBER THE LINERS IN MODULES 101, 201 AND 301 WERE REPLACED.

DURING NOVEMBER THE RUBBER LINER IN THE FAN HOUSING OF MODULE 101 WAS COATED WITH URETHANE.

THE UTILITY REPORTED THAT THE WORMAN RECYCLE PUMPS HAVE NOW ATTAINED 20,000 HOURS OF OPERATION WITHOUT REPAIRS.

12/80	101	73.0	55.1	67.1	55.1						
	201	100.0	81.3	100.0	81.3						
	301	98.9	94.6	98.9	94.6						
	401	48.4	48.4	48.4	48.4						
	501	94.9	93.4	94.8	93.4						
	SYSTEM	100.0	93.3	100.0	93.3			744	744	694	54.8
1/81	101	100.0	100.0	100.0	100.0						
	201	92.5	51.1	87.1	51.1						
	301	100.0	96.6	100.0	96.6						
	401	32.2	.0	.0	.0						
	501	88.2	51.1	81.2	51.1						
	SYSTEM	100.0	74.7	92.1	74.7			744	744	556	41.0

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER AND JANUARY.

2/81	101	92.1	51.6	73.5	51.6				
	201	99.1	86.5	88.2	86.5				
	301	98.9	93.2	98.9	93.2				
	401	3.6	3.6	3.6	3.6				
	501	95.2	93.6	95.2	93.6				
	SYSTEM	97.2	82.1	89.9	82.1	672	672	552	33.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE RUBBER LININGS ON THE FAN HOUSINGS OF MODULES 201 AND 301 WERE REPLACED WITH INCONEL 825.

3/81	101	59.8	38.7	49.1	38.7				
	201	59.1	59.1	59.1	59.1				
	301	53.6	53.6	53.6	53.6				
	401	21.1	21.1	21.1	21.1				
	501	59.9	58.9	59.5	58.9				
	SYSTEM	63.4	57.9	60.6	57.9	744	744	431	41.4

** PROBLEMS/SOLUTIONS/COMMENTS

UTILITY REPORTED THAT THE LOW BOILER CAPACITY FACTOR FOR THE MONTH OF MARCH WAS DUE TO THE COAL STRIKE (BOILERS WERE RUN AT REDUCED LOAD TO CONSERVE FUEL). GENERAL CLEANING WAS PERFORMED ON BOTH BOILERS AND FGD SYSTEM DURING THE MONTH.

THE FGD SYSTEM WAS DOWN FOR 10 DAYS TO REPAIR THE DUCTWORK AND EXPANSION JOINT LOCATED AT THE STACK. DURING THE OUTAGE, THE STACK, DAMPERS, AND REMAINING EXPANSION JOINTS WERE INSPECTED. THE STACK INSPECTION SHOWED MINOR DETERIORATION OF THE STACK FLUE.

4/81	101	88.1	76.9	86.6	76.9				
	201	72.3	46.2	62.5	46.2				
	301	90.0	82.6	89.2	82.6				
	401	86.7	85.6	86.6	85.6				
	501	94.2	82.3	93.4	82.3				
	SYSTEM	100.0	93.4	100.0	93.4	720	719	672	68.6

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF APRIL.

THE RUBBER COATED FAN HOUSING ON NUMBER 401 ID FAN WAS SPRAYED WITH A POLYURETHANE COATING TO PROTECT AGAINST CORROSION/EROSION EFFECTS.

SODIUM THIOSULFATE ADDITION WAS INITIATED IN APRIL TO AID AGAINST SCALING (HIGH EXCESS AIR PROBLEMS WHEN BOILERS RUN AT REDUCED LOADS).

5/81	101	100.0	96.7	100.0	96.7				
	201	.0	.0	.0	.0				
	301	100.0	100.0	100.0	100.0				
	401	100.0	67.0	100.0	67.0				
	501	88.7	50.2	81.7	50.2				
	SYSTEM	97.2	78.5	95.4	78.5	744	744	584	46.7

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF MAY THE INGERSOLL RAND RECYCLE PUMPS ON MODULE 201
 WERE REPLACED WITH RUBBER LINED WORMAN PUMPS.

6/81	101	95.4	92.6	97.1	92.6				
	201	61.7	61.7	61.7	61.7				
	301	93.3	86.0	92.8	86.0				
	401	88.3	76.7	86.8	76.7				
	501	63.9	41.5	53.5	41.5				
	SYSTEM	100.0	89.6	98.0	89.6	720	720	645	58.0
7/81	101	98.9	86.0	98.8	86.0				
	201	100.0	98.9	100.0	98.9				
	301	.0	.0	.0	.0				
	401	98.4	93.3	98.2	93.3				
	501	100.0	100.0	100.0	100.0				
	SYSTEM	99.3	94.6	99.3	94.6	744	744	704	67.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY, MODULE 301 WAS OUT OF SERVICE FOR GENERAL CLEANING AND FOR THE
 INSTALLATION OF POLYURETHANE IN THE FAN HOUSING.

8/81	101	97.3	90.5	97.3	90.5				
	201	98.9	58.5	98.2	58.5				
	301	.0	.0	.0	.0				
	401	97.7	95.6	97.5	95.6				
	501	97.4	80.9	96.9	80.9				
	SYSTEM	97.8	81.4	97.5	81.4	744	744	606	43.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 301 REMAINED DOWN DURING AUGUST FOR MAINTENANCE AND CLEANING.

9/81	101	100.0	68.2	100.0	68.2				
	201	100.0	98.3	100.0	98.3				
	301	.0	.0	.0	.0				
	401	100.0	87.2	100.0	87.2				
	501	100.0	51.0	100.0	51.0				
	SYSTEM	100.0	76.2	100.0	76.2	720	720	549	39.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER MODULE 301 WAS OUT OF SERVICE FOR CLEANING AND TO REPLACE
 THE RECYCLE PUMP.

10/81	101	85.6	62.1	81.2	62.1				
	201	100.0	95.3	100.0	95.3				
	301	.0	.0	.0	.0				
	401	96.0	94.0	95.8	94.0				
	501	100.0	57.6	100.0	57.6				
	SYSTEM	95.4	77.2	94.2	77.2	744	744	574	45.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE SO2 MONITORS WERE CERTIFIED. TO DATE, THE MONITORS
 HAVE AN EXCELLENT PERFORMANCE RECORD.

THE UTILITY CONTINUES TO ADD SODIUM THIOSULFATE TO CONTROL SCALE
 BELIEVED TO BE CAUSED BY LOAD FLUCTUATIONS.

11/81	101	100.0	69.0	100.0	69.0				
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DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	201	100.0	100.0	100.0	100.0					
	301	.0	.0	.0	.0					
	401	100.0	84.8	100.0	84.8					
	501	100.0	55.0	100.0	55.0					
	SYSTEM	100.0	77.2	100.0	77.2			720	720	556 48.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER, THE MODULE 301 RECYCLE PUMPS WERE REPLACED WITH RUBBER LINED PUMPS.

12/81	101	100.0	30.3	100.0	30.3					
	201	94.5	80.2	93.5	80.2					
	301	91.9	90.7	91.7	90.7					
	401	13.5	13.5	13.5	13.5					
	501	100.0	26.2	100.0	26.2					
	SYSTEM	99.9	60.2	99.7	60.2			744	744	448 46.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER, THE UTILITY REPORTED EXPERIENCING PROBLEMS WITH THE PROCESS CHEMISTRY DUE TO LOAD FLUCTUATIONS.

1/82	101	60.0	43.2	51.9	43.2					
	201	96.6	94.0	96.5	94.0					
	301	100.0	94.4	79.3	94.4					
	401	90.8	90.8	90.8	90.8					
	501	53.7	49.6	51.7	49.6					
	SYSTEM	100.0	94.4	79.3	94.4			744	744	702 73.0

2/82	101	.0	.0	.0	.0					
	201	79.6	78.5	79.4	78.5					
	301	96.3	93.9	96.2	93.9					
	401	100.0	82.6	100.0	82.6					
	501	91.4	81.3	90.4	81.3					
	SYSTEM	91.8	84.1	71.7	84.1			672	672	565 59.0

3/82	101	.0	.0	.0	.0					
	201	98.2	97.1	98.2	97.1					
	301	95.8	85.2	95.4	85.2					
	401	91.6	90.8	91.5	90.8					
	501	100.0	98.3	100.0	98.3					
	SYSTEM	96.4	92.8	76.5	92.8			744	744	691 67.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1982, THE MODULE 101 RECYCLE PUMPS WERE REPLACED WITH RUBBER LINED PUMPS.

4/82	SYSTEM							720		
5/82	SYSTEM							744		
6/82	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER THE CONVERSION OF THE RECYCLE PUMPS TO RUBBER LINED PUMPS WAS COMPLETED.

7/82	SYSTEM							744		
8/82	SYSTEM							744		
9/82	SYSTEM							720		

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/82	SYSTEM						744			
11/82	SYSTEM						720			
12/82	SYSTEM						744			
1/83	SYSTEM						744			
2/83	SYSTEM						672			
3/83	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH MARCH 1983.										
4/83	SYSTEM						720			
5/83	SYSTEM						744			
6/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH JUNE 1983.										
7/83	SYSTEM						744			
8/83	SYSTEM						744			
9/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED COMPLIANCE WITH STACK EMISSION TESTS CONDUCTED IN JULY AND AUGUST 1983.										
10/83	SYSTEM						744			
11/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED A TWO WEEK ANNUAL OUTAGE IN NOVEMBER, DURING WHICH TIME DAMPER AND DUCTWORK SECTIONS WERE REPAIRED.										
12/83	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED INSTALLING A PILOT SCRUBBER MODULE AT THE ELRAMA STATION DURING THE FOURTH QUARTER. THE 750 ACFM MODULE WILL BE USED TO TEST THE USE OF ADDITIVES IN CONJUNCTION WITH THEIR LIME PROCESS.										
1/84	SYSTEM						744			
2/84	SYSTEM						696			
3/84	SYSTEM						744			
4/84	SYSTEM						720			
5/84	SYSTEM						744			

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/84	SYSTEM								720	
7/84	SYSTEM								744	
8/84	SYSTEM								744	
9/84	SYSTEM								720	

** PROBLEMS/SOLUTIONS/COMMENTS

OVERALL FGD SYSTEM AVAILABILITY FOR THE FIRST THREE QUARTERS OF 1984 WAS ESTIMATED AT 90%.

THE UTILITY REPORTED THAT DUE TO A TIGHTENING OF THE WATER LOOP, IT IS NO LONGER NECESSARY TO SPIKE THE THIOSORBIC LIME WITH DOLOMITIC LIME. THE MAGNESIUM OXIDE CONTENT OF THE THIOSORBIC LIME IS SUFFICIENT FOR OPERATIONS.

THE UTILITY IS NOW DIVERTING INDUCED DRAFT FAN SPRAY WATER TO AN ASH POND INSTEAD OF RECYCLING TO THE ABSORBERS. LIME CONSUMPTION HAS IMPROVED SINCE THE HIGHLY ACIDIC SPRAY WATER IS NO LONGER INTRODUCED IN THE SYSTEM.

THE UTILITY REPORTED A THREE WEEK SCHEDULED ANNUAL OUTAGE IN THE FIRST THREE QUARTERS OF 1984. DURING THIS TIME REPAIRS WERE MADE TO DUCTWORK AND DAMPERS. MIST ELIMINATOR TURN VANES WERE ALSO REPLACED.

THE 1000 CFM PILOT SCRUBBER LOANED TO THE UTILITY BY DRAVO IS NOW IN OPERATION. THIS PILOT SCRUBBER IS USED TO TEST VARIOUS ADDITIVES TO THE LIME PROCESS SUCH AS SODIUM THIOSULFATE AND OTHER ORGANIC ADDITIVES.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DUQUESNE LIGHT	
PLANT NAME	PHILLIPS	
UNIT NUMBER	1-6	
CITY	SOUTH HEIGHTS	
STATE	PENNSYLVANIA	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	34.	(.080 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	258.	(.600 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	387	
GROSS UNIT GENERATING CAPACITY - MW	408	
NET UNIT GENERATING CAPACITY W/FGD - MW	373	
NET UNIT GENERATING CAPACITY WO/FGD - MW	387	
EQUIVALENT SCRUBBED CAPACITY - MW	408	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	FOSTER WHEELER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	CYCLING	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1047.62	(2220000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	183.3	(362 F)
STACK HEIGHT - M	104.	(340 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.9	(26.0 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26907.	(11568 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		11500-12500
AVERAGE ASH CONTENT - %	16.80	
RANGE ASH CONTENT - %	14.0-18.3	
AVERAGE MOISTURE CONTENT - %	5.93	
RANGE MOISTURE CONTENT - %	4.3-7.1	
AVERAGE SULFUR CONTENT - %	2.05	
RANGE SULFUR CONTENT - %	1.5-2.9	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	.03-.05	
 *** PARTICLE CONTROL		
 ** MECHANICAL COLLECTOR		
NUMBER	6	
NUMBER OF SPARES	0	
TYPE	MULTICLONE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY - CU.M/S	174.6	(370000 ACFM)
INLET FLUE GAS TEMPERATURE - C	183.3	(362 F)
PRESSURE DROP - KPA	.1	(1. IN-H2O)
 ** ESP		
NUMBER	6	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY - CU.M/S	174.6	(370000 ACFM)
INLET FLUE GAS TEMPERATURE - C	183.3	(362 F)
PRESSURE DROP - KPA	.1	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	70.0	
 ** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
LINER GENERIC MATERIAL	ORGANIC	

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	MAGNESIUM OXIDE, SODIUM
SYSTEM SUPPLIER	GE ENVIRONMENTAL SERVICES
A-E FIRM	GIBBS & HILL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	83.00
ENERGY CONSUMPTION - %	3.4
CURRENT STATUS	1
COMMERCIAL START-UP	6/74
INITIAL START-UP	7/73
CONTRACT AWARDED	7/71

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	2.30	
DESIGN COAL HEAT CONTENT - J/G	25586.0	(11000 BTU/LB)
DESIGN COAL ASH CONTENT - %	21.00	
DESIGN MOISTURE CONTENT - %	7.00	
DESIGN CHLORIDE CONTENT - %	.10	
SPACE REQUIREMENTS - SQ M	24246.9	(261000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	140.0	

** QUENCHER/PRESATURATOR

TYPE	NONE
------	------

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/SIDE-MOVABLE BLADES	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	GE ENVIRONMENTAL SERVICES	
DIMENSIONS - FT	40.0 X 66.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	MAT-REINFORCED EPOXY; GLASS FLAKE-FILLED POLYEST	
LINER MATERIAL TRADE NAME/COMMON TYPE	COROLINE 505AR; FLAKELINE 103	
GAS CONTACTING DEVICE TYPE	VARIABLE THROAT VENTURI	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1008.	(16000 GPM)
L/G RATIO - L/CU.M	3.9	(29.1 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.0	(8.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	45.7	(150.0 FT/S)
INLET GAS FLOW - CU. M/S	259.54	(550000 ACFM)
INLET GAS TEMPERATURE - C	183.3	(362 F)
SO2 REMOVAL EFFICIENCY - %	84.0	
PARTICLE REMOVAL EFFICIENCY - %	99.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR [EXTERNAL]	
NUMBER PER SYSTEM	3	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	HEIL	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	4	
FREEBOARD DISTANCE - M	5.79	(19.0 FT)
DISTANCE BETWEEN VANES - CM	5.1	(2.00 IN)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

VANE ANGLES - DEGREES	90
PRESSURE DROP - KPA	1.0 (4.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0 (10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	THICKENER OVERFLOW
WASH FREQUENCY	CONTINUOUS
** REHEATER	
NUMBER	2
GENERIC TYPE	DIRECT COMBUSTION
SPECIFIC TYPE	IN-LINE BURNER
TRADE NAME/COMMON TYPE	OIL
TEMPERATURE INCREASE - C	16.7 (30 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
NUMBER	4
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	GREEN FUEL ECONOMIZER
FUNCTION	BOOSTER
APPLICATION	INDUCED DRAFT
SERVICE	WET
FLUE GAS FLOW RATE - CU.M/S	188.76 (400000 ACFM)
FLUE GAS TEMPERATURE - C	51.7 (125 F)
PRESSURE DROP - KPA	5.2 (17.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY; HIGH ALLOY; STAINLESS
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	BUTTERFLY
SPECIFIC TYPE	N/A
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	LINED CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	STAINLESS STEEL
LINER SPECIFIC MATERIAL TYPE	AUSTENITIC
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	STAINLESS STEEL
LINER SPECIFIC MATERIAL TYPE	AUSTENITIC
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
LOCATION	SCRUBBER INLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	NA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	SCRUBBER OUTLET
CONFIGURATION	RECTANGULAR
DIMENSIONS	NA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	SLAKER
DEVICE TYPE	PASTE
MANUFACTURER	WALLACE & TIERNAN
NUMBER	4
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	3.6 (4 TPH)
PRODUCT QUALITY - % SOLIDS	22.5
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	4
REAGENT PREP PRODUCT	1
THICKENER OVERFLOW	1
SLUDGE STABILIZATION	1
** PUMPS	
SERVICE	NUMBER
-----	-----
SCRUBBER/ABSORBER RECIRCULATION	8
THICKENER OVERFLOW	6
THICKENER UNDERFLOW	1
SLURRY FEED	5
MAKEUP WATER	1
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	1
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	12(DIA)X16
CAPACITY	150 LB/HR/SQ FT OF CLOTH
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	30-35% SOLIDS
OUTLET STREAM CHARACTERISTICS	50% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	<0.1% SOLIDS
OUTLET STREAM DISPOSITION	SLUDGE TREATMENT
OVERFLOW STREAM DISPOSITION	THICKENER UNDERFLOW TANK
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	3
NUMBER OF SPARES	1
CONFIGURATION	CIRCULAR
DIMENSIONS FT	75.0 DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	5% SOLIDS
OUTLET STREAM CHARACTERISTICS	30-35% SOLIDS
OUTLET STREAM DISPOSITION	VACUUM FILTER
OVERFLOW STREAM DISPOSITION	ME WASH

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

*** SLUDGE	
MOISTURE CONTENT - % TOTAL FREE WATER	27.5
% CASO3 - DRY	4.0
% CASO4 - DRY	10.0
% ASH - DRY	50.0
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-O-TEC]
INLET FLOW RATE - LITER/S	34.6 (550 GPM)
INLET QUALITY - %	50.0
** DISPOSAL	
NATURE	INTERIM
TYPE	CONCRETE PAD FOR ON-SITE CURING
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	OFF-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	CLAY LINING
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	SLURRY RECIRCULATION STREAM
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	FLOW
CONTROL LEVELS	PH SET 7.7
MONITOR TYPE	UNIVERSAL UNILOC
MONITOR LOCATION	TANGENTIAL NOZZLE AT INLET TO ABSORBER
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	OPEN
EVAPORATION WATER LOSS - LITER/S	13.9 (220 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	1.9 (30 GPM)
SLUDGE INTERSTITIAL WATER LOSS - LITERS/S	3.1 (50 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	300
RECEIVING WATER STREAM	OHIO RIVER
MAKEUP WATER ADDITION - LITERS/S	22.0 (350 GPM)
SOURCE OF MAKEUP WATER	RIVER
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	MAGNESIUM-MODIFIED LIME
PRINCIPAL CONSTITUENT	CAO, MGO
SOURCE/SUPPLIER	DRAVO
CONSUMPTION	120 TPD
UTILIZATION %	85.0
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	.0
MIST ELIMINATOR %	.0
FAN - %	.0
SLAKER - %	.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP - %	.0
THICKENER - %	50.0
VACUUM FILTER - %	100.0

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

** FGD SPARE COMPONENT INDICES

ABSORBER	.0
MIST ELIMINATOR	.0
FAN	.0
SLAKER	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	.0
THICKENER	.5
VACUUM FILTER	1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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0/73 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

DETERMINATION OF THE AVAILABILITY OF THE PHILLIPS SYSTEM HAS BEEN DIFFICULT. UNTIL ALL BOILERS WERE CONNECTED TO THE SCRUBBERS, THERE WAS AT LEAST ONE SPARE TRAIN AND AS MUCH AS 100% SPARE SCRUBBER CAPACITY. THEREFORE HAVING A TRAIN OUT OF SERVICE FOR MAINTENANCE DID NOT REDUCE THE CAPABILITY OF THE SCRUBBER SYSTEM. UNTIL ALL SIX BOILERS WERE CONNECTED, MEANINGFUL AVAILABILITY FACTORS COULD NOT BE COMPUTED. ON MARCH 17, 1975, THE SIXTH BOILER WAS CONNECTED, AND ALL FOUR SCRUBBER TRAINS WERE REQUIRED TO BE IN SERVICE. OPERATION IN THAT MODE CONTINUED UNTIL AUGUST 4, 1975, WHEN THE NO. 6 BOILER WAS REMOVED FROM THE SCRUBBER SYSTEM BECAUSE THE PH LEVEL COULD NOT BE MAINTAINED AND DEPOSITS BECAME UNMANAGEABLE TO THE POINT THAT SCRUBBER OUTAGES WERE REDUCING GENERATING CAPABILITY OF THE STATION.

7/73	SYSTEM		81.0	31.2			744	232
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** PROBLEMS/SOLUTIONS/COMMENTS

SCRUBBING OPERATIONS BEGAN DURING JULY.

8/73	SYSTEM						744
9/73	SYSTEM						720
10/73	SYSTEM						744
11/73	SYSTEM						720
12/73	SYSTEM						744
1/74	SYSTEM						744
2/74	SYSTEM						672
3/74	SYSTEM						744

** PROBLEMS/SOLUTIONS/COMMENTS

STARTUP OF A PORTION OF THE PHILLIPS SCRUBBER SYSTEM BEGAN JULY 1973. SEVERAL PROBLEMS THEN DEVELOPED IN THE FORM OF EROSION OF FANS AND THE LIME FEED SYSTEM CAUSING OUTAGES OF THE SCRUBBER SYSTEM. AFTER AN EXTENDED OUTAGE, THE SCRUBBER SYSTEM WAS RETURNED TO SERVICE IN MARCH 1974. THE SYSTEM HAS BEEN OPERATING CONTINUOUSLY SINCE IT RETURNED TO SERVICE WITH VARIOUS NUMBERS OF BOILERS CONNECTED TO THE SCRUBBER SYSTEM AND SCRUBBER TRAINS IN SERVICE.

4/74	SYSTEM						720
5/74	SYSTEM						744
6/74	SYSTEM						720

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
7/74	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE FGD SYSTEM CONSISTS OF 1 TWO-STAGE AND 3 ONE-STAGE VENTURI SCRUBBERS. PRESENTLY ONLY THE TWO-STAGE AND 1 ONE-STAGE TRAIN ARE IN SERVICE TREATING FLUE GAS FROM BOILERS 2, 3, AND 4 (ABOUT 40% OF THE STATION CAPACITY). CHRONIC PROBLEMS INCLUDE PUMP EROSION AND FAN VIBRATION.									
8/74	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE FGD SYSTEM EXPERIENCED PLUGGING PROBLEMS IN EARLY AUGUST. THE UTILITY IS CURRENTLY INVOLVED IN A RECYCLE PUMP STUDY. CONSIDERATIONS FOR PUMP DESIGN AND MATERIALS ARE BEING MADE TO IMPROVE PUMP LIVE.									
9/74	SYSTEM							720	
10/74	SYSTEM							744	
11/74	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
SINCE STARTUP IN SEPTEMBER 1973 THE FGD SYSTEM HAS OPERATED AT REDUCED CAPACITY WITH ONLY 2 OR 3 OF THE 4 TRAINS OPERATING AT ANY TIME TREATING FLUE GAS FROM 4 BOILERS (ABOUT 40% OF THE STATION CAPACITY). THE TIE IN OF BOILER NO. 5 DURING NOVEMBER HAS BOOSTED THE FGD SYSTEMS LOAD TO ABOUT 62% OF THE STATION CAPACITY. OVERALL SO2 REMOVAL EFFICIENCY IS 60%. THE TWO-STAGE TRAIN ITSELF REMOVES 80% OF THE INLET SO2. TESTS WITH MAGNESIUM PROMOTED LIME INDICATE THAT SO2 REMOVAL EFFICIENCY CAN BE BOOSTED BY 60% OVER COMMERCIAL LIME.									
DURING THE PERIOD REBRACING OF FAN BLADES WAS IN PROGRESS.									
12/74	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
DURING DECEMBER REPAIRS WERE MADE TO HOLES IN THE MIST ELIMINATORS WITH CEILCOTE APPLICATIONS.									
FOUR TONS OF SLUDGE WERE REMOVED FROM ONE SCRUBBER BASE. THE VENTURI DAMPERS WERE SEIZING AS A RESULT OF SOLIDS BUILDUP.									
THE UTILITY IS AWAITING THE DELIVERY OF SPARE RECYCLE PUMPS.									
1/75	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
THREE SCRUBBING TRAINS OPERATED ON TWO THIRDS OF THE BOILER FLUE GAS OUTPUT. THE SCRUBBING SYSTEM OPERATED ON FLUE GAS FROM FIVE BOILERS THROUGHOUT JANUARY WITH NEARLY 100% FGD SYSTEM AVAILABILITY. OVERALL SO2 REMOVAL EFFICIENCY WAS APPROXIMATELY 60%.									
BECAUSE OF SOLIDS BUILDUP THE DAMPERS WERE SEIZING. THE UTILITY HAS BEEN EXERCISING THE DAMPERS MORE FREQUENTLY AS A RESULT AND THIS SEEMS TO HAVE IMPROVED DAMPER OPERATIONS.									
DUE TO COLD WINTER WEATHER AND RELATED CONDITIONS THE SLUDGE STABILIZATION PROCESS REQUIRES A LONGER PERIOD OF TIME. THE SLUDGE PONDS HAVE BEEN									

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

FILLING IN 8 TO 9 DAYS. 6 TO 7 DAYS ARE REQUIRED TO EMPTY PONDS. THE CURRENT SLUDGE PRODUCT HAS BEEN A SOUPY CONSISTENCY REQUIRING A CLAMSHELL TYPE DREDGE FOR THE POND. PLUGGING IN THE STABILIZING AGENT INJECTION LINES IS THOUGHT TO HAVE CONTRIBUTED TO THE POOR SLUDGE QUALITY.

SOME WET SIDE SO2 MONITORS FAILED DURING THE PERIOD. THEY ARE CURRENTLY BEING MODIFIED BY THE MANUFACTURER.

THE REHEATERS HAVE NOT YET BEEN TESTED.

2/75 SYSTEM 672

3/75 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE FOURTH FGD TRAIN AND THE SIXTH BOILER WERE TIED IN ON MARCH 17, 1975. ONE OF THE BOILERS WAS DOWN FOR MAINTENANCE SO THE SCRUBBING SYSTEM DID NOT OPERATE ON FLUE GAS FROM ALL SIX BOILERS.

DURING MARCH THE PROGRAM TO IMPROVE SCRUBBER RECYCLE PUMP PERFORMANCE CONTINUED. FOUR OUT OF SIX NEW PUMPS HAVE BEEN INSTALLED.

THE CALCILOX INJECTION SYSTEM LINES HAVE BEEN PLUGGING FREQUENTLY. THE UTILITY IS CONSIDERING A NEW PNEUMATIC DELIVERY SYSTEM FOR CALCILOX.

THE UTILITY IS CURRENTLY LOOKING FOR NEW SLUDGE DISPOSAL SITES.

4/75 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE PRESSURE DROP INSTRUMENTATION AT THE VENTURIS HAS BEEN A PROBLEM AREA.

THE DAMPERS HAVE STILL BEEN SEIZING BECAUSE OF SOLIDS BUILDUP.

ALL SIX BOILERS AND FOUR SCRUBBING TRAINS OPERATED IN AN INTEGRATED MODE IN APRIL. SOME SOLIDS BUILDUP HAS BEEN DISCOVERED AGAIN IN THE SCRUBBING TRAINS.

BECAUSE OF EROSION AND PLUGGING PROBLEMS, A CONTINUOUS WASH IS NOW PERFORMED ON THE MIST ELIMINATORS.

5/75 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

PRELIMINARY PARTICULATE MATTER REMOVAL EFFICIENCY TESTS SHOWED THAT THE UNIT MEETS THE 0.8 LB/MM BTU ALLEGHENY COUNTY STANDARD. THE OUTLET LOADINGS IN MAY WERE IN THE 0.04 LB/MM BTU RANGE.

A HOLE WAS DISCOVERED IN A SCRUBBER LINER DURING MAY. A PREVIOUSLY PATCHED AREA HAD FAILED AGAIN.

6/75 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED ON FLUE GAS FROM ALL SIX BOILERS DURING JUNE. THE TWO-STAGE SCRUBBING TRAIN HAS BEEN OUT OF SERVICE FOR GENERAL MAINTENANCE AND A LINER LEAK REPAIR IN THE FIRST-STAGE SCRUBBER SINCE JUNE 19.

SOME RECYCLE PUMP REPLACEMENTS WERE REQUIRED DURING JUNE.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

THE SLUDGE STABILIZATION FACILITY HAS BEEN EXPERIENCING PROBLEMS.

UNBURNED CARBON FINES ARE CAUSING PLUGGING IN THE SCRUBBING SYSTEMS. THE UTILITY HAS BEEN TRYING A WETTING AGENT TO MINIMIZE THE PROBLEM.

PROBLEMS WERE EXPERIENCED WITH THE LIME HANDLING SYSTEM DURING JUNE.

7/75	101	79.1	53.8			
	201	35.5	24.2			
	301	100.0	71.4			
	401	100.0	97.2			
	SYSTEM	90.5	61.6	744	506	458

** PROBLEMS/SOLUTIONS/COMMENTS

GENERAL MECHANICAL PROBLEMS WERE EXPERIENCED IN JULY.

8/75	101	97.7	64.2			
	201	100.0	91.7			
	301	66.0	43.4			
	401	65.3	42.9			
	SYSTEM	82.3	60.5	744	489	453

** PROBLEMS/SOLUTIONS/COMMENTS

SCRUBBER UNAVAILABILITY FORCED BOILER NO.6 TO BE RETURNED TO THE SCRUBBER BYPASS PATH IN ORDER TO PREVENT LOSS OF BOILER CAPACITY.

PLUGGING AND MAINTENANCE PROBLEMS HAVE BEEN ENCOUNTERED.

EVALUATION OF VARIOUS RECYCLE PUMPS CONTINUED IN AUGUST.

9/75	101	8.5	7.9			
	201	83.5	77.9			
	301	100.0	95.1			
	401	79.8	74.4			
	SYSTEM	68.0	63.8	720	672	460
10/75	101	88.4	81.6			
	201	30.1	27.8			
	301	73.5	67.9			
	401	70.9	65.5			
	SYSTEM	65.7	60.7	744	687	451

** PROBLEMS/SOLUTIONS/COMMENTS

IN OCTOBER 1975, THIOSORBIC LIME SCRUBBING WAS INITIATED IN THE PHILLIPS SINGLE-STAGE SCRUBBING TRAINS ON AN EXPERIMENTAL BASIS. THE UTILITY IS STUDYING COMPLIANCE FEASIBILITY, SO2 REMOVAL EFFICIENCY, AND QUALITY OF THE SLUDGE GENERATED BY THE SINGLE-STAGE SCRUBBING TRAINS.

PRESENTLY ONLY 4 OF THE 6 BOILERS ARE TIED INTO THE FGD SYSTEM.

11/75	101	86.9	86.9			
	201	100.0	100.0			
	301	.0	.0			
	401	10.4	10.4			
	SYSTEM	49.3	49.3	720	720	355
12/75	101	50.8	48.4			
	201	93.2	88.8			
	301	25.7	24.5			
	401	54.4	51.9			
	SYSTEM	56.0	53.4	744	709	397

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY CONCLUDED THE THIOSORBIC LIME TESTING PROGRAM IN MID-DECEMBER. FOUR BOILERS WERE COUPLED TO THE SCRUBBING SYSTEM DURING THE RUN. THE UTILITY IS NOW ANALYZING THE DATA GENERATED DURING THE TEST PROGRAM. THE SCRUBBERS HAVE BEEN PUT BACK ON REGULAR LIME. NO UNUSUAL PROBLEMS WERE ENCOUNTERED DURING THE TEST RUN. THE UTILITY HAS STARTED CONSTRUCTION ON AN ADDITIONAL LIME SLAKER FOR FULL SCALE MAGNESIUM PROMOTED LIME OPERATION. THE THICKENER MAY REQUIRE REDESIGN TO ACCOMMODATE INCREASED CAPACITY.

1/76	101	38.4	37.2			
	201	74.2	72.0			
	301	14.0	13.6			
	401	97.9	95.0			
	SYSTEM	56.1	54.4	744	722	405

** PROBLEMS/SOLUTIONS/COMMENTS

THE 2.5-MONTH TEST PROGRAM WITH THIOSORBIC LIME INCLUDED 1612 HOURS ON ONE TRAIN AND 1309 HOURS ON ANOTHER TRAIN. RESULTS INDICATE THAT THE REQUIRED DEGREE OF SO2 REMOVAL (83%) CAN BE OBTAINED WITH AN MGO CONTENT OF 8-10% IN THE LIME WITH SINGLE-STAGE SCRUBBING.

2/76	101	97.8	94.4			
	201	98.5	95.1			
	301	24.7	23.9			
	401	60.4	58.3			
	SYSTEM	70.4	67.9	696	672	472

3/76	101		93.4			
	201		47.5			
	301		88.6			
	401		62.0			
	SYSTEM		72.9	744		542

4/76	SYSTEM			720		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY IS STILL EXPERIENCING PROBLEMS WITH SOLIDS DEPOSITION IN THE VENTURI THROAT OF THE SCRUBBING TRAINS, CAUSING MOVEMENT INHIBITION AND GREATER PRESSURE DROPS.

THE SLUDGE STABILIZATION PRACTICES ARE STILL CONTINUING AT THIS FACILITY.

PLANT OPERATION IS PROCEEDING WITH A TOTAL OF FOUR BOILERS COUPLED INTO THE SCRUBBING SYSTEM (EQUALING 336 MW, WHICH IS 87% OF THE TOTAL PLANT CAPACITY). THE FGD SYSTEM OPERATED ON HIGH CALCIUM LIME DURING THE REPORT PERIOD. THE GENERAL OPERATION MODE AT THIS FACILITY HAS ONE OF THE FOUR SCRUBBING TRAINS OUT CONTINUALLY FOR REPAIRS, CLEANING, AND PREVENTIVE MAINTENANCE. THE FGD SYSTEM AVAILABILITY FOR THE FIRST QUARTER OF 1976 WAS 72%.

5/76	SYSTEM			744		
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6/76	SYSTEM			720		
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** PROBLEMS/SOLUTIONS/COMMENTS

REDUCED LOAD OPERATIONS WERE REPORTED BY THE UTILITY FOR THE MAY-JUNE PERIOD BECAUSE OF A SCHEDULED TURBINE OVERHAUL ON BOILER NO. 6.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

THE UTILITY IS PROCEEDING WITH THE INSTALLATION OF THREE ADDITIONAL LIME STORAGE SILOS AND A THIRD THICKENER.

THE SCRUBBING SYSTEM WAS SHUT DOWN ON JUNE 27 FOR A SCHEDULED FOUR WEEK REPAIR PERIOD. THE MAJORITY OF THE WORK WILL BE CONCENTRATED ON THE STACK ASSOCIATED DUCTWORK AND BOILER DAMPERS. THE ACID BRICK FLUE HAS BEEN LEAKING PARTICULARLY IN THE MORTAR JOINTS AND STEEL BANDS SUPPORTING THE BRICK HAVE BEEN CORRODING. CORROSION HAS OCCURRED IN THE DUCTWORK IN THE EXPANSION JOINT AREA WHERE THE DUCT ENTERS THE STACK.

THE SLUDGE IS CURRENTLY BEING STABILIZED WITH A CALCILOX ADDITION AT A RATE OF APPROXIMATELY 10% BY WEIGHT OF SLUDGE. THE UTILITY IS PLANNING TO CONTRACT IUCS FOR SLUDGE STABILIZATION IN APPROXIMATELY A YEAR.

7/76 SYSTEM 744

8/76 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE FOUR-WEEK SYSTEM OVERHAUL WAS COMPLETED JULY 25. THE THREE ADDITIONAL LIME STORAGE SILOS AND THE FOUNDATION FOR THE ADDITIONAL 75-FOOT DIAMETER THICKENER HAVE BEEN INSTALLED. WHEN THE NEW EQUIPMENT IS INSTALLED THE UTILITY WILL SWITCH FROM LIME TO MAGNESIUM PROMOTED (THIOSORBIC) LIME. THE UTILITY HAS SIGNED A LETTER OF INTENT WITH IUCS FOR A LONG-TERM SLUDGE TREATMENT SYSTEM.

REPAIRS WERE MADE ON THE TURNING VANES TO THE SCRUBBER MIST ELIMINATORS. THE CEILCOTE COATING ON MODULE 401 FAILED (ORIGINAL COAT ERODED AWAY AND CORROSION HAD SET IN).

REPAIR WORK WAS COMPLETED ON THE EXPANSION JOINT SEAL WHERE THE DUCTWORK TIES INTO THE MAIN STACK.

THE STEEL BANDS AROUND THE INNER STACK STRUCTURE WERE REPAIRED.

THE SCRUBBERS ID FANS WERE OVERHAULED.

THE BOILER EXIT DAMPERS WERE REPAIRED.

REPAIRS WERE MADE TO STOP LEAKING IN THE ACID-BRICK FLUE OF THE MAIN STACK.

9/76 SYSTEM 720

10/76 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

BOILER NUMBERS 2 THROUGH 6 WERE COUPLED INTO THE SCRUBBING SYSTEM. BOILER NO. 1 IS DOWN FOR OVERHAUL AND REPAIRS. THE IUCS INTERIM SLUDGE PROCESSING PLANT IS UNDER CONSTRUCTION AND WILL BE IN SERVICE BY DECEMBER 1976. THE TEMPORARY FACILITIES WILL PROCESS THE THICKENER UNDERFLOW AND PONDED SLUDGE UNTIL THE POND IS DEPLETED OF SLUDGE AND THE PERMANENT FACILITY HAS BEEN INSTALLED. SCRUBBING OPERATIONS ARE STILL PROCEEDING IN AN OPEN WATER LOOP MODE WITH PART OF THE THICKENER OVERFLOW BEING DIVERTED TO THE ASH POND. BECAUSE BOTH THE BEAVER VALLEY AND BRUCE MANSFIELD STATIONS ARE FULLY OPERATIONAL, THIS STATION HAS BEEN RELEGATED TO PEAK LOAD OPERATIONS. GENERAL LOAD OPERATIONS ARE FULL LOAD CAPACITY IN THE DAYTIME AND 50 TO 67% LOAD REDUCTION AT NIGHT.

TOTAL SCRUBBER HOURS: 23,274

TOTAL BOILER HOURS: 83,642

TOTAL SCRUBBER OUTAGE TIME: 5,500

TOTAL SCRUBBER AVAILABLE

THE FIGURES AT THE LEFT WERE COMPILED BY THE UTILITY FOR SYSTEM OPERATIONS FOR THE PERIOD FOLLOWING START-UP IN JULY 1973 INCLUSIVE TO OCTOBER 1976.

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
HOURS: 23,274 AVERAGE MW LOAD/SCRUBBER OPERATION HOUR: 243 TOTAL OPERABILITY INDEX: 28% TOTAL RELIABILITY INDEX: 81%						THE TOTAL SCRUBBER HOURS VALUE INCLUDES OPERATION TIME WHEN ONE OR MORE OF THE MODULES WERE IN SERVICE. TOTAL BOILER AND UNAVAILABILITY VALUES APPLY FOR ALL THE CORRESPONDING UNITS. THE TOTAL SCRUBBER AVAILABILITY INDEX INCLUDES THE TIME WHEN ONE OR MORE MODULES WERE AVAILABLE FOR SERVICE.				

11/76 SYSTEM

720

12/76 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE IUCS SLUDGE STABILIZATION FACILITY AT PHILLIPS WAS INSTALLED AND STARTED UP IN DECEMBER. THE FACILITY INCLUDES EQUIPMENT FOR DEWATERING, ESP-COLLECTED FLYASH ADDITION AND TRANSPORT TO THE OFF-SITE LANDFILL.

THE RECYCLE PUMP EVALUATION IS CONTINUING. AFTER 2500 HOURS OF OPERATION THE PUMPS USING CARBORUNDUM WEAR RINGS AND CD4 MCU IMPELLERS WERE HOLDING UP WELL. THEY HAVE NOW ACCUMULATED 2800 HOURS OF OPERATION (THEY WERE INSPECTED AFTER 2500 HOURS). AFTER 2900 HOURS OF OPERATION PUMPS USING CARBORUNDUM WEAR RINGS AND TITANIUM IMPELLERS WERE PERFORMING WELL.

BOILERS 2 THROUGH 6 WERE COUPLED INTO THE SYSTEM THROUGHOUT THE PERIOD. BOILER 1 REMAINED SHUT DOWN.

THE FIRST NEW SLAKER (PASTE TYPE SLAKER), ONE OF FOUR NEW UNITS CAME ON LINE DURING THE PERIOD. HIGHER STOICHIOMETRIC RATIOS, HIGHER PH VALUES AND INCREASED SO2 REMOVAL EFFICIENCY RESULTED IN THE SYSTEMS.

IN ORDER TO ENHANCE SETTLING IN THE TWO 75-FOOT DIAMETER THICKENERS A POLYELECTROLYTE MATERIAL WILL BE ADDED ON A TEMPORARY BASIS. WHEN THE NEW 75-FOOT THICKENER IS BROUGHT ON LINE THE POLYELECTROLYTE ADDITION IS EXPECTED TO BE TERMINATED.

THE CONTRACT WITH DRAVO FOR THIOSORBIC LIME (MG-PROMOTED LIME) HAS BEEN FINALIZED. THE SWITCH TO MAGNESIUM PROMOTED LIME WILL TAKE PLACE WHEN THE LAST THICKENER IS COUPLED INTO THE SYSTEM.

THE VENTURIS ARE ENCOUNTERING A GREAT DEAL OF SCALING. PRESSURE DROPS ACROSS THE VENTURIS ARE REGISTERING TWICE THE NORMAL PRESSURE DROP AT 12 INCHES H2O(6 INCHES H2O IS DESIGN).

1/77 SYSTEM

744

2/77 SYSTEM

672

** PROBLEMS/SOLUTIONS/COMMENTS

1977 FULL COMPLIANCE OPERATIONS WILL INCLUDE 83% SO2 REMOVAL FOR 2% SULFUR COAL UTILIZING THIOSORBIC LIME (6-12% MG) AND FIXATING THE SCRUBBER WASTES WITH THE IUCS POZ-O-TEC METHOD. THE FIXATED MATTER WILL BE HAULED AWAY TO AN OFF-SITE DISPOSAL AND LANDFILL. IUCS HAS BEEN AWARDED A TEN YEAR CONTRACT FOR THE USE OF THIS METHOD.

3/77 SYSTEM

744

4/77 SYSTEM

720

-----PERFORMANCE DATA-----							
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER FGD CAP. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

ALL SIX BOILERS ARE COUPLED INTO THE FGD SYSTEM.

THE RECYCLE PUMP EVALUATION IS CONTINUING. THE CARBORUNDUM IMPELLERS AND WEAR RINGS ARE PERFORMING WELL AFTER 4000 OPERATING HOURS.

CONSTRUCTION OF THE THICKENERS AND LIME FEEDERS IS STILL CONTINUING. FULL PLANT COMPLIANCE SHOULD OCCUR BY DECEMBER 1977 WHEN THE NEW THICKENERS AND SLAKERS COME ON LINE.

THE IUCS FACILITY IS JUST FILTERING OUT WATER. NO FIXATIVE IS BEING ADDED. THE WASTE ARE BEING HAULED AWAY TO AN OFF-SITE LANDFILL ONE MILE FROM THE STATION.

SO2 AND PARTICULATE MATTER REMOVAL EFFICIENCIES ARE 50 AND 99+% RESPECTIVELY.

1975 THIOSORBIC LIME TESTS SHOWS THAT 8% MGO IN THE LIME WAS OPTIMUM FOR SO2 REMOVAL BUT IT IS POSSIBLE TO GO AS HIGH AS 12% MGO. LIME ARRIVING AT PHILLIPS WILL HAVE A 6% MGO CONCENTRATION. IT WILL BE POSSIBLE TO BLEND THE LIME TO ACHIEVE HIGHER MGO AT THE STATION IF NECESSARY.

5/77 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

DAMPER AND MIST ELIMINATOR REPAIRS WILL BE CORRECTED DURING THE NEXT SCHEDULED OUTAGE. OVERALL SCRUBBER OPERABILITY IS ABOUT 75%.

THIOSORBIC LIME TESTS BEGAN IN LATE MAY BUT LASTED ONLY ABOUT ONE WEEK.

THE SCRUBBER SYSTEM WAS SHUT DOWN FOR THREE TO FOUR DAYS IN MAY DUE TO LEAKING IN THE WET DUCT HEADER THAT LEADS TO THE STACK. WHEN THE LEAK WAS REPAIRED SCRUBBING OPERATIONS BEGAN AGAIN ON FLUE GAS FROM FOUR BOILERS.

WHILE FIXING A DUCT LEAK INSPECTION OF OTHER COMPONENTS REVEALED THAT THE BOILER EXIT DAMPERS WERE ERODING.

ONE OF THE MODULE 201 EXTERNAL MIST ELIMINATORS WAS SEVERLY ERODED AND PLUGGED.

THE INTERIM SLUDGE DISPOSAL SYSTEM IS STILL OPERATIONAL. THE PERMANENT SLUDGE DISPOSAL FACILITY IS ON SCHEDULE FOR THE DECEMBER 1977 COMPLETION DATE.

THE CARBORUNDUM WEAR RINGS AND IMPELLERS WERE CONTINUING TO PERFORM WELL AFTER 5000 OPERATING HOURS.

6/77 SYSTEM

720

7/77 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

ALL SIX BOILERS ARE COUPLED INTO THE SCRUBBER PLANT. FLUE GAS FROM FIVE OF THESE UNITS IS BEING TREATED BY THE SCRUBBERS. ONLY FOUR OF THE SIX BOILERS ARE ACTUALLY OPERATING BECAUSE OF THE CURRENT TURBINES REPAIR OUTAGE. OPERATIONS ARE PROCEEDING WITH ONE SCRUBBING TRAIN OUT OF SERVICE AT ALL TIMES FOR MAINTENANCE AND CLEANOUT. SO2 REMOVAL EFFICIENCY IS APPROXIMATELY 50%.

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

BOILER 6 HAS BEEN OUT OF SERVICE WHILE TURBINE REPAIRS ARE BEING MADE.

THE RECYCLE PUMP EVALUATION STUDY CONTINUED DURING THE PERIOD. COMPONENTS BEING EVALUATED INCLUDE: CARBORUNDUM IMPELLERS, CARBORUNDUM WEAR RINGS, TITANIUM IMPELLERS, 317SS WEAR RINGS AND STELLITE TIPPED IMPELLERS.

A THIOSORBIC LIME TEST WAS PREMATURELY TERMINATED BECAUSE OF SOME MINOR SLAKER/FEEDER PROBLEMS. HIGH CALCIUM VIRGIN LIME WAS UTILIZED DURING THE MAJORITY OF OPERATIONS THROUGHOUT THE PERIOD.

8/77 SYSTEM 744

9/77 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

LIME HANDLING AND SOLID WASTE DISPOSAL FACILITIES WERE BEING SCALED UP TO HANDLE FULL CAPACITY AND A THIRD THICKENER WAS INSTALLED AND BROUGHT INTO SERVICE DURING THIS REPORT PERIOD. THE IUCS SYSTEM IS STILL PERFORMING INTERIM PHASE OPERATIONS. WASTE WATER IS BEING MIXED WITH FLYASH AND DISPOSED WITHOUT FIXATIVE ADDITION. CURRENT CONSTRUCTION WORK IS EXPECTED TO BE COMPLETED BY THE END OF JANUARY WHEN ALL SIX BOILERS WILL BE BACK ON LINE FOR A TWO MONTH TEST PERIOD. THIOSORBIC LIME IS STILL BEING TESTED. RESULTS ARE NOT YET AVAILABLE. THE FGD SYSTEM WILL BE DOWN FOR THE FIRST WEEKEND OF NOVEMBER. THE SYSTEM WILL ALSO BE CHECKED FOR MAIN DUCT LEAKS AT THIS TIME. THE SCRUBBER AND STACK LININGS AND RECYCLE PUMPS WILL BE THOROUGHLY CHECKED AS WELL. NECESSARY REPLACEMENTS AND REPAIRS WILL BE CARRIED OUT. CURRENT SO2 REMOVAL EFFICIENCY IS 50%. BY EARLY APRIL 1978 THE SYSTEM IS EXPECTED TO REACH COMPLIANCE WITH AN SO2 REMOVAL EFFICIENCY OF 83%.

10/77	101	92.6	92.6			
	201	4.0	4.0			
	301	88.3	88.3			
	401	87.7	87.7			
	SYSTEM			744	744	507

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 101 WAS DOWN A TOTAL OF 113 HOURS IN OCTOBER FOR REGULAR MAINTEN-
 ANCE AND REPAIRS.

MODULE 201 WAS PUT IN SERVICE ON OCTOBER 26 AFTER EXTENSIVE CLEAN UP. ALSO REPAIRS TO THE ID FAN HOUSING RUBBER LINING WERE MADE AND THE FAN WAS BALANCED.

MODULE 301 WAS DOWN A TOTAL OF 57 HOURS IN OCTOBER FOR MAINTENANCE AND REPAIRS.

MODULE 401 WAS DOWN A TOTAL OF 36 HOURS IN OCTOBER FOR REPAIR OF HOLES IN THE ID FAN LINING AND FOR THE TIE-IN OF THE THICKENER BLEED LINE.

11/77	101	92.1	92.1			
	201	91.6	91.6			
	301	28.1	28.1			
	401	56.3	56.3			
	SYSTEM	67.0	67.0	720	720	483

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SHUTDOWN OUTLET DUCT LEAKS WERE REPAIRED.

BOILER EXIT DAMPERS WERE REPLACED. THE OLD DAMPERS FAILED DUE TO FLYASH EROSION.

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

CORROSION OF STEEL BANDS IN STACK WAS DISCOVERED DURING THE PERIOD. THE CORROSION IS A RESULT OF CONDENSED MOISTURE SEEPING THROUGH THE MORTAR.

SLUDGE HANDLING PROBLEMS HAVE OCCURRED BECAUSE DEWATERING OPERATIONS ARE NOT WORKING PROPERLY.

THE RESULTS FROM THIOSORBIC LIME USE CAN NOT YET BE QUANTIFIED DUE TO LIME FEED SYSTEM PROBLEMS.

LIME FEED SYSTEM PROBLEMS OCCURRED OVER THE PERIOD.

THE MIST ELIMINATORS WERE CLEANED DURING NOVEMBER.

12/77	SYSTEM				744		
1/78	101	84.3	84.3				
	201	77.2	77.2				
	301	.0	.0				
	401	65.1	65.1				
	SYSTEM	56.6	56.7		744	744	421

** PROBLEMS/SOLUTIONS/COMMENTS

CUMULATIVE HOURS FOR JANUARY 1, 1977 THROUGH JANUARY 8, 1978 WERE 22391 FOR MODULE 101, 20998 FOR MODULE 201, 22229 FOR MODULE 301 AND 22259 FOR MODULE 401.

SCRUBBER TRAIN 301 WAS DOWN FOR AN OVERHAUL FROM NOVEMBER 17 TO FEBRUARY 6, 1978 WHEN IT WAS RETURNED TO SERVICE.

SCRUBBER TRAIN 401 WAS REMOVED FROM SERVICE ON FEBRUARY 6.

THE IUCS INTERIM SLUDGE TREATMENT SYSTEM HAS SOME DEWATERING PROBLEMS. DURING DECEMBER PHILLIPS EXPERIENCED POOR SLUDGE REMOVAL. THE IUCS PLANT IS WORKING ON A PART TIME BASIS. FULL OPERATIONS ARE EXPECTED LATE THIS SPRING. THE POOR QUALITY SLUDGE IS SENT TO AN EMERGENCY POND AND THEN RE-CIRCULATED BACK TO THE THICKENER.

TESTING WITH THIOSORBIC LIME AT 5% MGO HAS SHOWN THAT THE MGO CONCENTRATION IS NOT GREAT ENOUGH TO EFFECT ADEQUATE SO2 REMOVAL ON A SINGLE STAGE SCRUBBER. THE UTILITY IS GOING TO TEST AT A GREATER MGO CONCENTRATION BY STARTING AT 10% AND THEN DROPPING BACK UNTIL THE CONCENTRATION IS SATISFACTORY. THIS TESTING, AS WELL AS SCRUBBER OPERATIONS, HAVE, HOWEVER, BEEN HAMPERED BY LOW LOADS AS A RESULT OF THE COAL STRIKE.

AN OUTAGE HAS BEEN SCHEDULED AT PHILLIPS TO REPLACE THE CARBON STEEL SUPPORT BANDS IN THE STACK WITH STAINLESS STEEL BANDS.

2/78	101	43.5	31.1			
	201	58.5	41.8			
	301	3.8	2.7			
	401	31.7	22.6			
	SYSTEM	34.4	24.6		672	480 167
3/78	SYSTEM	.0	.0		744	0 0

** PROBLEMS/SOLUTIONS/COMMENTS

AN OUTAGE OCCURRED BETWEEN JANUARY 6 AND JANUARY 8 WHEN THE STACK DRAIN LEAKS WERE REPAIRED BY SANDBLASTING THE OUTER WALL AND REPLACING THE CARBON STEEL BANDS WITH STAINLESS STEEL BANDS.

THE SYSTEM WAS SHUTDOWN ON FEBRUARY 11 DUE TO THE COAL SHORTAGE. THE OUTAGE CONTINUED THROUGH MARCH AND THE SYSTEM IS SCHEDULED TO BE ON LINE BY

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

APRIL 15. DURING THE OUTAGE A NUMBER OF REPAIRS AND MODIFICATIONS WERE MADE.

THE BOILER EXIT DAMPERS WERE LINED WITH 316 SS ON AREAS OF HIGH EROSION CAUSED BY FLYASH IMPINGEMENT.

EXPANSION JOINTS ON THE INLET DUCTWORK WERE SHIELED BY METAL PLATES WHICH WERE WELDED AT ONE END.

NUMEROUS HOLES IN THE WET GAS DUCT WORK WERE REPAIRED AND THE DUCTS WERE RELINED WITH CEILCOTE.

THE VENTURI THROAT DAMPERS WERE CLEANED ON ALL THE SCRUBBERS.

INTERNAL MIST ELIMINATORS WERE CLEANED. THE EXTERNAL MIST ELIMINATORS, WHICH ARE BADLY DETERIORATED, MAY BE REPLACED.

THE STACK ACID BRICK FLUE WAS INSPECTED AND SOME BRICKS WERE REPLACED AT THE TOP OF THE STACK.

CONSTRUCTION WORK ON ADDITIONAL EQUIPMENT SUCH AS THE THICKENER AND SILOS IS ALMOST COMPLETE. IT WAS NOTED THAT THE CEILCOTE LINER COROLINE 505AR HAS HELD UP WELL OVER THREE YEARS ON THE CONICAL APEX OF MODULE 401.

4/78	SYSTEM					720	528	
5/78	SYSTEM					744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM CAME BACK ON LINE AFTER THE COAL STRIKE IN LATE MARCH. IT IS NOT OPERATING AT FULL LOAD BECAUSE THE NO. 6 BOILER IS STILL OUT AND SHOULD BE BACK ON LINE IN MID-JULY. COMPLIANCE TESTS WILL TAKE PLACE IN JULY, AFTER BOILER 6 IS BACK ON LINE, TO SEE IF THE SYSTEM IS MEETING THE 83% SO2 REMOVAL REQUIREMENT FOR 2% SULFUR COAL. THERE WERE NO HOURS REPORTED FOR THIS PERIOD BECAUSE OF PRELIMINARY TESTING BEING CONDUCTING IN PREPARATION FOR THE COMPLIANCE TESTS. SO FAR, TESTS INDICATE THAT THE SYSTEM WILL COMPLY WITH THE REQUIRED STANDARDS. THE OPERABILITY FOR ALL FOUR TRAINS WAS BETWEEN 65 AND 75%.

6/78	SYSTEM					720	720	
7/78	101	48.3	48.3		48.3			
	201	43.9	43.9		43.9			
	301	85.7	78.7		78.7			
	401	82.5	76.0		76.0			
	SYSTEM	65.1	61.7		61.7	744	744	459

** PROBLEMS/SOLUTIONS/COMMENTS

THE INTERNAL MIST ELIMINATOR ON MODULE 201 WAS REPLACED AND THE MODULE 301 MIST ELIMINATORS WERE CLEANED OVER THE PERIOD.

THE FGD SYSTEM HAS ACCUMULATED APPROXIMATELY 24000 HOURS OF OPERATION ON ALL FOUR MODULES SINCE START-UP.

WATER BALANCE PROBLEMS HAVE CONTRIBUTED TO THE OCCURRENCE OF LOW PH, RESULTING IN MIST ELIMINATOR PLUGGING.

THE MIST ELIMINATOR PLUGGING IS ALSO RELATED TO LOW PH RESULTING FROM LIME HANDLING AND SLURRY PREPARATION SYSTEM FAILURE.

THE UTILITY IS CURRENTLY STUDYING WAYS TO TIGHTEN THE WATER BALANCE BY USING THICKENER SUPERNATANT INTERMITTENTLY WITH CLEAR SERVICE WATER FOR

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

THE MIST ELIMINATORS.

THE LIME HANDLING FACILITY DOES NOT INCLUDE A GRIT REMOVAL STAGE. GRIT IS CAUSING PLUGGING IN THE SLURRY HANDLING SYSTEM AND MIXING EQUIPMENT.

PROCESS CHEMISTRY CONTROL IS A CHRONIC PROBLEM AT PHILLIPS DUE IN PART TO TO WATER BALANCE AND LIME HANDLING EQUIPMENT.

WHEN WATER BALANCE IS ACHIEVED THE FGD SYSTEM EXPERIENCES A BUILD UP OF SALTS.

8/78	101	100.0	97.3	97.3			
	201	73.2	71.9	71.9			
	301	100.0	88.8	88.8			
	401	92.4	85.0	85.0			
	SYSTEM	91.4	85.8	85.8	744	744	638

** PROBLEMS/SOLUTIONS/COMMENTS

THE RUBBER LINING IN MODULE 101 WAS REPAIRED.

HIGH PRESSURE WATER CLEANING WAS PERFORMED ON MODULES 101 AND 401.

9/78	101	63.7	62.4	62.4			
	201	82.7	75.6	75.6			
	301	83.9	67.5	67.5			
	401	65.6	55.7	55.7			
	SYSTEM	74.0	65.3	65.3	720	720	470

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE AUGUST-SEPTEMBER PERIOD MIST ELIMINATOR CLEANING TOOK PLACE IN ORDER TO CORRECT THE PLUGGING PROBLEM.

IN AUGUST THE INTERNAL MIST ELIMINATOR ON MODULE 201 WAS REPLACED.

THE LIME MIXING BASIN HAD TO BE SHUT DOWN OVER A WEEKEND SO THAT EXCESSIVE GRIT AND SOLID PARTICLES THAT HAD BUILT UP COULD BE CLEANED OUT.

HIGH PRESSURE WATER CLEANING WAS PERFORMED ON MODULES 101 AND 401.

THE RUBBER LINING IN MODULE 101 WAS REPAIRED.

A MAJOR PROBLEM AREA DURING THE PERIOD WAS CAUSED BY INSUFFICIENT SUPPLIES OF DRY FLYASH TO MIX WITH THE SLUDGE. AS A RESULT THE SLUDGE HAS BEEN LEAKING OUT OF THE TRANSPORT TRUCKS WHILE IN TRANSIT TO THE FINAL DISPOSAL SITE. APPARENTLY NOT ENOUGH FLYASH IS BEING COLLECTED WITH THE PRESENT SYSTEM.

10/78	101	100.0	96.1	96.1			
	201	97.7	87.5	87.5			
	301	95.3	87.9	87.9			
	401	4.8	2.2	2.2			
	SYSTEM	74.5	68.4	68.4	744	744	509
11/78	101	44.0	41.1	41.1			
	201	100.0	100.0	100.0			
	301	91.7	88.9	88.9			
	401	71.3	69.0	69.0			
	SYSTEM	76.8	74.8	74.8	720	720	538

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

SO2 AND PARTICULATE MATTER REMOVAL EFFICIENCY TESTS INDICATE THAT THE STATION NOW MEETS STATE STANDARDS.

THE FGD SYSTEM IS EXPERIENCING A LARGE AMOUNT OF SCALING BECAUSE OF THE HIGH EXCESS AIR ENTERING THE SYSTEM FROM THE BOILERS OXIDIZING THE SOFT SULFITE TO SULFATE ON THE SCRUBBER INTERNALS.

12/78	101	91.7	90.8	90.8			
	201	98.0	88.1	88.1			
	301	30.3	27.8	27.8			
	401	90.4	87.5	87.5			
	SYSTEM	77.6	73.6	73.6	744	744	547

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE PERIOD A LACK OF FLYASH FOR MIXING WITH SLUDGE RESULTED IN A WET SLUDGE PRODUCT THAT MUST BE LEFT ON SITE TO DRY BEFORE TRANSPORT TO THE LANDFILL.

1/79	101	89.0	86.8	86.8			
	201	77.9	69.2	69.2			
	301	50.1	50.0	50.0			
	401	86.1	83.7	83.7			
	SYSTEM	75.8	72.4	72.4	744	744	539
2/79	101	38.9	38.9	38.9			
	201	72.1	72.1	72.1			
	301	88.3	88.3	88.3			
	401	100.0	100.0	100.0			
	SYSTEM	74.8	74.8	74.8	672	672	503

** PROBLEMS/SOLUTIONS/COMMENTS

EXCESSIVE SCALING IN THE MODULE 101 EXIT DUCT CAUSED SUPPORT COLUMNS TO COLLAPSE. THE SCALE WAS REMOVED AND THE SUPPORT COLUMNS WERE SHORED UP.

3/79	101	.0	.0	.0			
	201	96.6	96.3	96.3			
	301	97.6	88.0	88.0			
	401	100.0	100.0	100.0			
	SYSTEM	73.6	71.1	71.1	744	744	529
4/79	101	89.9	86.8	86.8			
	201	5.9	5.9	5.9			
	301	97.6	85.0	85.0			
	401	89.0	84.9	84.9			
	SYSTEM	70.6	65.7	65.7	720	720	473
5/79	101	100.0	100.0	100.0			
	201	.0	.0	.0			
	301	99.3	96.6	96.6			
	401	99.4	99.2	99.2			
	SYSTEM	74.7	74.0	74.0	744	744	550
6/79	101	70.8	70.5	70.5			
	201	28.8	22.2	22.2			
	301	85.6	83.7	83.7			
	401	85.5	77.2	77.2			
	SYSTEM	67.7	63.4	63.4	720	720	457
7/79	101	100.0	98.6	98.6			

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	201	98.5	95.8		95.8						
	301	72.7	71.4		71.4						
	401	29.9	25.5		25.5						
	SYSTEM	75.3	72.8		72.8		744	744	542		
8/79	101	100.0	100.0		100.0						
	201	97.6	89.5		89.5						
	301	100.0	89.3		89.3						
	401	.0	.0		.0						
	SYSTEM	74.4	69.7		69.7		744	744	519		
9/79	101	88.8	81.8	88.8	81.8						
	201	94.8	80.3	93.9	80.3						
	301	99.6	85.5	99.6	85.5						
	401	.0	.0	.0	.0						
	SYSTEM	70.8	61.9	70.4	61.9		720	720	446		
10/79	101	99.4	97.0	99.3	97.0						
	201	86.5	86.6	86.6	86.6						
	301	93.8	93.0	93.7	93.0						
	401	.0	.0	.0	.0						
	SYSTEM	69.9	69.2	69.9	69.2		744	696	515		
11/79	101	53.0	50.7	51.9	50.7						
	201	99.0	99.0	99.0	99.0						
	301	83.6	83.6	83.6	83.6						
	401	11.5	11.5	11.6	11.5						
	SYSTEM	61.8	61.2	61.5	61.2		720	720	441		
12/79	101	.0	.0	.0	.0						
	201	100.0	98.6	100.0	98.6						
	301	90.7	89.6	90.6	89.6						
	401	77.7	72.9	76.6	72.9						
	SYSTEM	67.1	65.3	66.8	65.3		744	744	486		

** PROBLEMS/SOLUTIONS/COMMENTS

PRESENTLY THE UTILITY HAS BEEN ADDING SODIUM THIOSULFATE TO THE LIME TO PREVENT SCALE FORMATION. THIS PROCESS HAS IMPROVED SO2 COLLECTION AS WELL.

THE SCRUBBER FAN HOUSING LINERS ARE BEING REPLACED.

THE MECHANICAL COLLECTORS ARE BEING UPGRADED TO IMPROVE THE QUALITY OF THE WET SLUDGE.

1/80	101	.0	.0	.0	.0					
	201	98.1	93.3	98.0	93.3					
	301	100.0	99.0	100.0	99.0					
	401	97.6	95.8	97.5	95.8					
	SYSTEM	73.9	72.0	73.9	72.0		744	744	536	
2/80	101	13.7	13.7	13.7	13.7					
	201	91.6	91.6	91.7	91.6					
	301	86.2	84.6	86.0	84.6					
	401	94.2	90.5	94.0	90.5					
	SYSTEM	71.4	70.1	71.4	70.1		696	696	488	

** PROBLEMS/SOLUTIONS/COMMENTS

SODIUM THIOSULFATE ADDITION CONTINUED THROUGH THE FIRST QUARTER RESULTING IN A INCIDENCE OF SIGNIFICANTLY REDUCED MIST ELIMINATOR SCALING. 2000-5000 HOURS OF OPERATION HAVE BEEN LOGGED WITHOUT MIST ELIMINATOR SCALE ACCUMULATION. THE UTILITY REPORTED THAT SO2 REMOVAL EFFICIENCY HAS

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

IMPROVED 3% DUE TO THE SODIUM THIOSULFATE ADDITION. THE UTILITY IS LOOKING INTO SODIUM THIOSULFATE ADDITION AT ELRAMA.

THE FAN RUBBER LINERS HAVE BEEN A CONTINUAL PROBLEM. TWO FANS WILL BE REPLACED WITH INCONEL THE NEXT TIME THE RUBBER LINERS FAIL.

THE PHILLIPS FGD SYSTEM HAD A SYSTEM AVAILABILITY OF 71.8% FOR THE YEAR 1979.

3/80	101	94.7	84.0	94.0	84.0			
	201	59.0	53.9	56.8	53.9			
	301	48.4	40.3	43.8	40.3			
	401	95.4	95.3	99.8	95.3			
	SYSTEM	60.3	54.7	73.6	54.7	744	744	407

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WERE ENCOUNTERED WITH THE MODULE 101 ID FAN. THE MODULE WAS TAKEN OFF LINE SO THE ID FAN COULD BE BALANCED.

PROBLEMS WERE ENCOUNTERED WITH THE HUB BOLTS ON THE ID FAN OF MODULE 201, CAUSING THE MODULE TO COME OFF LINE FOR 11 DAYS.

THE RUBBER LINING ON THE ID FAN HOUSING OF MODULE 301 NEEDED REPAIR DURING MARCH.

MODULE 401 WAS TAKEN OFF LINE FOR APPROXIMATELY 2 HOURS SO REPAIRS COULD BE MADE ON THE SCRUBBER MAKE-UP VALVES.

4/80	101	92.6	89.4	92.4	89.4			
	201	14.2	10.0	10.5	10.0			
	301	99.2	99.0	99.8	99.0			
	401	95.8	94.6	98.6	94.6			
	SYSTEM	96.9	73.3	75.6	73.3	720	720	527

** PROBLEMS/SOLUTIONS/COMMENTS

ON APRIL 5 MODULE 101 WAS TAKEN OFF LINE DUE TO ID FAN BEARING PROBLEMS. LATER IN THE MONTH THE MODULE WAS SHUTDOWN DUE TO AN ID FAN INSTRUMENTATION PRESSURE SWITCH PROBLEM.

TOWARDS THE LATTER PART OF APRIL, MODULE 201 WAS SHUTDOWN DUE TO ID FAN BEARING PROBLEMS. THIS PROBLEM WAS CORRECTED BY BALANCING THE FAN.

MODULE 301 WAS REMOVED FROM OPERATION ON APRIL 11 DUE TO AN ID FAN MOTOR MALFUNCTION.

THE RECYCLE PUMP PACKING ON MODULE 401 NEEDED TO BE REPLACED DURING THE MONTH.

5/80	101	67.5	53.9	62.3	53.9			
	201	81.6	69.0	78.9	69.0			
	301	91.7	73.1	89.8	73.1			
	401	92.2	75.9	90.6	75.9			
	SYSTEM	83.2	68.0	80.2	68.0	744	744	506

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 101 CAME OFF LINE IN MAY SO REPAIRS COULD BE MADE ON THE CONTROL DAMPER AND TO INSTRUMENTATION.

DURING MAY MODULE 201 EXPERIENCED PROBLEMS WITH THE MIST ELIMINATOR AND THE ID FAN. THE MODULE WAS TAKEN OFF LINE FOR APPROXIMATELY TWO DAYS TO WASH THE MISTELIMINATOR INTERNALS AND ONE DAY TO REPAIR THE ID FAN BEARING.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

MODULE 301 EXPERIENCED ID FAN PROBLEMS AND WAS TAKEN OFF LINE WHILE THE ID FAN WAS BALANCED.

MODULE 401 WAS SHUTDOWN APPROXIMATELY 58 HOURS SO THAT THE ID FAN CONTROL DAMPERS COULD BE INSPECTED.

6/80	101	97.1	86.3	96.5	80.5				
	201	100.0	81.7	100.0	76.2				
	301	75.5	69.4	72.6	64.8				
	401	100.0	76.5	100.0	71.4				
	SYSTEM	93.2	78.5	91.5	73.2	720	672	527	55.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE MODULE 101 MIST ELIMINATOR WAS CLEANED DURING JUNE.

DURING JUNE MODULE 301 WAS DOWN FOR ID FAN HOUSING REPAIRS (RUBBER LINING) CAUSING APPROXIMATELY 176 HOURS DOWN TIME.

7/80	101	94.0	86.2	93.5	86.2				
	201	100.0	94.7	100.0	94.7				
	301	94.7	84.1	94.0	84.1				
	401	91.1	83.5	90.3	83.5				
	SYSTEM	94.9	87.1	94.5	87.1	744	744	648	71.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY THE RECYCLE PUMP IMPELLERS WERE REPLACED ON ALL THE MODULES EXCEPT FOR MODULE 201.

8/80	101	91.1	72.9	90.6	72.9				
	201	96.9	85.8	96.5	85.8				
	301	87.6	85.3	89.6	85.3				
	401	92.3	86.1	91.8	86.1				
	SYSTEM	92.0	82.5	91.5	82.5	744	744	614	58.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST MODULE 401 EXPERIENCED PACKING PROBLEMS WITH THE RECYCLE PUMP.

DURING THE PERIOD OF JUNE THROUGH AUGUST THE RUBBER LININGS ON THE FAN HOUSINGS WERE REPAIRED.

9/80	101	55.8	55.8	60.9	55.8				
	201	46.1	41.7	43.6	41.7				
	301	54.9	46.2	50.6	46.2				
	401	60.6	32.9	45.5	32.9				
	SYSTEM	54.4	47.3	47.0	44.2	720	720	318	30.1

** PROBLEMS/SOLUTIONS/COMMENTS

ON SEPTEMBER 20 THE ENTIRE PLANT WAS SHUTDOWN FOR A SCRUBBER INSPECTION. THE INSPECTION REVEALED THAT THERE IS EXTENSIVE MORTAR DETERIORATION IN THE STACK AND THAT REPAIRS WILL BE NECESSARY WITHIN THE NEXT TWO YEARS.

THE INSPECTION LASTED UNTIL OCTOBER 1 DUE TO THE NECESSARY REPAIR OF A DUCT EXPANSION JOINT AND THE REPAIR OF THE UPPER PORTION OF THE STACK JOINTS.

10/80	101	94.2	94.2	94.2	94.2				
	201	93.9	90.1	93.5	90.1				
	301	4.0	4.0	4.0	4.0				

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	401	93.8	92.6	93.6	92.6					
	SYSTEM	71.5	70.2	71.3	70.2		744	720	523	58.2

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER SCRUBBER MODULES 301 AND 401 WERE RELINED WITH CEILCOTE CORALINE 505 AR LINERS.

11/80	101	51.5	50.8	51.2	50.8					
	201	100.0	99.9	99.9	99.9					
	301	95.3	93.5	95.2	93.5					
	401	92.3	91.6	92.2	91.6					
	SYSTEM	84.8	84.0	84.6	84.0		720	720	604	72.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER MODULE 101 WAS RELINED WITH CEILCOTE CORALINE 505 AR LINER.

12/80	101	100.0	99.9	100.0	99.9					
	201	1.3	.0	.0	.0					
	301	100.0	98.8	100.0	98.8					
	401	100.0	88.1	100.0	88.1					
	SYSTEM	75.3	71.7	75.0	71.7		744	744	534	62.2

1/81	101	100.0	100.0	100.0	100.0					
	201	.0	.0	.0	.0					
	301	87.8	85.5	87.5	85.5					
	401	98.8	91.2	98.7	91.2					
	SYSTEM	71.7	69.2	71.6	69.2		744	744	533	56.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING DECEMBER AND JANUARY.

2/81	101	95.3	86.6	94.8	86.6					
	201	74.9	73.6	74.6	73.6					
	301	28.4	23.8	24.9	23.8					
	401	100.0	93.1	100.0	93.1					
	SYSTEM	74.7	69.3	73.6	69.3		672	672	466	47.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY A ROUTINE INSPECTION OF THE STACK REVEALED DETERIORATION OF THE ACID-RESISTANT BRICK AND MORTAR, WHICH WILL NECESSITATE REPLACEMENT IN THE NEAR FUTURE.

3/81	101	97.2	97.2	97.2	97.2					
	201	99.1	99.1	99.1	99.1					
	301	.0	.0	.0	.0					
	401	96.7	96.7	96.7	96.7					
	SYSTEM	73.3	73.3	73.3	73.3		744	744	545	72.8

4/81	101	93.9	81.0	92.9	81.0					
	201	98.5	97.2	98.5	97.2					
	301	18.5	18.5	18.5	18.5					
	401	82.3	82.3	82.3	82.3					
	SYSTEM	73.3	69.8	73.1	69.8		720	720	502	59.7

5/81	101	92.7	80.3	91.7	80.3					
	201	100.0	93.4	100.0	93.4					
	301	92.3	91.1	92.2	91.1					
	401	.0	.0	.0	.0					
	SYSTEM	71.3	66.2	71.0	66.2		744	744	493	60.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MARCH, APRIL, AND MAY.

DURING THE MONTH OF MAY, REPLACEMENT OF THE RUBBER-LINED CARBON STEEL HOUSING WITH INCOLEY 825 ON NUMBER 401 ID FAN WAS INITIATED. HOUSING REPLACEMENTS ON FANS 201 AND 301 HAVE BEEN COMPLETED.

SODIUM THIOSULFATE ADDITION WAS UTILIZED THROUGHOUT THE MONTHS OF MARCH, APRIL, AND MAY TO REDUCE SCALING ENHANCED BY HIGH EXCESS AIR REQUIREMENTS OF THE BOILERS.

6/81	101	100.0	97.9	100.0	97.9				
	201	100.0	95.7	100.0	95.7				
	301	100.0	98.1	100.0	98.1				
	401	.0	.0	.0	.0				
	SYSTEM	75.0	72.9	75.0	72.9	720	720	525	68.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 401 WAS OUT OF SERVICE DURING JUNE SO THAT THE FAN HOUSING COULD BE REPLACED WITH INCONEL.

7/81	101	97.7	97.0	97.7	97.0				
	201	98.3	93.1	98.0	93.1				
	301	97.8	96.4	97.8	96.4				
	401	.0	.0	.0	.0				
	SYSTEM	73.5	71.6	73.4	71.6	744	744	533	69.8

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 401 REMAINED OUT OF SERVICE DUE TO FAN REPAIRS AND GENERAL CLEANING.

8/81	101	87.0	75.0	83.9	67.7				
	201	90.2	74.1	87.1	66.9				
	301	87.0	87.9	85.9	79.4				
	401	35.5	18.9	20.9	17.1				
	SYSTEM	74.9	64.0	69.5	57.8	744	672	430	35.0

** PROBLEMS/SOLUTIONS/COMMENTS

PHILLIPS WAS SHUT DOWN FOR THREE DAYS IN AUGUST FOR A STACK AND FGD SYSTEM INSPECTION. THE PRELIMINARY REPORT INDICATED STACK DETERIORATION TO THE POINT OF DAMAGING THE STACK INTEGRITY. AS A RESULT, THE UTILITY PLANS TO PRESSURIZE THE ANNULUS.

9/81	101	71.1	58.6	67.0	58.6				
	201	94.3	75.9	93.0	75.9				
	301	98.1	82.4	97.7	82.4				
	401	9.5	2.1	2.3	2.1				
	SYSTEM	68.2	54.7	65.0	54.7	720	720	394	30.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER MODULE 101 UNAVAILABLE TIME WAS DUE TO THE START OF AN OVERHAUL.

MODULE 401 WAS OUT OF SERVICE FOR MOST OF SEPTEMBER TO INSTALL A NEW EXTERNAL MIST ELIMINATOR (MUNTERS).

10/81	101	51.6	51.6	51.6	51.6				
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DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	201	96.0	52.0	92.8	52.0					
	301	95.4	34.0	88.1	34.0					
	401	97.7	97.7	97.7	97.7					
	SYSTEM	85.2	58.8	82.6	58.8		744	744	440	26.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE CEILCOTE LINERS IN MODULES 101 AND 201 WERE REPLACED WITH COROLINE 505 DURING OCTOBER.

DURING OCTOBER THE UTILITY INSTALLED SO2 MONITORS. TO DATE, THE MONITORS HAVE AN EXCELLENT PERFORMANCE RECORD.

11/81	101	.0	.0	.0	.0					
	201	98.3	27.8	95.7	37.8					
	301	97.7	25.4	91.8	25.4					
	401	100.0	100.0	100.0	100.0					
	SYSTEM	74.0	40.8	71.9	40.8		720	720	294	25.8

** PROBLEMS/SOLUTIONS/COMMENTS

DUE TO LOAD FLUCTUATIONS, MODULES 201 AND 301 WERE DOWN APPROXIMATELY 12 HOURS TO UNPLUG THE TANGENTIAL NOZZLES.

12/81	101	.0	.0	.0	.0					
	201	100.0	64.6	100.0	64.6					
	301	100.0	37.7	100.0	37.7					
	401	93.6	93.6	93.6	93.6					
	SYSTEM	73.4	49.0	73.4	49.0		744	744	365	33.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 101 WAS OFF-LINE FOR THE ENTIRE PERIOD TO REPLACE THE RUBBER LINED FAN HOUSING WITH INCONEL 825 AND TO INSTALL NEW STUDS IN THE FAN ROTOR.

DURING NOVEMBER AND DECEMBER MODULE 101 WAS OFF-LINE FOR CLEANING. THE MODULE OPERATED 6,487 HOURS BEFORE BEING SHUT DOWN.

1/82	101	.0	.0	.0	.0					
	201	100.0	80.9	100.0	80.9					
	301	90.2	88.9	90.1	88.9					
	401	95.6	95.6	95.6	95.6					
	SYSTEM	71.5	66.3	69.9	66.3		744	744	494	64.0

2/82	101	.0	.0	.0	.0					
	201	99.2	64.0	98.8	64.0					
	301	100.0	80.4	100.0	80.4					
	401	100.0	100.0	100.0	100.0					
	SYSTEM	74.8	61.1	70.8	61.1		672	672	411	60.0

3/82	101	.0	.0	.0	.0					
	201	99.1	57.3	98.4	57.3					
	301	100.0	79.7	100.0	79.7					
	401	100.0	99.6	100.0	99.6					
	SYSTEM	74.8	59.1	70.1	59.1		744	744	440	46.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE 101 WAS OFF-LINE THE ENTIRE FIRST QUARTER OF 1982 FOR REPAIRS.

NEW SO2 MONITORS, INSTALLED IN JANUARY, WERE REPORTED TO HAVE WORKED WELL THROUGHOUT THE FIRST QUARTER. THE UTILITY IS ALSO PRESENTLY REQUESTING/EVALUATING BIDS TO PRESSURIZE THE STACK ANNULUS.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART. HOURS	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

4/82	SYSTEM						720			
5/82	SYSTEM						744			
6/82	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER THE SO2 MONITORS WERE CERTIFIED.

THE MODULE 301 MIST ELIMINATOR WAS REPLACED DUE TO DETERIORATION.

THE MODULE 401 FAN HAD TO BE BALANCED DURING THE PERIOD CAUSING ADDITIONAL OUTAGE TIME.

DURING THE PERIOD THE UTILITY INITIATED ADDING THIOSULFATE WHEN THE EXCESS AIR RECORDED GREATER THAN 11. THIS HAS SOLVED SOME OF THERE PREVIOUS PROBLEMS.

7/82	SYSTEM						744			
8/82	SYSTEM						744			
9/82	SYSTEM						720			
10/82	SYSTEM						744			
11/82	SYSTEM						720			
12/82	SYSTEM						744			
1/83	SYSTEM						744			
2/83	SYSTEM						672			
3/83	SYSTEM						744			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH MARCH 1983.

4/83	SYSTEM						720			
5/83	SYSTEM						744			
6/83	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY INITIATED STACK PRESSURIZATION AT PHILLIPS DURING THE MONTH TO CONTROL SEEPAGE AND SUBSEQUENT CORROSION.

7/83	SYSTEM						744			
8/83	SYSTEM						744			
9/83	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.

10/83	SYSTEM						744			
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DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

11/83	SYSTEM								720	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED INCREASING STACK PRESSURE BY TWO INCHES DURING THE MONTH FOR CONTROL OF SEEPAGE.

12/83	SYSTEM								744	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT ALTHOUGH THE UNIT HAS BEEN DOWN MONTHS AT A TIME DURING MOST OF 1983, THE FGD SYSTEM HAS BEEN AVAILABLE.

STAINLESS STEEL BANDS AROUND THE ABSORBER LINER WERE REPLACED WITH NARCOLITE DURING THE FOURTH QUARTER.

INSPECTIONS INDICATE THAT THE CEILCOTE LINING IN THE WET DUCT WILL HAVE TO BE REPLACED OVER THE NEXT THREE YEARS.

1/84	SYSTEM								744	
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2/84	SYSTEM								696	
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3/84	SYSTEM								744	
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4/84	SYSTEM								720	
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5/84	SYSTEM								744	
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6/84	SYSTEM								720	
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7/84	SYSTEM								744	
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8/84	SYSTEM								744	
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9/84	SYSTEM								720	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT OVERALL FGD SYSTEM AVAILABILITY FOR THE FIRST THREE QUARTERS OF 1984 WAS ABOVE 90%.

IT WAS REPORTED THAT LESS DETERIORATION HAS OCCURRED IN THE STACK NOW THAT IT IS PRESSURIZED.

AFTER 11 YEARS OF USAGE, THE CEILCOTE LINER IN THE WET DUCT TO THE STACK DETERIORATED. THE LINER WILL BE REPLACED OVER THE NEXT THREE YEARS DURING ANNUAL OUTAGES.

THE UTILITY IS NOW DIVERTING INDUCED DRAFT FAN SPRAY WATER TO AN ASH POND INSTEAD OF RECYCLING TO THE ABSORBERS. LIME CONSUMPTION HAS IMPROVED SINCE THE HIGHLY ACIDIC SPRAY WATER IS NO LONGER INTRODUCED IN THE SYSTEM.

THE UTILITY REPORTED A THREE WEEK SCHEDULED ANNUAL OUTAGE IN THE FIRST THREE QUARTERS OF 1984. DURING THIS TIME REPAIRS WERE MADE TO DUCTWORK AND DAMPERS. MIST ELIMINATOR TURN VANES WERE ALSO REPLACED.

DUE TO LOW POWER DEMAND IN THE FIRST THREE QUARTERS OF 1984, PHILLIPS DID NOT OPERATE STEADILY. AS A RESULT, BRIEF EPISODES OF HIGH EMISSIONS WERE REPORTED. HOWEVER, THE SYSTEM OPERATED EFFICIENTLY OVER 24 HOUR PERIODS.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	EAST KENTUCKY POWER	
PLANT NAME	SPURLOCK	
UNIT NUMBER	2	
CITY	MAYSVILLE	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	800	
GROSS UNIT GENERATING CAPACITY - MW	500	
NET UNIT GENERATING CAPACITY W/FGD - MW	500	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	500	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	*****	(***** ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9	(300 F)
STACK HEIGHT - M	244.	(802 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	9.1	(30.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	*****	
AVERAGE HEAT CONTENT - J/G	25586.	(11000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		*****
AVERAGE ASH CONTENT - %	16.00	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT %	8.00	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	3.50	
RANGE SULFUR CONTENT - %	*****	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT - %	0.02-0.11	

*** PARTICLE CONTROL

** ESP

TYPE	HOT SIDE
SUPPLIER	AMERICAN AIR FILTER
PARTICLE REMOVAL EFFICIENCY - %	99.5

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO ₂ REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	THYSSEN/CEA
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO ₂ REMOVAL EFFICIENCY - %	79.40

EAST KENTUCKY POWER: SPURLOCK 2 (CONT.)

CURRENT STATUS	1	
COMMERCIAL START-UP	4/83	
INITIAL START-UP	12/82	
CONTRACT AWARDED	0/79	
** DESIGN AND OPERATING PARAMETERS		
OPER. & MAINT. REQUIREMENT - MANHR/DAY	120.0	
** QUENCHER/PRESATURATOR		
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** ABSORBER		
NUMBER	4	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SHELL GENERIC MATERIAL	NR	
SHELL SPECIFIC MATERIAL	NR	
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR	
LINER GENERIC MATERIAL	NR	
LINER SPECIFIC MATERIAL	NR	
LINER MATERIAL TRADE NAME/COMMON TYPE	NR	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
L/G RATIO - L/CU.M	1.3	(10.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.4	(5.8 IN-H2O)
SO2 REMOVAL EFFICIENCY - %	90.0	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	4	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
NUMBER OF PASSES PER STAGE	4	
PRESSURE DROP - KPA	.0	(.1 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	.3	(1.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH FREQUENCY	CONTINUOUS	
** REHEATER		
NUMBER	1	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	2	
DESIGN	CENTRIFUGAL	
FUNCTION	NR	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
** FANS		
NUMBER	6	
DESIGN	CENTRIFUGAL	
FUNCTION	NR	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

EAST KENTUCKY POWER: SPURLOCK 2 (CONT.)

CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	****
REAGENT PREP PRODUCT	****
** PUMPS	
SERVICE	NUMBER
-----	-----
SLURRY TRANSFER	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	2
DIMENSIONS - FT	115.0 DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
OUTLET STREAM CHARACTERISTICS	30% SOLIDS
*** SLUDGE	
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
** DISPOSAL	
NATURE	FINAL
TYPE	NR
SITE TRANSPORTATION METHOD	RAIL
SITE TREATMENT	NR
** WATER BALANCE	
WATER LOOP TYPE	CLOSED

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR

12/82 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT INITIAL START-UP OCCURRED IN DECEMBER, 1982.

1/83 SYSTEM 744

2/83 SYSTEM 672

3/83 SYSTEM 744

EAST KENTUCKY POWER: SPURLOCK 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT SO FAR THE FGD SYSTEM IS OPERATING AT ABOUT 90% EFFICIENCY WITH NO MAJOR PROBLEMS.

4/83	SYSTEM				720
5/83	SYSTEM				744
6/83	SYSTEM				720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY ANNOUNCED THAT THE SPURLOCK 2 FGD SYSTEM INITIATED COMMERCIAL OPERATION IN APRIL. PERFORMANCE DATA FOR THE PERIOD OF APRIL THROUGH JUNE 1983, ARE NOT AVAILABLE AT THIS TIME.

7/83	SYSTEM	.0	.0	744	0
8/83	SYSTEM	.0	.0	744	0
9/83	SYSTEM	.0	.0	720	0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM WAS OUT OF SERVICE DURING THE THIRD QUARTER DUE TO DUCTWORK PROBLEMS.

STACK-RELATED PROBLEMS WERE ALSO REPORTED DURING THE PERIOD.

THE UTILITY HOPES TO RESUME OPERATION OF THE SPURLOCK 2 FGD SYSTEM DURING THE FIRST QUARTER OF 1984.

10/83	SYSTEM			744
11/83	SYSTEM			720
12/83	SYSTEM			744

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS REPORTED APPROXIMATELY 90 PERCENT AVAILABLE THROUGHOUT THE FOURTH QUARTER OF 1983.

THE UTILITY REPORTED THAT THE UNIT WAS DOWN FROM MID-NOVEMBER TO LATE DECEMBER DUE TO STACK AND DUCTWORK-RELATED PROBLEMS.

1/84	SYSTEM			744
2/84	SYSTEM			696
3/84	SYSTEM			744
4/84	SYSTEM			720
5/84	SYSTEM			744
6/84	SYSTEM			720
7/84	SYSTEM			744
8/84	SYSTEM			744
9/84	SYSTEM			720

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

EAST KENTUCKY POWER: SPURLOCK 2 (CONT.)

-----PERFORMANCE DATA-----							
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER BOILER FGD CAP. PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM WAS OUT OF SERVICE DURING THE FIRST THREE QUARTERS OF 1984 AND IS SCHEDULED TO GO BACK ON LINE BY LATE DECEMBER 1984. THE SYSTEM WAS DOWN DUE TO STACK LINER REPLACEMENT AND ABSORBER DUCTWORK REPAIRS.

SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	GRAND HAVEN BRD OF LIGHT & PWR	
PLANT NAME	J.B. SIMS	
UNIT NUMBER	3	
CITY	GRAND HAVEN	
STATE	MICHIGAN	
REGULATORY CLASSIFICATION	B	
PARTICULATE EMISSION LIMITATION - NG/J	13.	(.030 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	78	
GROSS UNIT GENERATING CAPACITY - MW	65	
NET UNIT GENERATING CAPACITY W/FGD - MW	58	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	65	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	122.69	(260000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	142.8	(289 F)
STACK HEIGHT - M	110.	(360 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	2.6	(8.5 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25586.	(11000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10700-12265
AVERAGE ASH CONTENT - %	11.20	
RANGE ASH CONTENT - %	9.5-15.8	
AVERAGE MOISTURE CONTENT - %	9.60	
RANGE MOISTURE CONTENT - %	3.3-15.5	
AVERAGE SULFUR CONTENT - %	2.75	
RANGE SULFUR CONTENT - %	1.2-4.5	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** ESP

NUMBER	1	
TYPE	COLD SIDE	
SUPPLIER	BABCOCK & WILCOX	
INLET FLUE GAS CAPACITY - CU.M/S	127.4	(270000 ACFM)
INLET FLUE GAS TEMPERATURE - C	140.6	(285 F)
PRESSURE DROP - KPA	.1	(0. IN-H2O)

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

GRAND HAVEN BRD OF LIGHT & PWR: J.B. SIMS 3 (CONT.)

UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00	
CURRENT STATUS	1	
COMMERCIAL START-UP	8/83	
INITIAL START-UP	5/83	
CONTRACT AWARDED	12/79	
** DESIGN AND OPERATING PARAMETERS		
** QUENCHER/PRESATURATOR		
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** ABSORBER		
NUMBER	2	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	BABCOCK & WILCOX	
DIMENSIONS - FT	25.0 DIA X 95.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
NUMBER OF CONTACTING ZONES	4	
LIQUID RECIRCULATION RATE - LITER/S	1180.	(18737 GPM)
L/G RATIO L/CU.M	11.8	(88.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.4	(5.4 IN-H2O)
INLET GAS FLOW - CU. M/S	122.69	(260000 ACFM)
INLET GAS TEMPERATURE C	140.6	(285 F)
SO2 REMOVAL EFFICIENCY - %	90.0	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	VERTICAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	BLENDED	
WASH RATE - L/S	6.6	(104 GAL/MIN)
** REHEATER		
NUMBER	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	HOT WATER	
TRADE NAME/COMMON TYPE	NR	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE C	27.8	(50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	122.69	(260000 ACFM)
INLET FLUE GAS TEMPERATURE C	50.6	(123 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	NR	
FUNCTION	BALANCED DRAFT	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	69.37	(147000 ACFM)
FLUE GAS TEMPERATURE C	140.6	(285 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	

GRAND HAVEN BRD OF LIGHT & PWR: J.B. SIMS 3 (CONT.)

** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	NR
FUNCTION	BALANCED DRAFT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	49.08 (104000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
NUMBER	2
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	1
REAGENT PREP PRODUCT	1
SPARGER/OXIDIZER	1
** PUMPS	
SERVICE	NUMBER
-----	-----
LIME SLURRY TRANSFER	2
SCRUBBER RECIRCULATION	6
RECYCLE WATER	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	70.0 DIA X 14.0
FEED STREAM CHARACTERISTICS	18% SOLIDS
OUTLET STREAM CHARACTERISTICS	35% SOLIDS
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	1
FEED STREAM CHARACTERISTICS	35% SOLIDS
OUTLET STREAM CHARACTERISTICS	63% SOLIDS
*** SLUDGE	
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	N/A
INLET FLOW RATE - LITER/S	1.0 (16 GPM)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

GRAND HAVEN BRD OF LIGHT & PWR: J.B. SIMS 3 (CONT.)

** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	OFF-SITE
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH, SLURRY DENSITY
PROCESS CHEMISTRY MODE	FEED FORWARD
** WATER BALANCE	
WATER LOOP TYPE	CLOSED

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/83	SYSTEM									744
6/83	SYSTEM									720

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL START-UP AND SHAKEDOWN PROCEDURES OF THE FGD SYSTEM COMMENCED IN MAY. THE UNIT IS SCHEDULED TO BEGIN COMMERCIAL OPERATIONS BY JULY, 1983.

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED DURING STARTUP WITH EITHER THE TURBINE OR FGD SYSTEM. INITIAL FGD PERFORMANCE TESTING SHOWED A 98 PERCENT SO2 REMOVAL EFFICIENCY.

SINCE STARTUP, THE UTILITY REPORTED THAT IT HAS ENCOUNTERED PROBLEMS WITH PROPER BOILER COMBUSTION.

7/83	SYSTEM									744
8/83	SYSTEM									744
9/83	SYSTEM									720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM BEGAN COMMERCIAL OPERATIONS ON AUGUST 8, 1983. THE FGD SYSTEM HAS CONTINUED TO ACHIEVE HIGH SO2 REMOVAL EFFICIENCIES IN THE RANGE OF 90 TO 95%. ALTHOUGH GAS SIDE OPERATION HAS BEEN EXCELLENT, THE UTILITY REPORTED THAT IT EXPERIENCED MINOR PROBLEMS WITH SYSTEM CHEMISTRY AND WASTE HANDLING.

THE FORCED OXIDATION SYSTEM HAS NOT OPERATED TO ITS DESIGNED CAPACITY. ALTHOUGH DESIGNED TO ACHIEVE BETWEEN 80 TO 90% OXIDATION, ACTUAL RATES HAVE BEEN IN THE RANGE OF 10 TO 35%. PLUGGED SPARGERS AND LOOSE DOWNCOMERS IN THE OXIDATION TANK ARE REPORTED TO BE THE CAUSE.

THE UTILITY REPORTED THAT THE SLUDGE HANDLING CONVEYORS WERE UNDERDESIGNED. THE UTILITY SOLVED THE PROBLEM BY INCREASING THE SPEED OF THE CONVEYORS.

MODULE A EXPERIENCED PLUGGED SPRAY NOZZLES DURING THE THIRD QUARTER. THE UTILITY REPORTED THAT MAINTENANCE WORKERS REMOVED HARD SCALE FROM THE INLET OF THE ABSORBER, AND CHUNKS OF SCALE DROPPED INTO THE ABSORBER SUMP. SUBSEQUENTLY, THE PUMPS PICKED UP THE SCALE AND FED IT TO THE NOZZLES CAUSING THEM TO PLUG.

PUMP ALIGNMENT PROBLEMS HAVE CAUSED SEVERAL BEARING FAILURES ON THE MODULE B ABSORBER.

MINOR PLUGGING PROBLEMS WERE ENCOUNTERED WITH THE PUG MILL DURING THE THIRD QUARTER.

10/83	SYSTEM									744
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GRAND HAVEN BRD OF LIGHT & PWR: J.B. SIMS 3 (CONT.)

-----PERFORMANCE DATA-----							
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER FGD CAP. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM WAS FORCED OFF-LINE FOR 1.5 WEEKS IN OCTOBER TO MAKE REPAIRS TO THE FORCED OXIDATION TANK. A LOOSE DOWN-COMER IN THE TANK CAUSED DAMAGE TO THE STIR PADDLE AND RUBBER LINING.

11/83	SYSTEM						720
12/83	SYSTEM						744

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING THE MONTHS OF NOVEMBER AND DECEMBER. FGD SYSTEM AVAILABILITY DURING THESE TWO MONTHS WAS APPROXIMATELY 99 PERCENT. THE SYSTEM WAS REPORTED TO BE ACHIEVING SO2 REMOVAL EFFICIENCIES IN THE RANGE OF 95 TO 98 PERCENT.

1/84	SYSTEM						744
2/84	SYSTEM						696
3/84	SYSTEM						744
4/84	SYSTEM						720
5/84	SYSTEM						744
6/84	SYSTEM						720
7/84	SYSTEM						744
8/84	SYSTEM						744
9/84	SYSTEM						720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT A SECTION OF MIST ELIMINATOR CHEVRON BAFFLES FELL DURING THE THIRD QUARTER 1984.

THIOSORBIC LIME TESTING WAS CONDUCTED DURING THE FIRST THREE QUARTERS OF 1984.

FGD SYSTEM AVAILABILITY DURING THE FIRST THREE QUARTERS OF 1984 WAS ESTIMATED AT 99%.

THE UTILITY REPORTED THAT SO2 REMOVAL EFFICIENCIES DURING THE FIRST THREE QUARTERS OF 1984 WERE APPROXIMATELY 92 TO 97 PERCENT.

BABCOCK AND WILCOX IS INSTALLING A DUST COLLECTION SYSTEM AT THE SLUDGE-FLYASH MIXING AREA. EXCESSIVE DUST LEVELS FROM THE PUG MILLS WARRANTED THE DECISION TO INSTALL THIS EQUIPMENT.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	HOOSIER ENERGY	
PLANT NAME	MEROM	
UNIT NUMBER	1	
CITY	MEROM	
STATE	INDIANA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	*****	
GROSS UNIT GENERATING CAPACITY - MW	490	
NET UNIT GENERATING CAPACITY W/FGD - MW	460	
NET UNIT GENERATING CAPACITY WO/FGD - MW	466	
EQUIVALENT SCRUBBED CAPACITY - MW	441	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	817.33	(1732000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	*****	(**** F)
STACK HEIGHT - M	214.	(702 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.8	(19.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	*****	(***** BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****	
AVERAGE ASH CONTENT - %	*****	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	*****	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	3.50	
RANGE SULFUR CONTENT - %	*****	
AVERAGE CHLORIDE CONTENT - %	.20	
RANGE CHLORIDE CONTENT - %	*****	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** FABRIC FILTER		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	1	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	BUELL DIVISION, ENVIROTECH	
INLET FLUE GAS CAPACITY - CU.M/S	873.0	(1850000 ACFM)
INLET FLUE GAS TEMPERATURE - C	137.8	(280 F)
PARTICLE REMOVAL EFFICIENCY - %	99.4	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	

HOOSIER ENERGY: MEROM 1 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	mitsubishi heavy industries
A-E FIRM	UNITED ENGINEERS & CONSTRUCTORS
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.40
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	1.2
CURRENT STATUS	1
COMMERCIAL START-UP	8/82
INITIAL START-UP	8/82
CONTRACT AWARDED	3/78

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.20	
DESIGN COAL HEAT CONTENT - J/G	24423.0	(10500 BTU/LB)
DESIGN COAL ASH CONTENT - %	16.00	

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	GRID PACKING	
TRADE NAME/COMMON TYPE	COCURRENT	
SUPPLIER	MITSUBISHI	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	NR	
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR	
LINER GENERIC MATERIAL	NR	
LINER SPECIFIC MATERIAL	NR	
LINER MATERIAL TRADE NAME/COMMON TYPE	NR	
GAS CONTACTING DEVICE TYPE	FIXED GRIDS	
LIQUID RECIRCULATION RATE - LITER/S	1333.	(21160 GPM)
L/G RATIO - L/CU.M	5.7	(42.3 GAL/1000 ACF)
INLET GAS FLOW - CU. M/S	235.95	(500000 ACFM)
INLET GAS TEMPERATURE - C	137.8	(280 F)
SO2 REMOVAL EFFICIENCY - %	90.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	MIST ELIMINATOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
CONFIGURATION	HORIZONTAL
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** REHEATER

NUMBER	1	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	NR	
TRADE NAME/COMMON TYPE	NR	
TEMPERATURE INCREASE - C	27.8	(50 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOOSIER ENERGY: MEROM 1 (CONT.)

** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	BOOSTER
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	AXIAL
SUPPLIER	NOVENCO
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR; SEAL AIR
MANUFACTURER	MOSSER
MODULATION	OPEN
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR; SEAL AIR
MANUFACTURER	MOSSER
MODULATION	OPEN
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	NR
SPECIFIC TYPE	NR
MANUFACTURER	MOSSER
MODULATION	CLOSED
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	NR
SPECIFIC TYPE	NR
MANUFACTURER	MOSSER
MODULATION	OPEN
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	TOWER MILL
DEVICE	N/A
DEVICE TYPE	N/A
MANUFACTURER	JAPAN TOWER MILL CO.
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	25.4 (28 TPH)
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	LIMESTONE PRECRUSHER
DEVICE	N/A
DEVICE TYPE	N/A

HOOSIER ENERGY: MEROM 1 (CONT.)

MANUFACTURER
NUMBER
FULL LOAD DRY FEED CAPACITY - M.TONS/HR

PENNSYLVANIA CRUSHER CORP.
1
25.4 (28 TPH)

** TANKS

SERVICE

NUMBER

PROCESS SURGE
INTERMEDIATE

1
1

** PUMPS

SERVICE

NUMBER

ABSORBER
ABSORBER COOLING
OXIDIZER FEED
THICKENER OVERFLOW
THICKENER UNDERFLOW
SURGE-TANK
SEED SLURRY
LIMESTONE SLURRY FEED (LOW HEAD)
LIMESTONE SLURRY FEED (HIGH HEAD)

12
8
2
2
2
3
2
2
2

** SOLIDS CONCENTRATING/DEWATERING

DEVICE

THICKENER

NUMBER

1

NUMBER OF SPARES

0

DIMENSIONS - FT

140 DIA

CAPACITY

1116000 GAL

SHELL GENERIC MATERIAL TYPE

CARBON STEEL

SHELL SPECIFIC MATERIAL TYPE

AISI 1110

LINER GENERIC MATERIAL TYPE

ORGANIC

LINER SPECIFIC MATERIAL TYPE

NR

FEED STREAM SOURCE

ABSORBER BLOWDOWN & SEED CYCLONE OVERFLOW

FEED STREAM CHARACTERISTICS

18 % SOLIDS

OUTLET STREAM CHARACTERISTICS

35% SOLIDS

OUTLET STREAM DISPOSITION

VACUUM FILTERS

OVERFLOW STREAM DISPOSITION

FGD SYSTEM

** SOLIDS CONCENTRATING/DEWATERING

DEVICE

VACUUM FILTER

NUMBER

2

NUMBER OF SPARES

0

DIMENSIONS - FT

12.0 DIA X 24

FEED STREAM SOURCE

THICKENER

FEED STREAM CHARACTERISTICS

35 % SOLIDS

OUTLET STREAM CHARACTERISTICS

55 % SOLIDS

OUTLET STREAM DISPOSITION

IUCS

*** SLUDGE

** TREATMENT

METHOD

FORCED OXIDATION

DEVICE

PUG MILL

PROPRIETARY PROCESS

CONVERSION SYSTEMS (POZ-O-TEC)

INLET QUALITY - %

15.0

** DISPOSAL

NATURE

FINAL

TYPE

LANDFILL

LOCATION

ON-SITE

SITE TRANSPORTATION METHOD

TRUCK

SITE TREATMENT

NONE

SITE DIMENSIONS

250 ACRES X 50 FT

SITE CAPACITY CU.M

15360880 (12560.0 ACRE-FT)

SITE SERVICE LIFE - YRS

30

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOOSIER ENERGY: MEROM 1 (CONT.)

** WATER BALANCE	
WATER LOOP TYPE	CLOSED
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	CACO3
POINT OF ADDITION	PRECRUSHER

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

8/82	SYSTEM							744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM COMMENCED OPERATION IN AUGUST AND IS CURRENTLY IN THE STARTUP PHASE OF OPERATION. TESTING FOR NSPS COMPLIANCE IS SCHEDULED FOR MARCH.

9/82	SYSTEM							720		
10/82	SYSTEM							744		
11/82	SYSTEM							720		
12/82	SYSTEM							744		
1/83	SYSTEM							744		
2/83	SYSTEM							672		
3/83	A	53.1	54.1	54.1	51.3					
	B	53.1	56.0	56.0	53.1					
	C	53.1	54.2	54.2	51.4					
	D	53.1	43.6	43.6	41.4					
	SYSTEM	53.1	52.0	52.0	49.3			744	706	367 58.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM COMPLETED COMPLIANCE TESTING DURING THE MONTH OF MARCH.

4/83	A	100.0	74.4	100.0	3.1					
	B	100.0	74.4	100.0	3.1					
	C	100.0	.0		.0					
	D	100.0	74.4	100.0	3.1					
	SYSTEM	100.0	55.8	75.0	2.3			720	30	23 35.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS TAKEN OUT OF SERVICE ON APRIL 2 FOR STACK REPAIRS.

5/83	A	.0			.0					
	B	.0			.0					
	C	.0			.0					
	D	.0			.0					
	SYSTEM	.0			.0			744	0	0
6/83	A	.0			.0					
	B	.0			.0					
	C	.0			.0					
	D	.0			.0					
	SYSTEM	.0			.0			720	0	0

HOOSIER ENERGY: MEROM 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OUT OF SERVICE DURING MAY AND JUNE FOR CONTINUED STACK REPAIRS.

7/83	A	.0			.0				
	B	.0			.0				
	C	.0			.0				
	D	.0			.0				
	SYSTEM	.0			.0	744	0	0	
8/83	A	.0			.0				
	B	.0			.0				
	C	.0			.0				
	D	.0			.0				
	SYSTEM	.0			.0	744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OUT OF SERVICE DURING JULY AND AUGUST FOR STACK LINER REPAIRS.

9/83	A	15.6	16.9	17.8	12.2				
	B	45.1	56.7	59.5	40.7				
	C	45.1	58.1	61.0	41.7				
	D	45.1	55.6	58.4	39.9				
	SYSTEM	37.8	46.8	49.2	33.6	720	517	242	44.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED EXPERIENCING COMPUTER PROBLEMS DURING THE MONTH. THE PROBLEMS WERE RESOLVED, HOWEVER, BY REPLACING VARIOUS COMPUTER CONTROL CARDS.

THE UTILITY ATTRIBUTED START-UP PROBLEMS DURING SEPTEMBER TO THE PREVIOUS EXTENDED OUTAGE.

10/83	A	99.2	93.6	100.0	93.4				
	B	99.2	94.6	100.0	94.4				
	C	99.2	86.1	100.0	85.8				
	D	99.2	86.2	100.0	86.0				
	SYSTEM	99.2	90.1	100.0	89.9	744	742	669	75.3
11/83	A	98.3	98.3	98.3	98.3				
	B	98.3	98.3	98.3	98.3				
	C	98.3	98.3	98.3	98.3				
	D	98.3	98.3	98.3	98.3				
	SYSTEM	98.3	98.3	98.3	98.3	720	720	708	77.6

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING OCTOBER AND NOVEMBER 1983.

12/83	A	57.2	54.9	55.0	54.0				
	B	57.2	54.1	54.2	53.3				
	C	57.2	54.9	55.0	54.0				
	D	57.2	44.8	44.9	44.2				
	SYSTEM	57.2	52.2	52.3	51.4	744	733	382	80.3

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOOSIER ENERGY: MEROM 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

EXTREME COLD WEATHER CONDITIONS DURING DECEMBER RESULTED IN TORN EXPANSION JOINTS.

A MALFUNCTION ON THE SLUDGE STABILIZATION SYSTEM OCCURRED DURING DECEMBER RESULTING FROM EXTREME COLD WEATHER CONDITIONS.

1/84	A	75.3	63.0	63.0	63.0				
	B	100.0	68.8	68.8	68.8				
	C	100.0	66.6	66.6	66.6				
	D	100.0	66.6	66.6	66.6				
	SYSTEM	93.8	66.2	66.2	66.2	744	744	493	74.0

** PROBLEMS/SOLUTIONS/COMMENTS

A MALFUNCTION IN THE SLUDGE HANDLING SYSTEM ACCOUNTED FOR A SYSTEM OUTAGE DURING JANUARY.

COMPUTER-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH.

FROZEN LIMESTONE ACCOUNTED FOR ADDITIONAL DOWN TIME IN JANUARY.

ADDITIONAL PROBLEMS DUE TO FREEZING WERE ENCOUNTERED DURING THE MONTH.

2/84	A	90.2	88.4	91.9	85.6				
	B	89.9	88.0	91.5	85.3				
	C	90.6	88.8	92.4	86.0				
	D	90.1	88.3	91.8	85.5				
	SYSTEM	90.2	88.4	91.9	85.6	696	674	596	70.3

3/84	A	96.7	86.8	92.8	85.0				
	B	94.3	85.8	91.7	84.0				
	C	96.7	89.3	95.5	87.5				
	D	96.7	87.3	93.3	85.5				
	SYSTEM	96.1	87.3	93.3	85.5	744	729	636	80.0

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING FEBRUARY AND MARCH.

4/84	A	68.2	49.3	49.9	48.8				
	B	66.9	48.0	48.6	47.5				
	C	67.6	48.7	49.3	48.2				
	D	69.6	50.7	51.3	50.2				
	SYSTEM	68.1	49.2	49.8	48.7	720	712	350	69.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT A PUMP FAILURE AND BUCKET ELEVATOR FAILURES LED TO PROBLEMS IN THE LIMESTONE PREPARATION SYSTEM.

5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

HOOSIER ENERGY: MEROM 1 (CONT.)

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF MAY THROUGH SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	HOOSIER ENERGY	
PLANT NAME	MEROM	
UNIT NUMBER	2	
CITY	MEROM	
STATE	INDIANA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	*****	
GROSS UNIT GENERATING CAPACITY - MW	490	
NET UNIT GENERATING CAPACITY W/FGD - MW	460	
NET UNIT GENERATING CAPACITY WO/FGD - MW	466	
EQUIVALENT SCRUBBED CAPACITY - MW	441	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	817.33	(1732000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	*****	(**** F)
STACK HEIGHT M	214.	(702 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.8	(19.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	*****	(***** BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****	*****
AVERAGE ASH CONTENT - %	*****	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	*****	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	3.50	
RANGE SULFUR CONTENT - %	*****	
AVERAGE CHLORIDE CONTENT - %	.20	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** FABRIC FILTER

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	BUELL DIVISION, ENVIROTECH	
INLET FLUE GAS CAPACITY - CU.M/S	873.0	(1850000 ACFM)
INLET FLUE GAS TEMPERATURE - C	137.8	(280 F)
PARTICLE REMOVAL EFFICIENCY - %	99.4	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

HOOSIER ENERGY: MEROM 2 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	MITSUBISHI HEAVY INDUSTRIES
A-E FIRM	UNITED ENGINEERS & CONSTRUCTORS
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.40
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	1.2
CURRENT STATUS	1
COMMERCIAL START-UP	2/82
INITIAL START-UP	12/81
CONTRACT AWARDED	3/78

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.20	
DESIGN COAL HEAT CONTENT - J/G	24423.0	(10500 BTU/LB)
DESIGN COAL ASH CONTENT - %	16.00	

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	GRID PACKING	
TRADE NAME/COMMON TYPE	COCURRENT	
SUPPLIER	MITSUBISHI	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	NR	
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR	
LINER GENERIC MATERIAL	NR	
LINER SPECIFIC MATERIAL	NR	
LINER MATERIAL TRADE NAME/COMMON TYPE	NR	
GAS CONTACTING DEVICE TYPE	FIXED GRIDS	
LIQUID RECIRCULATION RATE - LITER/S	1333.	(21160 GPM)
L/G RATIO - L/CU.M	5.7	(42.3 GAL/1000 ACF)
INLET GAS FLOW - CU. M/S	235.95	(500000 ACFM)
INLET GAS TEMPERATURE - C	137.8	(280 F)
SO2 REMOVAL EFFICIENCY - %	90.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	MIST ELIMINATOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
CONFIGURATION	HORIZONTAL
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** REHEATER

NUMBER	1	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	NR	
TRADE NAME/COMMON TYPE	NR	
TEMPERATURE INCREASE - C	27.8	(50 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOOSIER ENERGY: MEROM 2 (CONT.)

** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	BOOSTER
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	AXIAL
SUPPLIER	NOVENCO
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR; SEAL AIR
MANUFACTURER	MOSSER
MODULATION	OPEN
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR; SEAL AIR
MANUFACTURER	MOSSER
MODULATION	OPEN
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	NR
SPECIFIC TYPE	NR
MANUFACTURER	MOSSER
MODULATION	CLOSED
** DAMPERS	
NUMBER	1
FUNCTION	SHUT-OFF
GENERIC TYPE	NR
SPECIFIC TYPE	NR
MANUFACTURER	MOSSER
MODULATION	OPEN
** DUCTWORK	
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	TOWER MILL
DEVICE	N/A
DEVICE TYPE	N/A
MANUFACTURER	JAPAN TOWER MILL CO.
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	25.4 (28 TPH)
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	LIMESTONE PRECRUSHER
DEVICE	N/A
DEVICE TYPE	N/A

HOOSIER ENERGY: MEROM 2 (CONT.)

MANUFACTURER	PENNSYLVANIA CRUSHER CORP.
NUMBER	1
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	25.4 (28 TPH)
** TANKS	
SERVICE	NUMBER
-----	-----
PROCESS SURGE	1
INTERMEDIATE	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER	12
ABSORBER COOLING	8
OXIDIZER FEED	2
THICKENER OVERFLOW	2
THICKENER UNDERFLOW	2
SURGE-TANK	3
SEED SLURRY	2
LIMESTONE SLURRY FEED [LOW HEAD]	2
LIMESTONE SLURRY FEED [HIGH HEAD]	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
DIMENSIONS FT	140 DIA
CAPACITY	1116000 GAL
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	NR
FEED STREAM SOURCE	ABSORBER BLOWDOWN & SEED CYCLONE OVERFLOW
FEED STREAM CHARACTERISTICS	18 % SOLIDS
OUTLET STREAM CHARACTERISTICS	35% SOLIDS
OUTLET STREAM DISPOSITION	VACUUM FILTERS
OVERFLOW STREAM DISPOSITION	FGD SYSTEM
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	0
DIMENSIONS - FT	12.0 DIA X 24
FEED STREAM SOURCE	THICKENER
FEED STREAM CHARACTERISTICS	35 % SOLIDS
OUTLET STREAM CHARACTERISTICS	55 % SOLIDS
OUTLET STREAM DISPOSITION	IUCS
*** SLUDGE	
** TREATMENT	
METHOD	FORCED OXIDATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-O-TEC]
INLET QUALITY - %	15.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	NONE
SITE DIMENSIONS	250 ACRES X 50 FT
SITE CAPACITY - CU.M	15360880 (12560.0 ACRE-FT)
SITE SERVICE LIFE - YRS	30

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOOSIER ENERGY: MEROM 2 (CONT.)

** WATER BALANCE	
WATER LOOP TYPE	CLOSED
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	CACO3
POINT OF ADDITION	PRECRUSHER

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

12/81	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

ON DECEMBER 30, 1981 OPERATION OF THE FGD SYSTEM INSTALLED ON MEROM 2 COMMENCED. THE SYSTEM IS PRESENTLY IN THE START UP PHASE WITH COMMERCIAL OPERATION SCHEDULED FOR FEBRUARY.

1/82	SYSTEM						744		
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2/82	SYSTEM						672		
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3/82	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT COMMERCIAL OPERATION WAS INITIATED ON THE FIRST OF FEBRUARY. EXCEPT FOR SOME MINOR FREEZING PROBLEMS, NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER PERIOD.

HOWEVER, THE UTILITY DID REPORT THAT HIGH FLYASH LOADINGS TO THE ABSORBER WERE ENCOUNTERED DUE TO ESP INABILITY TO REMOVE FLYASH FROM ITS HOPPERS. THE PROBLEM WAS PARTIALLY DUE TO THE HIGH MOISTURE CONTENT OF THE COAL (FLY ASH STICKS IN THE HOPPERS AND EVENTUALLY TRIPS ESP) IN ADDITION TO FIRING WITH OIL DURING STARTUP (FLYASH STICKS TO OIL RESIDUE LEFT ON PLATES).

4/82	SYSTEM				19.8		720		
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5/82	SYSTEM				48.3		744		
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6/82	SYSTEM				30.0		720		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED EXPERIENCING PROBLEMS WITH THE LINER CRACKING IN THE THICKENERS AND SETTLING IN THE SURGE TANKS DOWNSTREAM OF THE THICKENERS. FGD AVAILABILITY FOR THE FIRST SIX MONTHS OF OPERATION WAS APPROXIMATELY 25 PERCENT.

7/82	A	80.5	77.3	77.3	66.4				
	B	80.5	77.3	77.3	66.4				
	C	80.5	77.3	77.3	66.4				
	D	80.5	77.3	77.3	66.4				
	SYSTEM	80.5	77.3	77.3	66.4	744	640	494	48.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM EXPERIENCED A TOTAL OUTAGE TIME OF 145.2 HOURS DURING JULY. 104.5 HOURS OF THAT PERIOD WAS DUE TO A UNIT OUTAGE.

PART OF THE FGD SYSTEM OUTAGE WAS DUE TO AN INSPECTION OF THE PROCESS TANKS.

A THICKENER LINER FAILURE ALSO CONTRIBUTED TO THE OUTAGE DURING JULY.

HOOSIER ENERGY: MEROM 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

A 13 HOUR OUTAGE DURING JULY WAS THE RESULT OF AN EFFORT TO UNPLUG THE THICKENER UNDERFLOW LINES.

PROBLEMS WITH A PRECIPITATOR LED TO A 13.5 HOUR OUTAGE DURING THE MONTH.

A 74 HOUR OUTAGE OCCURRED DURING THE MONTH DUE TO EXTENDED FGD MAINTENANCE FOLLOWING THE UNIT OUTAGE.

8/82	A	55.0	54.1	54.1	53.0				
	B	55.0	54.1	54.1	53.0				
	C	55.0	54.1	54.1	53.0				
	D	55.0	54.1	54.1	53.0				
	SYSTEM	55.0	54.1	54.1	53.0	744	729	394	46.0

** PROBLEMS/SOLUTIONS/COMMENTS

A BREAKDOWN OF THE LIMESTONE PREPARATION SYSTEM LED TO A 334 HOUR OUTAGE DURING AUGUST. THE BUCKET ELEVATOR CHAINS HAD TO BE REPLACED DUE TO CRACKED LINKS IN THE CHAINS. THE UTILITY REPORTED THAT DUE TO THE NATURE OF THE FAILURE, IT APPEARED THAT THE LINKS WERE DEFECTIVE.

9/82	A	76.4	22.9	22.9	7.0				
	B	76.4	22.9	22.9	7.0				
	C	76.4	22.9	22.9	7.0				
	D	76.4	22.9	22.9	7.0				
	SYSTEM	76.4	22.9	22.9	7.0	720	221	51	46.0

** PROBLEMS/SOLUTIONS/COMMENTS

A FAILURE OF THE LIMESTONE PREPARATION SYSTEM RESULTED FROM A PLUGGING PROBLEM AND CAUSED A 6.5 HOUR OUTAGE DURING SEPTEMBER.

A 163.5 HOUR OUTAGE DURING THE MONTH WAS DUE TO PLUGGED WALL WASH LINES IN THE QUENCHER SECTION. ALL LINES IN ALL FOUR MODULES WERE PLUGGED AND THE CAUSE WAS SUSPECTED OF BEING A DESIGN DEFICIENCY IN THE SYSTEM. THE LINES WERE UNPLUGGED WITHIN A MATTER OF DAYS AND THE SYSTEM WAS ALLOWED TO CONTINUE OPERATING WITHOUT THE WALL WASH.

10/82	A	87.3	49.7	52.4	49.3				
	B	87.3	57.3	60.5	56.9				
	C	87.3	65.7	69.4	65.2				
	D	87.3	76.4	80.7	75.8				
	SYSTEM	87.3	62.3	65.8	61.8	744	738	460	47.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER PROBLEMS WITH A PRECIPITATOR LED TO A 39 HOUR OUTAGE.

A 21 HOUR OUTAGE OCCURRED DURING THE MONTH AS A RESULT OF A COMPUTER MALFUNCTION.

A FAILURE IN THE LIMESTONE SLURRY PREPARATION SYSTEM PRODUCED A 19.5 HOUR OUTAGE DURING OCTOBER.

DURING THE MONTH THE UNIT OPERATED TYPICALLY WITH THREE MODULES ONLY DUE TO LOW BOILER LOADS.

11/82	A	47.4	46.2	46.3	45.6				
	B	47.4	46.2	46.3	45.6				
	C	47.4	37.3	37.3	36.8				
	D	47.4	13.6	13.6	13.4				
	SYSTEM	47.4	35.8	35.9	35.3	720	711	254	48.4

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOOSIER ENERGY: MEROM 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER PROBLEMS WITH A PRECIPITATOR LED TO A 13 HOUR OUTAGE.

A FAILURE IN THE LIMESTONE SLURRY PREPARATION SYSTEM PRODUCED A 51.5 HOUR OUTAGE DURING NOVEMBER.

BYPASS DAMPER PROBLEMS CREATED A BRIEF 1 HOUR OUTAGE DURING THE MONTH.

A TOTAL FAILURE OF THE EXPANSION JOINTS THROUGHOUT THE FGD SYSTEM RESULTED IN A 326.5 HOUR OUTAGE DURING NOVEMBER.

THE UNIT CONTINUED OPERATING WITH THREE MODULES ONLY DURING THE MONTH DUE TO LOW LOADS.

12/82	A	.0	.0	.0	.0				
	B	.0	.0	.0	.0				
	C	.0	.0	.0	.0				
	D	.0	.0	.0	.0				
	SYSTEM	.0	.0	.0	.0	744	269	0	44.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE EXPANSION JOINT FAILURE PROBLEM WITHIN THE FGD SYSTEM CONTINUED DURING DECEMBER. REPLACEMENT OF THE JOINTS WAS IN PROGRESS.

1/83	A	.0	.0	.0	.0				
	B	.0	.0	.0	.0				
	C	.0	.0	.0	.0				
	D	.0	.0	.0	.0				
	SYSTEM	.0	.0	.0	.0	744	744	0	47.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE EXPANSION JOINT FAILURE PROBLEM CONTINUED DURING JANUARY AND REPLACEMENT OF THE JOINTS WAS STILL IN PROGRESS.

2/83	A	.0	.0	.0	.0				
	B	.0	.0	.0	.0				
	C	.0	.0	.0	.0				
	D	.0	.0	.0	.0				
	SYSTEM	.0	.0	.0	.0	672	667		50.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE EXPANSION JOINT FAILURE PROBLEM CONTINUED DURING FEBRUARY AND REPLACEMENT OF THE JOINTS WAS STILL IN PROGRESS.

3/83	A	64.5	.0		.0				
	B	64.5	.0		.0				
	C	64.5	.0		.0				
	D	64.5	.0		.0				
	SYSTEM	64.5	.0		.0	744	40	0	44.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE CONTINUATION OF EXPANSION JOINT REPAIRS OCCURRED DURING MARCH.

4/83	A	59.0	35.4	37.9	29.4				
	B	75.7	84.7	90.7	70.3				
	C	75.7	74.7	79.9	62.0				
	D	67.8	45.9	49.2	38.1				
	SYSTEM	69.5	60.2	64.4	49.9	720	597	360	57.8

HOOSIER ENERGY: MEROM 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MODIFICATIONS WERE MADE TO MODULES A AND D DURING APRIL.

COMPUTER MALFUNCTIONS WERE ATTRIBUTED TO PART OF THE 175 HOUR OUTAGES DURING THE MONTH.

PLUGGED SPRAY HEADER LINES ALSO CONTRIBUTED TO THE 175 HOUR OUTAGES IN APRIL.

ESP MALFUNCTIONS CONTRIBUTED TO 39 HOURS OF FGD OUTAGE IN APRIL.

5/83	A	95.8	88.6	88.6	88.6				
	B	95.8	85.0	85.0	85.0				
	C	76.4	61.2	61.2	61.2				
	D	95.8	95.5	95.5	95.5				
	SYSTEM	90.9	82.6	82.6	82.6	744	744	614	60.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MAY.

6/83	A	21.9	86.9	86.9	21.9				
	B	1.3	5.2	5.2	1.3				
	C	21.9	82.0	82.0	20.7				
	D	21.9	86.2	86.2	21.7				
	SYSTEM	16.8	65.1	65.1	16.4	720	182	118	53.6

** PROBLEMS/SOLUTIONS/COMMENTS

EXTENSIVE SCHEDULED MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM DURING A BOILER OUTAGE IN JUNE.

7/83	A	100.0	73.2	72.9	72.6				
	B	100.0	99.9	99.5	99.1				
	C	100.0	100.0	100.0	99.6				
	D	100.0	61.0	60.7	60.5				
	SYSTEM	100.0	83.5	83.3	82.9	744	738	617	71.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS PARTIALLY BYPASSED DURING JULY TO MINIMIZE STACK LINER CRACKING BY MAINTAINING A SPECIFIC TEMPERATURE RANGE WITHIN THE STACK. THE UTILITY ATTRIBUTED LOWER SO2 REMOVAL EFFICIENCIES TO THE BYPASS INCIDENT.

LINER REPAIRS ARE SCHEDULED FOR THE FALL OF 1983.

THE UNIT EXPERIENCED AN AIR HEATER FAILURE DURING JULY AND THE FGD SYSTEM WAS CONSEQUENTLY USED TO COOL GAS, PROTECTING THE STACK LINER.

8/83	A	99.7	98.8	99.5	85.8				
	B	99.7	98.9	99.6	85.9				
	C	99.7	99.2	100.0	86.2				
	D	99.7	97.9	98.6	85.0				
	SYSTEM	99.7	98.7	99.4	85.7	744	646	638	65.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AGAIN PARTIALLY BYPASSED DURING AUGUST TO MINIMIZE STACK LINER CRACKING BY MAINTAINING A SPECIFIC TEMPERATURE WITHIN THE STACK.

9/83	A	97.2	88.3	90.4	38.1				
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOOSIER ENERGY: MEROM 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	97.9	90.0	92.2	38.9					
	C	97.9	90.0	92.2	38.9					
	D	98.6	90.0	92.2	38.9					
	SYSTEM	97.9	89.6	91.7	38.7		720	311	278	28.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE FALL SCHEDULED OUTAGE FOR STACK LINER REPAIRS COMMENCED IN SEPTEMBER.

10/83	A	100.0			.0					
	B	100.0			.0					
	C	100.0			.0					
	D	100.0			.0					
	SYSTEM	100.0			.0		744	0	0	
11/83	A	100.0			.0					
	B	100.0			.0					
	C	100.0			.0					
	D	100.0			.0					
	SYSTEM	100.0			.0		720	0	0	.0
12/83	A									
	B									
	C									
	D									
	SYSTEM						744	0		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS OUT OF SERVICE DURING THE FOURTH QUARTER OF 1983.

1/84	A	.0			.0					
	B	.0			.0					
	C	.0			.0					
	D	.0			.0					
	SYSTEM	.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OUT OF SERVICE THROUGHOUT JANUARY.

2/84	A	.0	.0		.0					
	B	.0	.0		.0					
	C	.0	.0		.0					
	D	.0	.0		.0					
	SYSTEM	.0	.0		.0		696	54	0	2.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT STACKLINER REPAIR WAS COMPLETED AND THE UNIT WAS IN INITIAL START UP AT THE END OF THE MONTH.

3/84	A	.0	.0		.0					
	B	.0	.0		.0					
	C	.0	.0		.0					
	D	.0	.0		.0					
	SYSTEM	.0	.0		.0		744	66	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUT DOWN ON MARCH 3 FOR TURBINE REPAIRS. THE REPAIRS WERE COMPLETED ON MARCH 31.

HOOSIER ENERGY: MEROM 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/84	A	82.3	74.5	74.9	74.1					
	B	81.8	74.1	74.5	73.7					
	C	83.0	75.2	75.6	74.9					
	D	75.1	67.3	67.6	67.0					
	SYSTEM	80.5	72.8	73.1	72.4		720	717	522	77.6

** PROBLEMS/SOLUTIONS/COMMENTS

A BUCKET ELEVATOR FAILURE LED TO PROBLEMS IN THE LIMESTONE PREPARATION SYSTEM.

5/84	SYSTEM						744			
6/84	SYSTEM						720			
7/84	SYSTEM						744			
8/84	SYSTEM						744			
9/84	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF MAY THROUGH SEPTEMBER 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	HOUSTON LIGHTING & POWER
PLANT NAME	W.A. PARISH
UNIT NUMBER	8
CITY	THOMPSONS
STATE	TEXAS
REGULATORY CLASSIFICATION	B
PARTICULATE EMISSION LIMITATION - NG/J	13. (.030 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	155. (.360 LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	215. (.500 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	3670
GROSS UNIT GENERATING CAPACITY - MW	600
NET UNIT GENERATING CAPACITY W/FGD - MW	545
NET UNIT GENERATING CAPACITY WO/FGD - MW	551
EQUIVALENT SCRUBBED CAPACITY MW	492
 ** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1038.18 (2200000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9 (300 F)
STACK HEIGHT - M	152. (500 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	6.7 (22.0 FT)
 ** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20799. (8942 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	8000-8785/8800-9636
AVERAGE ASH CONTENT - %	4.75
RANGE ASH CONTENT %	4.77-10.00/2.26-6.00
AVERAGE MOISTURE CONTENT - %	26.69
RANGE MOISTURE CONTENT - %	25.98-31.30/21.17-27.67
AVERAGE SULFUR CONTENT - %	.41
RANGE SULFUR CONTENT - %	.34-.79/.08-.60
AVERAGE CHLORIDE CONTENT - %	.01
RANGE CHLORIDE CONTENT - %	.01
 *** PARTICLE CONTROL	
** FABRIC FILTER	
NUMBER	4
TYPE	REVERSE FLOW
SUPPLIER	RESEARCH-COTTRELL
NUMBER OF COMPARTMENTS	40
NUMBER OF SPARE COMPARTMENTS	4
INLET FLUE GAS CAPACITY - CU.M/S	259.5 (550000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9 (300 F)
PRESSURE DROP - KPA	1.9 (7.5 IN-H ₂ O)
PARTICLE REMOVAL EFFICIENCY - %	99.8
TYPICAL GAS/CLOTH RATIO - M/MIN	.6 (1.9 FT/MIN)
 ** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
 *** FGD SYSTEM	
** GENERAL DATA	
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO ₂ REMOVAL MODE	WET SCRUBBING

HOUSTON LIGHTING & POWER: W.A. PARISH 8 (CONT.)

PROCESS TYPE	LIMESTONE	
PROCESS ADDITIVES	NONE	
SYSTEM SUPPLIER	GE ENVIRONMENTAL SERVICES	
A-E FIRM	BECHTEL	
DEVELOPMENT LEVEL	FULL SCALE	
NEW/RETROFIT	NEW	
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.80	
UNIT DESIGN SO ₂ REMOVAL EFFICIENCY - %	70.00	
ENERGY CONSUMPTION - %	1.0	
CURRENT STATUS	1	
COMMERCIAL START-UP	12/82	
INITIAL START-UP	10/82	
CONTRACT AWARDED	8/79	
** DESIGN AND OPERATING PARAMETERS		
DESIGN COAL SULFUR CONTENT - %	.44	
DESIGN COAL HEAT CONTENT - J/G	20510.7	(8818 BTU/LB)
DESIGN COAL ASH CONTENT - %	6.13	
DESIGN MOISTURE CONTENT - %	26.24	
DESIGN CHLORIDE CONTENT - %	.02	
SPACE REQUIREMENTS - SQ M	9673.2	(104125 SQ FT)
** QUENCHER/PRESATURATOR		
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; INORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; HYDRAULICALLY-BONDED MORTAR	
** ABSORBER		
NUMBER	3	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	GE ENVIRONMENTAL SERVICES	
DIMENSIONS - FT	40.0 DIA X 90.3	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	FIBERGLASS REINFORCED	
LINER MATERIAL TRADE NAME/COMMON TYPE	CEILCOTE 2500AR	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	3	
DISTANCE BETWEEN GAS CONTACTING ZONES - CM	152.4	(60.0IN)
LIQUID RECIRCULATION RATE - LITER/S	2142.	(34000 GPM)
L/G RATIO - L/CU.M	5.6	(42.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.7	(2.7 IN-H ₂ O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(9.9 FT/S)
INLET GAS FLOW - CU. M/S	422.03	(894328 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
SO ₂ REMOVAL EFFICIENCY - %	85.0	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	3	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	GE ENVIRONMENTAL SERVICES	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	4	
FREEBOARD DISTANCE M	3.66	(12.0 FT)
DISTANCE BETWEEN STAGES CM	.51	(.2 IN)
DISTANCE BETWEEN VANES - CM	7.6	(3.00 IN)
VANE ANGLES DEGREES	56	
PRESSURE DROP KPA	.1	(.3 IN-H ₂ O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(9.9 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPROPYLENE	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOUSTON LIGHTING & POWER: W.A. PARISH 8 (CONT.)

WASH WATER SOURCE	FRESH	
WASH RATE - L/S	12.6	(200 GAL/MIN)
** REHEATER		
NUMBER	0	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	18.0	
TEMPERATURE INCREASE - C	17.8	(32 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	4	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	GREEN FAN	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	259.54	(550000 ACFM)
FLUE GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP - KPA	13.4	(44.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	1	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	OPPOSED BLADE	
MANUFACTURER	ANDCO	
MODULATION	NR	
SEAL AIR FLOW - CU. M/S	1.51	(3200 ACFM)
SERVICE CONDITIONS	300	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	CORTEN	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DAMPERS		
NUMBER	1	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	SINGLE BLADE	
MANUFACTURER	ANDCO	
MODULATION	NR	
SEAL AIR FLOW - CU. M/S	1.51	(3200 ACFM)
SERVICE CONDITIONS	300	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	CORTEN	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DAMPERS		
NUMBER	1	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	SINGLE BLADE	
MANUFACTURER	ANDCO	
MODULATION	NR	
SEAL AIR FLOW - CU. M/S	1.51	(3200 ACFM)
SERVICE CONDITIONS	300	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	317L	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
LOCATION	UPSTREAM	
CONFIGURATION	RECTANGULAR	

HOUSTON LIGHTING & POWER: W.A. PARISH 8 (CONT.)

DIMENSIONS	22X15.6
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-36
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	NONE
** DUCTWORK	
LOCATION	DOWNSTREAM
CONFIGURATION	RECTANGULAR
DIMENSIONS	16.1X16.1
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-36
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	K.V.S.
NUMBER	2
NUMBER OF SPARES	1
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	3.6 (4 TPH)
PRODUCT QUALITY - % SOLIDS	40.0
** TANKS	
SERVICE	NUMBER
-----	-----
REAGENT PREP PRODUCT	1
THICKENER OVERFLOW	1
THICKENER UNDERFLOW	1
THICKENER	1
** PUMPS	
SERVICE	NUMBER
-----	-----
LIMESTONE SLURRY	1
OVERFLOW	2
THICKENER UNDERFLOW	2
ABSORBER BLEED	2
THICKENER TUNNEL SUMP	2
LIMESTONE AREA SUMP	2
ABSORBER RECIRCULATION	9
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	0
CONFIGURATION	PARALLEL
DIMENSIONS - FT	12X20
CAPACITY	63 TON/HOUR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	NATURAL RUBBER
BELT GENERIC MATERIAL TYPE	CLOTH
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	600 GPM, 25% SOLIDS
OUTLET STREAM CHARACTERISTICS	60% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	400 GPM, 0% SOLIDS
OVERFLOW STREAM DISPOSITION	MAKEUP
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	ROUND
DIMENSIONS - FT	60.0 DIA X 15.0
CAPACITY	416300
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	ASTM A-283
LINER GENERIC MATERIAL TYPE	ASPHALTIC MEMBRANE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOUSTON LIGHTING & POWER: W.A. PARISH 8 (CONT.)

LINER SPECIFIC MATERIAL TYPE	FABRIC REINFORCED
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	328 GPM, 7% SOLIDS
OUTLET STREAM CHARACTERISTICS	66 GPM, 30% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	298 GPM, 2.5% SOLIDS
OUTLET STREAM DISPOSITION	FILTRATION
OVERFLOW STREAM DISPOSITION	MAKEUP
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	39.9 (44.0 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	70.0
** TREATMENT	
METHOD	STABILIZATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	RESEARCH-COTTRELL
INLET QUALITY - %	60.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	25 ACRES
SITE SERVICE LIFE - YRS	3
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	FLOW, DENSITY
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEED FORWARD
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	CALCIUM
CONSUMPTION	130 TON/DAY
POINT OF ADDITION	BALL MILL
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	50.0
MIST ELIMINATOR - %	.0
FAN %	50.0
BALL MILL - %	100.0
RECIRCULATION PUMP - %	50.0
THICKENER - %	.0
VACUUM FILTER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	1.0
MIST ELIMINATOR	.0
FAN	.0
BALL MILL	1.0
RECIRCULATION PUMP	1.0
THICKENER	.0
VACUUM FILTER	.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOUSTON LIGHTING & POWER: W.A. PARISH 8 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/82	SYSTEM								744	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT INITIAL START-UP OF THE FGD SYSTEM OCCURRED DURING OCTOBER, 1982.										
11/82	SYSTEM								720	
12/82	SYSTEM								744	
1/83	SYSTEM								744	
2/83	SYSTEM								672	
3/83	SYSTEM								744	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.										
4/83	SYSTEM								720	
5/83	SYSTEM								744	
6/83	SYSTEM								720	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER OF 1983.										
7/83	SYSTEM								744	
8/83	SYSTEM								744	
9/83	SYSTEM								720	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE THIRD QUARTER OF 1983.										
10/83	SYSTEM								744	
11/83	SYSTEM								720	
12/83	SYSTEM								744	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER OF 1983.										
1/84	SYSTEM								744	
2/84	SYSTEM								696	
3/84	SYSTEM								744	
4/84	SYSTEM								720	
5/84	SYSTEM								744	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

HOUSTON LIGHTING & POWER: W.A. PARISH 8 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
6/84	SYSTEM							720	
7/84	SYSTEM							744	
8/84	SYSTEM							744	
9/84	SYSTEM							720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT DURING THE PERIOD OF JANUARY THROUGH SEPTEMBER 1984, EIGHT MIST ELIMINATORS WERE REPLACED. A UNIT TRIP OCCURRED CAUSING A LOSS OF AUXILIARY POWER AND A SUBSEQUENT INABILITY TO BYPASS THE FGD SYSTEM. AS A RESULT, THE EXTREME HIGH TEMPERATURE FLUE GAS ENTERED THE MIST ELIMINATORS AND BURNED THEM OUT. NO DAMAGE WAS REPORTED TO OTHER EQUIPMENT DOWSTREAM.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	INDIANAPOLIS POWER & LIGHT	
PLANT NAME	PETERSBURG	
UNIT NUMBER	3	
CITY	PETERSBURG	
STATE	INDIANA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1180	
GROSS UNIT GENERATING CAPACITY - MW	532	
NET UNIT GENERATING CAPACITY W/FGD - MW	515	
NET UNIT GENERATING CAPACITY WO/FGD - MW	528	
EQUIVALENT SCRUBBED CAPACITY - MW	532	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1061.77	(2250000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	137.2	(279 F)
STACK HEIGHT - M	188.	(616 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	6.1	(20.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25004.	(10750 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10200-11000
AVERAGE ASH CONTENT - %	10.50	
RANGE ASH CONTENT - %	8-12	
AVERAGE MOISTURE CONTENT - %	10.75	
RANGE MOISTURE CONTENT - %	10.5-16.5	
AVERAGE SULFUR CONTENT - %	3.25	
RANGE SULFUR CONTENT - %	2.8-4.5	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	2
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	RESEARCH-COTTRELL
INLET FLUE GAS CAPACITY - CU.M/S	464.1 (983500 ACFM)
INLET FLUE GAS TEMPERATURE - C	137.2 (279 F)
PRESSURE DROP - KPA	.4 (2. IN-H2O)
PARTICLE REMOVAL EFFICIENCY %	99.3

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
A-E FIRM	GIBBS & HILL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.30
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	2.4
CURRENT STATUS	1
COMMERCIAL START-UP	12/77
INITIAL START-UP	12/77
CONTRACT AWARDED	1/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.50	
DESIGN COAL HEAT CONTENT - J/G	25004.5	(10750 BTU/LB)
DESIGN COAL ASH CONTENT - %	15.00	
DESIGN MOISTURE CONTENT - %	12.00	
DESIGN CHLORIDE CONTENT - %	.06	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	120.0	

** QUENCHER/PRESATURATOR

NUMBER	4	
TYPE	HORIZONTAL SPRAY CHAMBER	
SUPPLIER	AIR CORRECTION DIVISION, UOP	
INLET GAS FLOW - CU. M/S	265.44	(562500 ACFM)
INLET GAS TEMPERATURE - C	137.8	(280 F)
LIQUID RECIRCULATION RATE - LITERS/S	16.	(250 GPM)
L/G RATIO - L/CU. M	.1	(.4 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	MOBILE BED PACKING	
TRADE NAME/COMMON TYPE	TURBULENT CONTACT ABSORBER	
SUPPLIER	AIR CORRECTION DIVISION, UOP	
DIMENSIONS - FT	30.0 X 30.0 X 100.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	SYNTHETIC RUBBER	
LINER MATERIAL TRADE NAME/COMMON TYPE	NEOPRENE LS-576	
GAS CONTACTING DEVICE TYPE	GRIDS	
NUMBER OF CONTACTING ZONES	3	
DISTANCE BETWEEN GAS CONTACTING ZONES - CM	30.5	(12.0IN)
LIQUID RECIRCULATION RATE - LITER/S	1386.	(22000 GPM)
L/G RATIO L/CU.M	7.8	(58.7 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.1	(8.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	4.4	(14.5 FT/S)
INLET GAS FLOW - CU. M/S	176.96	(375000 ACFM)
INLET GAS TEMPERATURE C	47.8	(118 F)
SO2 REMOVAL EFFICIENCY - %	80.0	
PARTICLE REMOVAL EFFICIENCY - %	99.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	8
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	2
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

MANUFACTURER	STRUCTURE-LITE [UOP HAS PATENT]
CONFIGURATION	HORIZONTAL
NUMBER OF PASSES PER STAGE	3
FREEBOARD DISTANCE - M	.91 (3.0 FT)
VANE ANGLES - DEGREES	90
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	THICKENER OVERFLOW, MAKEUP, TRAP-OUT TRAY RETURN
WASH FREQUENCY	CONTINUOUS
** REHEATER	
NUMBER	2
NUMBER OF SPARES	0
GENERIC TYPE	INDIRECT HOT AIR
SPECIFIC TYPE	EXTERNAL HEAT EXCHANGER
TRADE NAME/COMMON TYPE	STEAM TUBE BUNDLE
LOCATION	EXTERNAL
PERCENT GAS BYPASSED - AVG	.0
TEMPERATURE INCREASE - C	16.7 (30 F)
INLET FLUE GAS FLOW RATE - CU. M/S	149.59 (317000 ACFM)
INLET FLUE GAS TEMPERATURE - C	47.8 (118 F)
OUTLET FLUE GAS FLOW RATE - CU. M/S	74.80 (158500 ACFM)
OUTLET FLUE GAS TEMPERATURE - C	64.4 (148 F)
NUMBER OF HEAT EXCHANGER BANKS	1
NUMBER OF BUNDLES PER BANK	1
NUMBER OF TUBES PER BUNDLE	565
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	BOOSTER
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	224.15 (475000 ACFM)
FLUE GAS TEMPERATURE - C	137.2 (279 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	2
FUNCTION	CONTROL
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	SIDE-ENTRY GUILLOTINE
MANUFACTURER	ANDCO
MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY [SEALS]
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; IRON BASE/NICKEL-CHROMIUM-COPPER-MOLY
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	ANDCO
MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY [SEALS]
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; IRON BASE/NICKEL-CHROMIUM-COPPER-MOLY
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	ANDCO

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY [SEALS]
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; IRON BASE/NICKEL-CHROMIUM-COPPER-MOLY
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	MOSSER
MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY [SEALS]
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; IRON BASE/NICKEL-CHROMIUM-COPPER-MOLY
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	ANDCO
MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY [SEALS]
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; IRON BASE/NICKEL-CHROMIUM-COPPER-MOLY
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
MANUFACTURER	ANDCO
MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; HIGH ALLOY [SEALS]
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; IRON BASE/NICKEL-CHROMIUM-COPPER-MOLY
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	SCRUBBER INLET
CONFIGURATION	CIRCULAR
DIMENSIONS	16 FT DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	SCRUBBER OUTLET
CONFIGURATION	CIRCULAR
DIMENSIONS	18 FT DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** DUCTWORK	
LOCATION	BYPASS
CONFIGURATION	RECTANGULAR
DIMENSIONS	16 FT X 20 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

** REAGENT PREPARATION EQUIPMENT

FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KENNEDY VAN SAUN
NUMBER	1
NUMBER OF SPARES	0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	38.1 (42 TPH)
PRODUCT QUALITY - % SOLIDS	35.0

** TANKS

SERVICE	NUMBER
REAGENT PREP PRODUCT	2
WASTE SLURRY BLEED	1
ABSORBER RECYCLE	4
THICKENER OVERFLOW	1
SLURRY TRANSFER	1
ME WASH	1

** PUMPS

SERVICE	NUMBER
ABSORBER RECIRCULATION	12
SLURRY TRANSFER	2
WASTE SLURRY	4
WASTE SLURRY BOOSTER	2
THICKENER UNDERFLOW	2
RECLAIMED WATER [THICKENER OVERFLOW]	2
ME WASH	2
SEAL WATER	3
REHEATER CONDENSATE RETURN	2

** SOLIDS CONCENTRATING/DEWATERING

DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	0
CONFIGURATION	HORIZONTAL
DIMENSIONS - FT	10 DIA X 20.5
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	COAL TAR EPOXY
BELT GENERIC MATERIAL TYPE	ORGANIC
BELT SPECIFIC MATERIAL TYPE	POLYPROPYLENE
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	28% SOLIDS
OUTLET STREAM CHARACTERISTICS	55% SOLIDS
OUTLET STREAM DISPOSITION	SLUDGE STABILIZATION
OVERFLOW STREAM DISPOSITION	RETURNED TO SYSTEM

** SOLIDS CONCENTRATING/DEWATERING

DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
DIMENSIONS - FT	165 DIA X 12
CAPACITY	2000000
SHELL GENERIC MATERIAL TYPE	CARBON STEEL [WALLS]; INORGANIC [BOTTOM]
SHELL SPECIFIC MATERIAL TYPE	AISI 1110; HYDRAULICALLY-BONDED CONCRETE
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	COAL TAR EPOXY
FEED STREAM CHARACTERISTICS	7-15% SOLIDS
OUTLET STREAM CHARACTERISTICS	28% SOLIDS
OUTLET STREAM DISPOSITION	TO VACUUM FILTER
OVERFLOW STREAM DISPOSITION	TO QUENCHER, ME WASH TANK, BALL MILL, RECYCLE TA

*** SLUDGE

FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	38.1	(42.0 TPH)
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
INLET QUALITY - %	60.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	NONE
SITE SERVICE LIFE - YRS	8
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	ABSORBER RECYCLE
CHEMICAL PARAMETERS	PH, INLET SO ₂ , OUTLET SO AT STACK
PHYSICAL VARIABLES	FLUE GAS OUTLET FLOW
CONTROL LEVELS	PH 5.5-5.9
MONITOR TYPE	LEEDS & NORTHRUP
MONITOR LOCATION	RECYCLE SLURRY LINE
PROCESS CONTROL MANNER	MANUAL
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
RECEIVING WATER STREAM	NONE
MAKEUP WATER ADDITION - LITERS/S	55.6 (882 GPM)
SOURCE OF MAKEUP WATER	RIVER WATER
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	96% CaCO ₃ , 3% MgCO ₃
SOURCE/SUPPLIER	SOUTHERN INDIANA QUARRY
CONSUMPTION	500 TPD
UTILIZATION - %	83.0
POINT OF ADDITION	BALL MILL
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	.0
MIST ELIMINATOR - %	.0
REHEATER %	.0
FAN - %	.0
BALL MILL %	.0
VACUUM FILTER - %	50.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
BALL MILL	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	.5
THICKENER	.0
VACUUM FILTER	.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO ₂ PART.	HOURS	HOURS	HOURS FACTOR

12/77 SYSTEM

744

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER BEGAN COMMERCIAL OPERATIONS ON NOVEMBER 29, 1977.

OPERATION OF ALL FOUR MODULES COMMENCED DURING DECEMBER. CURRENTLY
 PH ADJUSTMENTS AND OTHER SHAKEDOWN PROCEDURES ARE IN PROGRESS.

REPAIRS TO THE RECYCLE TANK AGITATOR WERE REQUIRED.

COLD WEATHER ARRIVED EARLIER THAN EXPECTED. TEMPORARY ENCLOSURES WERE
 CONSTRUCTED AROUND SOME FGD COMPONENTS. THESE ENCLOSURES WILL BE
 REMOVED WHEN INSTALLATION OF HEAT TRACING CAN BE COMPLETED.

1/78 SYSTEM 744 0

** PROBLEMS/SOLUTIONS/COMMENTS

INSTALLATION OF HEAT TRACING ON FGD SYSTEM COMPONENTS WAS COMPLETED
 DURING THE PERIOD.

2/78 SYSTEM 672 0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS TAKEN OFF LINE ON FEBRUARY 24 TO ALLOW CORRECTION OF
 THE PROBLEMS ASSOCIATED WITH THE FLYASH REMOVAL SYSTEM.

PIPE AND VALVE FREEZE-UP DAMAGE WAS ENCOUNTERED AND REPAIRED.

REPAIRS WERE MADE ON THE ISOLATION DAMPERS.

3/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

INSULATION WAS INSTALLED ON FGD SYSTEM COMPONENTS DURING A SCHEDULED
 SYSTEM OUTAGE.

A BROKEN PINION GEAR IN THE THICKENER WAS REPAIRED DURING THE SYSTEM
 OUTAGE.

INSTRUMENTATION MAINTENANCE WAS PERFORMED DURING THE SYSTEM OUTAGE.

PROBLEMS WITH THE FLYASH HANDLING SYSTEM HAVE NOT YET BEEN SOLVED.

4/78 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS PUT BACK ON LINE IN MID-APRIL.

ALL CONTROL VALVES WERE RETURNED TO THE FACTORY FOR MODIFICATIONS. BOTH
 CONTROL VALVES AND PIPING HAVE BEEN PROBLEM AREAS FOR THIS SYSTEM.

5/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE MAIN POWER TRANSFORMER FAULTED CAUSING THE SYSTEM TO SHUTDOWN.

6/78 SYSTEM 720

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM SHUTDOWN RESULTING FROM THE MAIN POWER TRANSFORMER FAILURE IN MAY, LASTED THROUGH JUNE 16.

7/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM IS STILL EXPERIENCING SHAKEDOWN PROBLEMS. DURING THIS PERIOD SOME DESIGN CHANGES HAVE BEEN MADE TO IMPROVE OPERATIONS.

VALVE PROBLEMS WERE ENCOUNTERED DURING JULY. MANY VALVES HAD TO BE REMOVED AND REPAIRED.

8/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS HAVE BEEN EXPERIENCED WITH INSTRUMENTATION.

CRACKING PROBLEMS HAVE BEEN EXPERIENCED WITH FIBERGLASS PIPING. THE PROBLEM WAS SOLVED BY REPLACING SECTIONS WITH RUBBER LINED STEEL PIPING, NEW FRP PIPING, AND PROVIDING ADDITIONAL PIPE SUPPORTS.

9/78 SYSTEM

720

10/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

BYPASS DAMPER PROBLEMS WERE EXPERIENCED.

AN SO2 COMPLIANCE TEST WAS INVALID DUE TO BYPASS DAMPER PROBLEMS.

11/78 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

FREEZE-UPS IN THE LIME DELIVERY SYSTEM WERE EXPERIENCED.

AN INSTRUMENTATION POWER TRANSFORMER FAILURE FORCED THE SYSTEM OUT OF SERVICE FOR ABOUT SIX DAYS.

12/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

MONTHLY OPERATIONAL HOURS ARE NOT YET AVAILABLE. THE UTILITY REPORTED THAT THE SYSTEM HAS NOT YET PASSED AN ACCEPTANCE TEST.

THE FOLLOWING CUMULATIVE FGD SYSTEM UTILIZATION FIGURES FOR THE PERIOD SEPTEMBER 15 THROUGH DECEMBER 29, 1978 WERE CALCULATED BASED UPON UTILITY REPORTED FGD SYSTEM HOURS FOR THE SAME PERIOD.

A MODULE	22.1%
B MODULE	21.7%
C MODULE	34.6%
D MODULE	34.1%
SYSTEM	28.1%

REPORTED FGD SYSTEM HOURS FOR THIS PERIOD WERE 562, 551, 880 AND 868 FOR MODULES A, B, C AND D RESPECTIVELY.

1/79 SYSTEM

744

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS SHUTDOWN ON JANUARY 1, 1979 AS A RESULT OF SEVERE WINTER WEATHER CONDITIONS.

2/79	SYSTEM							672		
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3/79	SYSTEM							744		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS DOWN FROM JANUARY 1 TO MARCH 15 DUE TO SEVERE WINTER WEATHER.

4/79	SYSTEM							722		
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** PROBLEMS/SOLUTIONS/COMMENTS

DUE TO THE FORMER STACK LINING PEELING AWAY, THE STEEL SHELL WAS SAND BLASTED AND RIGIFLAK 4850 APPLIED BY TROWEL.

ALL MIST ELIMINATORS WERE CLEANED DUE TO SEVERE SCALING PROBLEMS.

EXTENSIVE REPAIRS WERE MADE TO THE INLET DAMPERS, THE OUTLET DUCTS WERE LINED WITH RESISTIFLAK 1150, AND MAJOR REPAIRS WERE MADE TO BONNETS BECAUSE OF ACID CORROSION.

THE SYSTEM HAS BEEN DOWN SINCE MID-MARCH FOR INSPECTION AND MAINTENANCE.

5/79	SYSTEM							744		
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6/79	SYSTEM							720		
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SYSTEM RAN ABOUT THREE DAYS TOTAL DURING THIS PERIOD.

PROCESS CONTROL HAS BEEN A MAJOR PROBLEM AREA SINCE THE SYSTEM BEGAN INITIAL OPERATIONS.

MIST ELIMINATOR PLUGGING CONTRIBUTED TO THE OUTAGE TIME ACCUMULATED DURING THIS PERIOD.

7/79	SYSTEM							744		
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8/79	SYSTEM							744		
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9/79	SYSTEM				.0			720	0	0 .0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUTDOWN FOR A SCHEDULED BOILER AND SCRUBBER OVERHAUL IN SEPTEMBER.

10/79	SYSTEM				.0			744	0	0 .0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FOR A SCHEDULED BOILER/TURBINE/FGD SYSTEM OUTAGE FOR FOUR WEEKS. THE UNIT STARTED UP AGAIN AFTER THE OUTAGE BUT HAD TO SHUTDOWN AFTER ONLY A FEW DAYS BECAUSE OF BOILER PROBLEMS.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS FACTOR

INSTRUMENTATION IS A CONTINUING PROBLEM. THE MODULE PRESSURE MONITORS,
AND SO2 AND PH MONITORS ARE ALL INOPERATIVE. THE UTILITY HAS BEEN UNABLE
TO KEEP THE FGD SYSTEM ON LINE FOR MORE THAN 10 DAYS WITHOUT HAVING AT
LEAST ONE MODULE FORCED OUT OF SERVICE.

11/79 SYSTEM 720 360

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT CAME BACK ON LINE AGAIN IN MID-NOVEMBER AFTER RESOLUTION OF
BOILER PROBLEMS.

12/79 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FOURTH QUARTER THE UTILITY REPORTED THAT THERE WERE NO NEW
MAJOR PROBLEMS.

1/80 SYSTEM 744

2/80 SYSTEM 696

3/80 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980, THE ENTIRE SCRUBBER PACKING BED WAS LOST
DUE TO EXCESSIVE WEAR OF THE NEOPRENE FOAM PACKING BALLS. THE UNIT
WILL BE TAKEN OFF LINE IN APRIL TO ACCOMODATE NECESSARY REPAIRS AND
REPLACEMENT OF THE BALLS.

BYPASS DAMPER FAILURES ALSO OCCURRED AND ARE REPORTED TO BE A CONTINUAL
PROBLEM. MODIFICATIONS WERE MADE TO THE GULLOTINE TYPE DAMPERS DURING
THE PERIOD.

4/80 SYSTEM 720

5/80 SYSTEM 744

6/80 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE PERIOD APRIL 1980 THROUGH JUNE
1980.

7/80 SYSTEM 744

8/80 SYSTEM 744

9/80 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE OPERATIONAL DATA FOR THE THIRD QUARTER 1980 WERE NOT AVAILABLE FOR
PUBLICATION.

10/80 SYSTEM 744

11/80 SYSTEM 720

12/80 SYSTEM 744

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT OPERATIONAL DATA FOR FGD OPERATIONS AT PETERSBURG 3 ARE STILL UNAVAILABLE FOR RELEASE.

1/81 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY, ALL OF THE PACKING SPHERES WERE REMOVED FROM THE FOUR ABSORBER MODULES. THE SUPPORTING GRIDS WERE LEFT INTACT AND THE MODULES ARE BEING UTILIZED AS GRID TOWERS.

ALSO DURING JANUARY, REPAIRS TO FREEZE DAMAGED PIPING WERE COMPLETED. THE FRP RECLAIM WATER PIPING WAS RESET IN PLACES WHERE IT HAD PULLED APART AND THE WASTE SLURRY AND SLUDGE TREATMENT WATER LINES WERE THAWED. SOME PIPING GASKETS AND HEAT TRACING CIRCUITS WERE REPAIRED AND UPGRADED. IN ADDITION, SOME DRAIN VALVES WERE ADDED TO IMPROVE THE CAPABILITY TO DRAIN PIPING AND AVOID FUTURE FREEZE DAMAGE.

2/81 SYSTEM

672

3/81 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER, PUMP REPAIRS INCLUDED REBUILDING THE CASING OF A MIST ELIMINATOR WASH PUMP, OVERHAULING A RECYCLE PUMP, AND REPAIRING ONE RECLAIM WATER PUMP AND MOTOR.

4/81 SYSTEM

720

5/81 SYSTEM

744

6/81 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER, REMAINING PORTIONS OF THE FRP RECLAIM WATER PIPING WERE RESET AND ALIGNED.

SCALE FORMATION WAS REMOVED FROM ALL MIST ELIMINATOR ASSEMBLIES DURING THE SECOND QUARTER.

THE GUNNITE LINING IN THE PRESATURATOR DUCT SECTIONS OF THE FOUR ABSORBER MODULES WERE REPLACED DURING THE THREE MONTH PERIOD.

7/81 SYSTEM

744

8/81 SYSTEM

744

9/81 SYSTEM

720

10/81 SYSTEM

744

11/81 SYSTEM

720

12/81 SYSTEM

744

1/82 SYSTEM

744

2/82 SYSTEM

672

3/82 SYSTEM

744

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
 INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
4/82	SYSTEM						720		
5/82	SYSTEM						744		
6/82	SYSTEM						720		
7/82	SYSTEM						744		
8/82	SYSTEM						744		
9/82	SYSTEM						720		
10/82	SYSTEM						744		
11/82	SYSTEM						720		
12/82	SYSTEM						744		
1/83	SYSTEM						744		
2/83	SYSTEM						672		
3/83	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1981 THROUGH MARCH 1983.									
4/83	SYSTEM						720		
5/83	SYSTEM						744		
6/83	SYSTEM						720		
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1981 THROUGH JUNE 1983.									
7/83	SYSTEM						744		
8/83	SYSTEM						744		
9/83	SYSTEM						720		
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.									
10/83	SYSTEM						744		
11/83	SYSTEM						720		
12/83	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.									
1/84	SYSTEM						744		
2/84	SYSTEM						696		
3/84	SYSTEM						744		

INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/84	SYSTEM							720		
5/84	SYSTEM							744		
6/84	SYSTEM							720		
7/84	SYSTEM							744		
8/84	SYSTEM							744		
9/84	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE PERIOD OF JANUARY THROUGH
SEPTEMBER OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS CITY POWER & LIGHT	
PLANT NAME	LA CYGNE	
UNIT NUMBER	1	
CITY	LA CYGNE	
STATE	KANSAS	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	55.	(.128 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	1290.	(3.000 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1450	
GROSS UNIT GENERATING CAPACITY - MW	874	
NET UNIT GENERATING CAPACITY W/FGD - MW	820	
NET UNIT GENERATING CAPACITY WO/FGD - MW	848	
EQUIVALENT SCRUBBED CAPACITY - MW	874	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	CYCLONE	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1302.44	(2760000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	140.6	(285 F)
STACK HEIGHT M	213.	(700 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.0	(23.0 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	21864.	(9400 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		9000-9700
AVERAGE ASH CONTENT - %	25.00	
RANGE ASH CONTENT - %	25.0-35.0	
AVERAGE MOISTURE CONTENT - %	8.60	
RANGE MOISTURE CONTENT - %	9.0-10.0	
AVERAGE SULFUR CONTENT - %	5.39	
RANGE SULFUR CONTENT - %	5.0-6.0	
AVERAGE CHLORIDE CONTENT - %	.03	
RANGE CHLORIDE CONTENT - %	0.02-0.03	
 *** PARTICLE CONTROL		
 ** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
 ** ESP		
NUMBER	0	
TYPE	NONE	
 ** PARTICLE SCRUBBER		
NUMBER	8	
NUMBER OF SPARES	0	
INITIAL START-UP DATE	2/73	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/SIDE-MOVABLE BLOCKS	
TRADE NAME/COMMON NAME	N/A	
SUPPLIER	BABCOCK & WILCOX	
DIMENSIONS - FT	18.0 X 22.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
LINER GENERIC MATERIAL	INORGANIC	
LINER SPECIFIC MATERIAL	HYDRAULICALLY-BONDED MORTAR	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	315.0	(5000 GPM)
L/G RATIO - LITER/CU.M	1.9	(14.5 GAL/1000ACF)
PH CONTROL ADDITIVE	LIMESTONE	
PRESSURE DROP - KPA	2.5	(10.0 IN-H2O)
SUPERFICIAL GAS VELOCITY M/S	48.8	(160.0 FT/S)

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

INLET GAS FLOW RATE - CU.M/S	162.8	(345000 ACFM)
INLET GAS TEMPERATURE - C	140.6	(285 F)
SO2 REMOVAL EFFICIENCY - %	22.0	
PARTICLE REMOVAL EFFICIENCY - %	95.0	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	80.00
ENERGY CONSUMPTION - %	3.2
CURRENT STATUS	1
COMMERCIAL START-UP	6/73
INITIAL START-UP	12/72
CONTRACT AWARDED	3/71

** DESIGN AND OPERATING PARAMETERS

SPACE REQUIREMENTS - SQ M	18765.8	(202000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	300.0	

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	8	
NUMBER OF SPARES	0	
GENERIC TYPE	TRAY TOWER	
SPECIFIC TYPE	SIEVE TRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	BABCOCK & WILCOX	
DIMENSIONS - FT	32.0 X 16.0 X 65.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	PERFORATED TRAYS	
NUMBER OF CONTACTING ZONES	2	
DISTANCE BETWEEN GAS CONTACTING ZONES - CM	121.9	(48.0IN)
LIQUID RECIRCULATION RATE - LITER/S	630.	(10000 GPM)
L/G RATIO - L/CU.M	5.6	(41.9 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.7	(3.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.6	(8.5 FT/S)
INLET GAS FLOW - CU. M/S	112.55	(238500 ACFM)
INLET GAS TEMPERATURE - C	50.0	(122 F)
SO2 REMOVAL EFFICIENCY - %	80.0	
PARTICLE REMOVAL EFFICIENCY - %	95.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRECOLLECTOR	
NUMBER PER SYSTEM	8	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	BULK SEPARATION	
SPECIFIC TYPE	PERFORATED TRAYS	
TRADE NAME/COMMON TYPE	SIEVE TRAY	
MANUFACTURER	BABCOCK & WILCOX	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	1	
FREESBOARD DISTANCE - M	1.68	(5.5 FT)
SUPERFICIAL GAS VELOCITY - M/S	2.6	(8.5 FT/S)

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
WASH WATER SOURCE	NONE
WASH FREQUENCY	N/A
** REHEATER	
NUMBER	8
NUMBER OF SPARES	0
NUMBER PER MODULE	1
GENERIC TYPE	IN-LINE
SPECIFIC TYPE	STEAM
TRADE NAME/COMMON TYPE	BARE TUBE
LOCATION	TOP OF ABSORBER VESSEL
PERCENT GAS BYPASSED - AVG	.0
TEMPERATURE INCREASE - C	16.7 (30 F)
INLET FLUE GAS FLOW RATE - CU. M/S	112.55 (238500 ACFM)
INLET FLUE GAS TEMPERATURE - C	50.0 (122 F)
OUTLET FLUE GAS TEMPERATURE - C	66.7 (152 F)
NUMBER OF HEAT EXCHANGER BANKS	4
NUMBER OF BUNDLES PER BANK	4
NUMBER OF TUBES PER BUNDLE	32
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
** FANS	
NUMBER	6
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	UNIT
APPLICATION	INDUCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	207.64 (440000 ACFM)
FLUE GAS TEMPERATURE - C	66.7 (152 F)
PRESSURE DROP - KPA	7.0 (23.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	3
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	WESTINGHOUSE
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
PRESSURE DROP - KPA	6.1 (20.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	8
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	NR
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	285
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	8
FUNCTION	CONTROL
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	AIR CLEAN
MODULATION	NR
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	122

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	8
FUNCTION	SHUT-OFF
GENERIC TYPE	BUTTERFLY
SPECIFIC TYPE	N/A
MANUFACTURER	NR
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	6
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	NR
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	175
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	6
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	NR
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.00 (0 ACFM)
SERVICE CONDITIONS	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
CONFIGURATION	CIRCULAR, RECTANGULAR
DIMENSIONS	20 FT DIA, 10.5 FT X 10.5 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	BREECHING TO STACK
CONFIGURATION	CIRCULAR
DIMENSIONS	20 FT DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	INERT FLAKE-FILLED VINYL ESTER
** DUCTWORK	
LOCATION	OUTLET
CONFIGURATION	CIRCULAR, RECTANGULAR
DIMENSIONS	12 FT DIA, 13 FT X 13 FT
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	INERT FLAKE-FILLED VINYL ESTER
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
MANUFACTURER	KOPPERS HARDINGE
NUMBER	2
NUMBER OF SPARES	1
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	99.9 (110 TPH)
PRODUCT QUALITY - % SOLIDS	20.0
** TANKS	
SERVICE	NUMBER
-----	-----
REAGENT PREP PRODUCT 1	2
ABSORBER RECYCLE	8
REAGENT PREP PRODUCT 2	2
SLURRY BOOSTER HOLD	1
** PUMPS	
SERVICE	NUMBER
-----	-----
POND RETURN	2
SLURRY FEED	2
ABSORBER RECIRCULATION	8
SCRUBBER RECIRCULATION	8
CLASSIFIER FEED	4
SPENT SLURRY BOOSTER	2
RECIRCULATION TANK DRAIN	1
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
MOISTURE CONTENT - % TOTAL FREE WATER	76.0
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	160 ACRES X 11 FT DEEP
SITE CAPACITY - CU.M	2152480 (1760.0 ACRE-FT)
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	500 ACRES X 11 FT DEEP
SITE CAPACITY - CU.M	6726500 (5500.0 ACRE-FT)
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	VENTURI
CHEMICAL PARAMETERS	PH
CONTROL LEVELS	PH 5.6-5.8
MONITOR TYPE	UNILOC
MONITOR LOCATION	VENTURI INLET
PROCESS CONTROL MANNER	AUTOMATIC

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	OPEN
MAKEUP WATER ADDITION - LITERS/S	72.3 (1148 GPM)
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	91% CaCO ₃ , 1% MgCO ₃
SOURCE/SUPPLIER	BATES COUNTY ROCK [SUPPLIER]
CONSUMPTION	81 TPH MAX., 70 TPH TYPICAL
POINT OF ADDITION	BALL MILL
** FGD SPARE CAPACITY INDICES	
SCRUBBER - %	.0
ABSORBER - %	.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	17.0
BALL MILL - %	100.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP - %	.0
** FGD SPARE COMPONENT INDICES	
SCRUBBER	.0
ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	1.0
BALL MILL	1.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	.0

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂ PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

12/72 SYSTEM

744

**** PROBLEMS/SOLUTIONS/COMMENTS**

THE FIRST TRIAL OPERATION BEGAN ON DECEMBER 26, 1972 AND WAS PLAGUED WITH NUMEROUS PROBLEMS. SOME OF THESE PROBLEMS, SUCH AS VIBRATIONS OF THE INDOUCED-DRAFT FANS AND THEIR SENSITIVITY TO IMBALANCE, OCCURRED EVEN BEFORE THE BOILER WAS FIRED. AS THESE FABRICATION PROBLEMS WERE CORRECTED AND THE FGD SYSTEM WENT INTO OPERATION TWO OTHER TYPES OF PROBLEMS APPEARED. THE FIRST TYPE ASSOCIATED WITH THE WET LIMESTONE PROCESS, INCLUDED PLUGGING OF THE MIST ELIMINATORS AND STRAINERS. THE CORROSION ASSOCIATED WITH CONDENSATION OF ACID VAPORS FROM THE GAS ON THE REHEATER TUBE BUNDLES WAS CONTROLLED BY INJECTION OF SLIP STREAMS OF HOT AIR FROM THE BOILER COMBUSTION AIR HEATER INTO THE SCRUBBED FLUE GASES AT THE INLET TO THE REHEATER UNITS. THIS PRACTICE WHICH REDUCED THE MAXIMUM GENERATING CAPACITY OF THE BOILER BY LIMITING THE AIR AVAILABLE FOR COAL COMBUSTION, IS NO LONGER NECESSARY BECAUSE OF SYSTEM DESIGN MODIFICATIONS.

6/73	A	20.0								
	B	21.0								
	C	40.0								
	D	21.0								
	E	27.0								
	F	30.0								
	G	23.0								
	SYSTEM	64.0			26.0		720	294	187	15.2
7/73	A	7.0								
	B	24.0								

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
	C				25.0				
	D				41.0				
	E				27.0				
	F				25.0				
	G				31.0				
	SYSTEM		64.0		26.0		744	303	195 15.2
8/73	A				79.0				
	B				64.0				
	C				65.0				
	D				74.0				
	E				47.0				
	F				48.0				
	G				70.0				
	SYSTEM		68.0		64.0		744	699	476 42.1
9/73	A				13.0				
	B				.0				
	C				13.0				
	D				13.0				
	E				13.0				
	F				.0				
	G				.0				
	SYSTEM		53.0		7.0		720	95	50 3.5
10/73	A				28.0				
	B				41.0				
	C				34.0				
	D				54.0				
	E				33.0				
	F				3.0				
	G				46.0				
	SYSTEM		56.0		34.0		744	452	253 19.7
11/73	A				48.0				
	B				1.0				
	C				38.0				
	D				4.0				
	E				63.0				
	F				59.0				
	G				49.0				
	SYSTEM		57.0		37.0		720	463	266 18.1
12/73	A				42.0				
	B				20.0				
	C				5.0				
	E				26.0				
	D				31.0				
	F				11.0				
	G				32.0				
	SYSTEM		53.0		24.0		744	339	179 10.3
0/74	SYSTEM								

** PROBLEMS/SOLUTIONS/COMMENTS

THE 1974 FIGURES ARE BASED UPON ACTUAL SYSTEM OPERATION HOURS AS A
FUNCTION OF ACTUAL BOILER HOURS

1/74	A	49.0
	B	32.0
	C	44.0
	D	87.0

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
	E	23.0							
	F	37.0							
	G	81.0							
	SYSTEM	50.0			24.0		744	364	182 6.0
2/74	A	66.0							
	B	68.0							
	C	59.0							
	D	76.0							
	E	52.0							
	F	100.0							
	G	65.0							
	SYSTEM	69.0			37.0		672	364	251 16.0
3/74	SYSTEM				.0		744	0	0 .0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUTDOWN FOR THE ENTIRE MONTH OF MARCH.

4/74	A	67.0							
	B	70.0							
	C	75.0							
	D	88.0							
	E	74.0							
	F	100.0							
	G	88.0							
	SYSTEM	80.0			37.0		720	332	266 15.0
5/74	A	69.0							
	B	83.0							
	C	78.0							
	D	85.0							
	E	78.0							
	F	84.0							
	G	80.0							
	SYSTEM	80.0			54.0		744	500	400 27.0
6/74	A	92.0							
	B	84.0							
	C	83.0							
	D	90.0							
	E	82.0							
	F	83.0							
	G	87.0							
	SYSTEM	86.0			57.0		720	480	413 32.0
7/74	A	75.0							
	B	80.0							
	C	80.0							
	D	81.0							
	E	85.0							
	F	79.0							
	G	77.0							
	SYSTEM	80.0			34.0		744	313	250 19.0
8/74	A	90.0							
	B	90.0							
	C	73.0							
	D	81.0							
	E	81.0							
	F	78.0							
	G	99.0							
	SYSTEM	85.0			65.0		744	571	485 39.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

9/74	A		69.0							
	B		88.0							
	C		73.0							
	D		76.0							
	E		83.0							
	F		89.0							
	G		86.0							
	SYSTEM		81.0		68.0		720	606	491	36.0
10/74	A		71.0							
	B		61.0							
	C		59.0							
	D		81.0							
	E		79.0							
	F		93.0							
	G		89.0							
	SYSTEM		76.0		68.0		744	662	503	39.0
11/74	A		90.0							
	B		71.0							
	C		60.0							
	D		61.0							
	E		84.0							
	F		85.0							
	G		84.0							
	SYSTEM		76.0		41.0		720	386	293	23.0
12/74	SYSTEM				.0	744	0	0	.0	
0/75	SYSTEM									

** PROBLEMS/SOLUTIONS/COMMENTS

THE 1975 FIGURES ARE BASED UPON SYSTEM AVAILABLE HOURS AS A FUNCTION OF HOURS IN THE PERIOD.

1/75	SYSTEM	100.0		.0		744	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUTDOWN DURING JANUARY AND FEBRUARY FOR TURBINE/GENERATOR REPAIR.

2/75	SYSTEM	100.0		.0		672	0	0	.0
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3/75	A	82.0							
	B	96.0							
	C	90.0							
	D	77.0							
	E	93.0							
	F	92.0							
	G	96.0							
	SYSTEM	89.0				744	694		41.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING REDUCED LOAD CONDITIONS SOME OF THE MODULES WERE NOT REQUIRED AND THEREFORE SHUT DOWN ALTHOUGH THEY WERE AVAILABLE. AVAILABILITY WAS THEREFOR HIGHER THAN SOME OF THE POSTED FIGURES INDICATE.

4/75	SYSTEM	100.0				720			3.4
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KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE BOILER WAS OFF LINE FOR 25 DAYS DUE TO NECESSARY GENERATOR REPAIRS.

5/75	A	95.0			
	B	85.0			
	C	94.0			
	D	90.0			
	E	90.0			
	F	89.0			
	G	83.0			
	SYSTEM	89.0	744	683	56.0
6/75	A	88.0			
	B	85.0			
	C	84.0			
	D	85.0			
	E	84.0			
	F	86.0			
	G	89.0			
	SYSTEM	86.0	720	667	56.0
7/75	A	78.0			
	B	90.0			
	C	90.0			
	D	84.0			
	E	85.0			
	F	87.0			
	G	85.0			
	SYSTEM	86.0	744	590	50.0
8/75	A	75.0			
	B	88.0			
	C	87.0			
	D	78.0			
	E	92.0			
	F	85.0			
	G	83.0			
	SYSTEM	84.0	744	630	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULES A AND D ARE USED FOR RESEARCH TESTS. ONE MODULE IS SHUT DOWN EACH EVENING FOR CLEANING.

9/75	A	78.0			
	B	84.0			
	C	84.0			
	D	85.0			
	E	79.0			
	F	78.0			
	G	74.0			
	SYSTEM	80.0	720	610	42.0
10/75	A	66.0			
	B	77.0			
	C	46.0			
	D	74.0			
	E	72.0			
	F	73.0			
	G	65.0			
	SYSTEM	68.0	744	231	13.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

11/75	A	93.0								
	B	91.0								
	C	80.0								
	D	93.0								
	E	96.0								
	F	89.0								
	G	94.0								
	SYSTEM	91.0						720	346	29.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS DOWN OCTOBER 16 TO NOVEMBER 13 OWING TO PROBLEMS WITH THE GENERATOR AND ID AIR FAN.

AVAILABILITY FIGURES FOR OCTOBER AND NOVEMBER DO NOT INCLUDE THE OUTAGE TIME FROM OCTOBER 16 TO NOVEMBER 13.

12/75	A	91.0								
	B	87.0								
	C	81.0								
	D	85.0								
	E	87.0								
	F	89.0								
	G	84.0								
	SYSTEM	86.0						744	597	47.0

** PROBLEMS/SOLUTIONS/COMMENTS

THREE BOILER OUTAGES OCCURRED DURING DECEMBER.

1/76	A	86.0								
	B	85.0								
	C	91.0								
	D	72.0								
	E	84.0								
	F	82.0								
	G	84.0								
	SYSTEM	83.0						744	621	51.0

2/76	A	94.0								
	B	90.0								
	C	86.0								
	D	91.0								
	E	92.0								
	F	93.0								
	G	95.0								
	SYSTEM	92.0						696	595	55.0

3/76	A	92.0								
	B	90.0								
	C	88.0								
	D	93.0								
	E	94.0								
	F	91.0								
	G	91.0								
	SYSTEM	91.0						744	643	57.0

4/76	A	92.0								
	B	91.0								
	C	89.0								
	D	97.0								
	E	96.0								

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	F	98.0								
	G	95.0								
	SYSTEM	94.0					720	143		13.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS SHUT DOWN ON APRIL 6 FOR A SCHEDULED BOILER AIR PREHEATER, AND STACK BREECHING OVERHAUL. THE UNIT WAS RESTARTED ON MAY 10.

DURING THE OUTAGE SOME MAINTENANCE WAS PERFORMED ON THE SCRUBBER DUCTWORK, PRIMARILY BECAUSE OF CORROSION PROBLEMS.

5/76	A	97.0								
	B	92.0								
	C	94.0								
	D	96.0								
	E	89.0								
	F	95.0								
	G	96.0								
	SYSTEM	94.0					744	436		38.0

** PROBLEMS/SOLUTIONS/COMMENTS

FROM MAY 10 TO THE END OF THE MONTH FOUR UNIT OUTAGES WERE ENCOUNTERED.

6/76	A	93.0								
	B	94.0								
	C	94.0								
	D	95.0								
	E	92.0								
	F	94.0								
	G	91.0								
	SYSTEM	93.0					720	656		56.0

** PROBLEMS/SOLUTIONS/COMMENTS

FOUR FORCED MINOR SCRUBBER OUTAGES OCCURRED DURING JUNE.

7/76	A	96.0								
	B	95.0								
	C	92.0								
	D	93.0								
	E	93.0								
	F	94.0								
	G	94.0								
	SYSTEM	94.0					744	688		60.0

** PROBLEMS/SOLUTIONS/COMMENTS

TWO MINOR SCRUBBER OUTAGES OCCURRED DURING JULY.

THE UNIT RECORDED ITS LARGEST MW-HOUR MONTH SINCE INITIATION OF COMMERCIAL OPERATION (359,028).

8/76	A	94.0								
	B	93.0								
	C	92.0								
	D	93.0								
	E	92.0								
	F	90.0								
	G	88.0								
	SYSTEM	92.0					744	521		46.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS TAKEN OUT OF SERVICE AUGUST 24 FOR REPAIR OF A TURBINE BLADE. THE UNIT WAS RETURNED TO SERVICE ON OCTOBER 20. OPERATION WAS INTERMITTENT PENDING TURBINE BLADE REBALANCING AND REESTABLISHMENT OF NORMAL OPERATING CONDITIONS.

DURING THE TURBINE REPAIR PERIOD THE UTILITY COATED THE STACK INNER STRUCTURE WITH PLASTITE 4005.

THE AUGUST AVAILABILITY FIGURES DO NOT INCLUDE THE OUTAGE TIME.

9/76	SYSTEM	100.0	.0	720	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS DOWN DUE TO TURBINE REPAIR.

10/76	A	97.0					
	B	97.0					
	C	98.0					
	D	89.0					
	E	96.0					
	F	96.0					
	G	96.0					
	SYSTEM	96.0		744	256		15.0

11/76	A	95.0					
	B	93.0					
	C	94.0					
	D	95.0					
	E	94.0					
	F	91.0					
	G	94.0					
	SYSTEM	94.0		720	627		59.0

12/76	A	87.0					
	B	89.0					
	C	81.0					
	D	94.0					
	E	94.0					
	F	95.0					
	G	91.0					
	SYSTEM	90.0		744	706		60.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE A-MODULE VENTURI RECYCLE PUMP EXPERIENCED SOME PROBLEMS AND WAS REPAIRED.

THE C-MODULE REHEAT STEAM TUBE BUNDLES WERE INCREASED IN NUMBER FROM FOUR TO EIGHT.

1/77	A	94.0					
	B	90.0					
	C	95.0					
	D	95.0					
	E	95.0					
	F	92.0					
	G	90.0					
	SYSTEM	93.0		744	539		43.0

2/77	A	93.0					
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
	B	93.0							
	C	93.0							
	D	94.0							
	E	93.0							
	F	94.0							
	G	88.0							
	SYSTEM	93.0					672	590	58.0
3/77	A	94.0							
	B	92.0							
	C	86.0							
	D	94.0							
	E	91.0							
	F	94.0							
	G	90.0							
	SYSTEM	92.0					744	558	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE EIGHTH MODULE HAS BEEN INSTALLED.

THE MIST ELIMINATORS IN TWO MODULES HAVE BEEN MODIFIED TO THE POINT WHERE THEY HAVE BEEN OPERATING CONTINUOUSLY CLEAN.

ADDITIONAL BANKS OF STEAM TUBE BUNDLES HAVE BEEN INSTALLED IN SOME MODULES. 50 F OF REHEAT HAS BEEN DETERMINED AS THE NECESSARY TEMPERATURE BOOST AT LA CYGNE TO PRECLUDE STACK PROBLEMS RELATED TO ACID DEW POINT.

THE WATER LOOP IS NOW 95% CLOSED.

A NEW SETTLING POND IS BEING INSTALLED AT THE PLANT.

THE PLANT IS STILL GENERATING 700-720 MW DURING THE DAY AND 500-570 MW AT NIGHT.

4/77	A	96.0							
	B	94.0							
	C	97.0							
	D	94.0							
	E	95.0							
	F	96.0							
	G	95.0							
	SYSTEM	95.0					720	384	31.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE EIGHTH MODULE HAS BEEN RUN FOR TWO DAYS.

5/77	SYSTEM	100.0			.0		744	0	0 .0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUT DOWN IN MAY DUE TO TURBINE PROBLEMS. THE UNIT RESTARTED JULY 5, 1977.

THE MIST ELIMATOR WASHING CONFIGURATION IS BEING CHANGED TO WORK COUNTERCURRENT TO THE GAS FLOW.

ADDITIONAL STEAM TUBE BUNDLES ARE BEING ADDED TO INCREASE THE REHEAT AREA.

THE NEW SETTLING POND IS STILL BEING DRAWN UP. EXCAVATION HAS NOT BEGUN.

6/77	SYSTEM	100.0			.0		720	0	0 .0
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-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MINOR CLEANOUT AND REPAIR WORK WAS DONE ON THE SCRUBBING SYSTEM DURING THE TURBINE OUTAGE.

7/77	A	95.0			
	B	93.0			
	C	94.0			
	D	95.0			
	E	95.0			
	F	95.0			
	G	95.0			
	H	95.0			
	SYSTEM	95.0	744	485	36.0

** PROBLEMS/SOLUTIONS/COMMENTS

RESUMPTION OF OPERATIONS WAS CONDUCTED WITH EIGHT SCRUBBER MODULES IN THE FLUE GAS PATH, ENABLING THE UNIT TO OPERATE AT A MAXIMUM CONTINUOUS LOAD CAPACITY OF 800-820 MW.

8/77	A	89.0			
	B	55.0			
	C	93.0			
	D	93.0			
	E	90.0			
	F	93.0			
	G	93.0			
	H	93.0			
	SYSTEM	87.0	744	501	43.0

** PROBLEMS/SOLUTIONS/COMMENTS

PARTICLE REMOVAL TESTS WERE CONDUCTED IN LATE AUGUST AND UNIT NO.1 HAS PASSED THE COMPLIANCE REQUIREMENTS (0.13 LB/MM BTU).

MODULE B HAD LOW AVAILABILITY DUE TO THE BURNING OF THE MOTOR ON THE RECIRCULATING PUMP. IT WAS REMOVED FROM SERVICE AND STARTED AGAIN AFTER 12 DAYS.

9/77	A	93.0			
	B	94.0			
	C	89.0			
	D	90.0			
	E	93.0			
	F	95.0			
	G	92.0			
	H	93.0			
	SYSTEM	92.0	720	524	50.0
10/77	A	91.0			
	B	96.0			
	C	89.0			
	D	94.0			
	E	93.0			
	F	94.0			
	G	89.0			
	H	93.0			
	SYSTEM	92.0	744	457	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

A 12 DAY OUTAGE IN OCTOBER WAS REQUIRED TO DESLAG THE BOILER.

11/77	A	93.0				
	B	96.0				
	C	93.0				
	D	94.0				
	E	92.0				
	F	93.0				
	G	96.0				
	H	95.0				
	SYSTEM	94.0			720	234

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN NOVEMBER 15 BECAUSE OF A NECESSARY TURBINE OVERHAUL. THE BOILER WENT BACK ON LINE DECEMBER 25.

12/77	A	98.0				
	B	98.0				
	C	96.0				
	D	96.0				
	E	96.0				
	F	97.0				
	G	98.0				
	H	99.0				
	SYSTEM	97.0			744	300

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE A FEW SMALL BOILER RELATED OUTAGES IN DECEMBER.

1/78	A	90.0				
	B	95.0				
	C	95.0				
	D	95.0				
	E	93.0				
	F	94.0				
	G	94.0				
	H	94.0				
	SYSTEM	94.0			744	597

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE SOME BOILER RELATED OUTAGES IN JANUARY, TOTALING ABOUT 50 HOURS.

THE FGD SYSTEM CONTINUED TO OPERATE WITHOUT ANY PROBLEMS.

2/78	A	92.0				
	B	93.0				
	C	95.0				
	D	94.0				
	E	91.0				
	F	97.0				
	G	96.0				
	H	93.0				
	SYSTEM	94.0			672	578
						58.0
3/78	A	95.0				
	B	95.0				

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
	C	90.0							
	D	95.0							
	E	94.0							
	F	95.0							
	G	89.0							
	H	93.0							
	SYSTEM	93.0					744	741	62.0
4/78	A	91.0							
	B	92.0							
	C	93.0							
	D	91.0							
	E	90.0							
	F	92.0							
	G	91.0							
	H	91.0							
	SYSTEM	91.0					720	620	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN A TOTAL OF 100 HOURS IN APRIL. THIS TIME INCLUDED THREE OUTAGES DUE TO BOILER LEAKS AND LACK OF LOAD REQUIREMENT.

DURING THE BOILER OUTAGES MODIFICATIONS TO THE FGD SYSTEM INCLUDED CHANGING THE REHEAT TUBE BUNDLES.

5/78	A	89.0							
	B	92.0							
	C	92.0							
	D	93.0							
	E	92.0							
	F	91.0							
	G	93.0							
	H	86.0							
	SYSTEM	91.0					744	593	

** PROBLEMS/SOLUTIONS/COMMENTS

IN MAY THE BOILER WAS DOWN TWICE FOR A TOTAL OF 151 HOURS. OUTAGES WERE AGAIN CAUSED BY BOILER LEAKS.

GENERAL MAINTENANCE AND REPAIRS ON THE FGD SYSTEM CONTINUED.

6/78	SYSTEM						720	15	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS UP FOR ONLY 15 HOURS IN JUNE. IN THE FIRST PART OF JUNE THERE WERE BOILER TUBE LEAKS. FROM JUNE 8 TO JUNE 17 A BOILER OUTAGE WAS NECESSARY FOR GENERATOR REPAIR.

7/78	A	88.0							
	B	97.0							
	C	92.0							
	D	94.0							
	E	88.0							
	F	93.0							
	G	93.0							
	H	95.0							
	SYSTEM	93.0					744	341	

8/78	A	92.0							
	B	93.0							

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
	C	95.0								
	D	96.0								
	E	93.0								
	F	94.0								
	G	95.0								
	H	95.0								
	SYSTEM	94.0					744	577		

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE TWO BOILER OUTAGES IN AUGUST.

THE UTILITY IS EXPERIMENTING WITH A 3-STAGE MIST ELIMINATOR AND SOME DOUBLE STAGE MIST ELIMINATORS. BETTER MIST ELIMINATION AT THE SCRUBBER EXIT WOULD REDUCE THE FREQUENCY OF REHEATER CLEANING.

9/78	A	96.0								
	B	96.0								
	C	96.0								
	D	96.0								
	E	96.0								
	F	96.0								
	G	95.0								
	H	97.0								
	SYSTEM	96.0					720	720		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE JULY-SEPTEMBER PERIOD TWO ID FAN ROTERS WERE REPLACED.

10/78	A	96.0								
	B	96.0								
	C	98.0								
	D	97.0								
	E	97.0								
	F	98.0								
	G	97.0								
	H	96.0								
	SYSTEM	97.0					744	255		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO UNUSUAL OPERATING PROBLEMS WERE ENCOUNTERED DURING OCTOBER AND NOVEMBER.

11/78	A	92.0								
	B	95.0								
	C	94.0								
	D	93.0								
	E	94.0								
	F	93.0								
	G	94.0								
	H	96.0								
	SYSTEM	94.0					720	720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO UNUSUAL OPERATING PROBLEMS WERE ENCOUNTERED DURING OCTOBER AND NOVEMBER.

12/78	A	93.9								
	B	92.9								
	C	94.0								

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

	D	95.0			
	E	94.7			
	F	90.5			
	G	94.4			
	H	94.7			
	SYSTEM	93.8		744	239

1/79	A	95.6			
	B	96.5			
	C	97.2			
	D	96.3			
	E	90.7			
	F	97.2			
	G	97.2			
	H	95.4			
	SYSTEM	95.8		744	205

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE DECEMBER-JANUARY PERIOD THE UNIT EXPERIENCED A MULTITUDE OF BOILER OUTAGES.

2/79	A	95.0			
	B	94.6			
	C	92.6			
	D	93.5			
	E	95.1			
	F	94.3			
	G	94.1			
	H	93.8			
	SYSTEM	94.1		672	342

3/79	A	96.1			
	B	96.0			
	C	93.2			
	D	95.6			
	E	96.5			
	F	94.8			
	G	95.7			
	H	93.4			
	SYSTEM	95.2		744	314

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD SYSTEM PROBLEMS WERE REPORTED BY THE UTILITY FOR FEBRUARY OR MARCH.

THE UTILITY HAS REPORTED THAT MANY TUBE LEAKS AND CYCLONE LEAKS WERE EXPERIENCED WITH THE BOILER.

4/79	A	95.5			
	B	95.7			
	C	94.4			
	D	91.4			
	E	95.5			
	F	96.2			
	G	95.9			
	H	95.7			
	SYSTEM	95.0		720	638

5/79	A	96.5			
	B	96.3			
	C	96.7			

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

D 95.3
 E 95.4
 F 95.7
 G 96.3
 H 95.5
 SYSTEM 96.0

744 476

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD PROBLEMS HAD OCCURRED.

6/79 SYSTEM 100.0 .0 720 0 0 .0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS REMOVED FROM SERVICE THE LATTER PART OF MAY FOR SCHEDULED BOILER OVERHAUL AND REMAINED OUT OF SERVICE THROUGH JUNE.

7/79 SYSTEM 100.0 .0 744 0 0

** PROBLEMS/SOLUTIONS/COMMENTS

THE TURBINE WAS OVERHAULED DURING JULY. DURING THE OUTAGE SOME MINOR MAINTENANCE WAS PERFORMED ON THE SCRUBBING SYSTEM.

8/79 A 86.8
 B 95.9
 C 96.3
 D 96.3
 E 95.9
 F 96.2
 G 88.5
 H 96.9
 SYSTEM 94.1

744 231

9/79 A 96.0
 B 96.1
 C 95.6
 D 94.3
 E 96.7
 F 96.1
 G 96.0
 H 96.9
 SYSTEM 96.0

720 618

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD UNITS OPERATED WITH NO MAJOR PROBLEMS AND ONLY REGULAR MAINTENANCE WAS PERFORMED DURING AUGUST AND SEPTEMBER.

10/79 A 95.3
 B 95.8
 C 94.7
 D 92.7
 E 94.4
 F 94.9
 G 94.7
 H 94.5
 SYSTEM 94.6

744 436

11/79 SYSTEM .0 .0 720 0 0 .0

12/79 SYSTEM .0 .0 744 0 0 .0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WENT DOWN FOR AN OVERHAUL ON OCTOBER 19 AND WAS OUT OF SERVICE THROUGH DECEMBER.

EXTENSIVE MAINTENANCE WORK BEGAN ON THE FGD SYSTEM LATE IN OCTOBER CAUSING THE SYSTEM TO BE UNAVAILABLE DURING NOVEMBER AND DECEMBER. SOME ITEMS INCLUDED IN THE MAINTENANCE WERE:

THE INSTALLATION OF TWO NEW SPRAY HEADERS IN SIX OF THE MODULES, REPLACEMENT OF THE ABSORBER SIDEWALLS, REPLACEMENT OF THE MODULE OUTLET DUCTS AND DAMPERS, AND VARIOUS DUCTWORK PATCHING.

1/80	SYSTEM	.0		.0		744	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM REMAINED UNAVAILABLE DURING JANUARY DUE TO THE ON-GOING GENERATOR/TURBINE OVERHAUL AND THE EXTENSIVE FGD SYSTEM MODIFICATIONS BEING PERFORMED.

2/80	A	98.2	84.1	95.7	20.0				
	B	98.2	58.3	92.9	13.2				
	C	97.4	66.2	89.7	14.9				
	D	99.1	45.9	92.3	10.3				
	E	98.2	93.0	97.3	21.0				
	F	99.1	91.7	97.3	20.7				
	G	99.1	91.7	97.3	20.7				
	H	99.6	92.4	97.3	20.8				
	SYSTEM	98.6	77.7	95.3	17.5	696	157	122	10.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE TURBINE/GENERATOR OVERHAUL WAS COMPLETED IN FEBRUARY AND THE BOILER AND FGD SYSTEM RETURNED TO SERVICE ON FEBRUARY 20. THE FGD SYSTEM WAS AVAILABLE FOR OPERATION MOST OF THE MONTH.

3/80	A	94.6	100.0	100.0	4.3				
	B	96.2	100.0	100.0	4.3				
	C	96.1	100.0	100.0	4.3				
	D	96.1	100.0	100.0	4.3				
	E	95.8	93.8	100.0	4.0				
	F	94.7	53.1	100.0	2.3				
	G	93.3	31.3	100.0	1.3				
	H	95.7	.0		.0				
	SYSTEM	95.3	72.3	100.0	3.1	744	32	23	1.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OPERATED FOR ONLY 23 HOURS IN MARCH AS A RESULT OF GENERATOR/TURBINE PROBLEMS. SOME ROUTINE CLEANING AND INSPECTIONS OF THE FGD SYSTEM WERE PERFORMED DURING THE OUTAGE TIME.

4/80	A	96.3	94.1	94.5	61.7				
	B	95.1	78.4	91.4	51.4				
	C	95.0	97.5	92.9	63.9				
	D	96.7	93.6	94.8	61.4				
	E	95.3	86.0	92.3	56.4				
	F	92.5	76.3	87.2	50.0				
	G	97.0	68.4	93.9	44.9				
	H	97.0	62.9	93.4	41.3				
	SYSTEM	95.6	82.2	92.6	53.9	720	472	388	37.6

5/80	A	96.4	89.4	96.0	84.1				
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
	B	94.6	87.9	93.9	82.7					
	C	95.7	88.3	95.2	83.1					
	D	95.9	83.9	95.1	78.9					
	E	96.1	84.4	95.3	79.4					
	F	96.5	89.3	96.2	84.0					
	G	96.1	96.0	94.0	90.3					
	H	96.8	82.3	96.2	77.4					
	SYSTEM	96.0	87.7	95.5	82.5			744	700	614 49.9
6/80	A	98.2	89.5	97.2	46.0					
	B	98.1	90.3	96.8	46.4					
	C	97.4	96.8	96.7	49.7					
	D	98.1	92.5	98.0	47.5					
	E	98.1	87.6	97.9	45.0					
	F	98.3	91.1	98.5	46.8					
	G	98.8	88.2	97.3	45.3					
	H	99.3	87.3	98.6	44.9					
	SYSTEM	98.3	90.4	98.9	46.4			720	370	334 35.5

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD RELATED PROBLEMS WERE REPORTED FOR THE SECOND QUARTER OF 1980.

7/80	A	89.7	86.9	87.1	69.9					
	B	97.8	97.6	97.3	78.5					
	C	97.3	96.9	96.6	77.9					
	D	98.1	98.0	97.7	78.8					
	E	98.2	97.6	97.8	78.4					
	F	98.6	98.6	98.3	79.3					
	G	98.1	97.9	97.6	78.7					
	H	97.7	96.9	97.1	77.9					
	SYSTEM	96.9	96.3	96.2	77.4			744	598	576 60.9

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR JULY.

8/80	A	94.6	92.7	93.9	66.9					
	B	97.9	97.3	97.2	70.3					
	C	98.1	97.3	97.3	70.3					
	D	97.7	96.8	97.4	69.9					
	E	97.2	96.2	96.7	69.5					
	F	98.7	97.2	98.1	70.2					
	G	97.6	96.9	96.7	69.9					
	H	97.3	96.4	96.3	69.6					
	SYSTEM	97.4	96.4	96.7	69.6			744	537	518 54.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF AUGUST.

9/80	A	98.9	90.4	98.0	53.9					
	B	98.6	91.1	97.5	54.3					
	C	97.8	90.7	96.0	54.0					
	D	94.9	84.8	90.8	50.6					
	E	98.6	91.1	97.5	54.3					
	F	99.2	93.0	98.5	55.4					
	G	99.2	93.0	98.5	55.4					
	H	98.8	90.2	97.7	53.8					
	SYSTEM	98.2	90.7	97.0	54.0			720	429	389 43.3

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS TAKEN OFF LINE SEVERAL TIMES FOR A TOTAL OF 118 HOURS BECAUSE OF BOILER TUBE LEAKS.

THE BOILER WENT DOWN ON SEPTEMBER 27, 1980 FOR A SCHEDULED MAINTENANCE OVERHAUL. THE FGD SYSTEM WAS AVAILABLE DURING THIS TIME.

10/80	SYSTEM	100.0		.0		744	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE BOILER REMAINED OUT OF SERVICE DUE TO AN ANNUAL TURBINE/BOILER OVERHAUL. THE FGD SYSTEM WAS AVAILABLE DURING THIS TIME.

11/80	A	99.9	92.1	98.3	8.0				
	B	100.0	100.0	100.0	10.0				
	C	100.0	100.0	100.0	10.0				
	D	90.0	.0	.0	.0				
	E	100.0	100.0	100.0	10.0				
	F	100.0	100.0	100.0	10.0				
	G	99.7	85.7	96.4	7.5				
	H	100.0	59.5	100.0	5.2				
	SYSTEM	87.5	87.3	85.9	7.6	720	63	55	8.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE BOILER WAS IN SERVICE APPROXIMATELY 63 HOURS DUE TO THE ANNUAL TURBINE/BOILER OVERHAUL. THE FGD SYSTEM WAS AVAILABLE 98.7% DURING THIS TIME.

MODULE D WAS OUT OF SERVICE DUE TO REPAIRS CAUSED BY FIRE DAMAGE RECEIVED ON OCTOBER 13, 1980.

12/80	A	97.8	96.7	96.9	66.7				
	B	98.0	96.3	97.0	66.4				
	C	98.1	97.1	97.3	66.9				
	D	.0	.0	.0	.0				
	E	98.5	97.7	97.8	67.3				
	F	98.2	93.8	97.4	64.6				
	G	95.2	90.6	92.8	62.5				
	H	98.9	93.6	98.1	64.5				
	SYSTEM	85.6	93.6	98.1	64.5	720	513	427	45.2

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE D REMAINED OUT OF SERVICE THE ENTIRE MONTH DUE TO THE NECESSARY REPAIRS CAUSED BY FIRE DAMAGE IN OCTOBER.

THE UTILITY REPORTED NO MAJOR FGD-RELATED PROBLEMS OCCURRED DURING THE MONTH OF DECEMBER.

1/81	A	96.9	100.0	96.1	76.5				
	B	94.1	100.0	92.9	76.7				
	C	94.4	100.0	93.2	77.0				
	D	18.3	1.5	1.1	1.0				
	E	95.8	100.0	94.9	76.9				
	F	97.0	100.0	96.4	78.6				
	G	96.8	100.0	96.1	79.4				
	H	97.2	100.0	96.6	79.8				
	SYSTEM	85.6	100.0	83.3	68.3	744	465	508	62.5
2/81	A	99.6	100.0	99.4	72.0				

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
	B	99.3	100.0	98.8	68.0				
	C	99.4	99.7	99.1	65.2				
	D	99.3	100.0	99.0	72.9				
	E	99.1	93.1	98.5	60.9				
	F	99.1	92.9	98.6	60.7				
	G	99.7	95.2	99.4	62.2				
	H	99.6	100.0	99.2	66.2				
	SYSTEM	99.4	100.0	99.1	66.1		672	439	444 47.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING PART OF JANUARY AND FEBRUARY MODULE D WAS OUT OF SERVICE FOR REPAIRS DUE TO FIRE DAMAGE.

3/81	A	97.2	100.0	96.9	86.9				
	B	97.7	96.5	97.3	82.1				
	C	95.6	100.0	95.1	85.8				
	D	96.8	96.1	96.2	81.2				
	E	97.2	98.4	96.7	83.7				
	F	97.8	89.8	97.3	76.5				
	G	97.3	93.3	96.7	79.4				
	H	97.7	87.3	97.0	74.3				
	SYSTEM	97.2	95.5	96.6	81.3		744	633	605 68.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO OTHER MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1981.

4/81	A	97.4	97.3	94.5	45.7				
	B	97.5	98.2	94.9	46.1				
	C	97.1	97.3	94.0	45.7				
	D	97.2	97.6	94.0	45.8				
	E	97.4	97.3	94.5	45.7				
	F	97.4	97.6	94.3	45.8				
	G	97.4	97.6	94.6	45.8				
	H	97.1	96.7	94.0	45.4				
	SYSTEM	97.3	97.5	94.4	45.8		720	338	330 36.1

5/81	A	99.7	53.3	94.1	5.4				
	B	99.7	81.3	96.8	8.2				
	C	100.0	84.0	100.0	8.5				
	D	100.0	84.0	100.0	8.5				
	E	100.0	33.3	100.0	3.4				
	F	100.0	.0		.0				
	G	100.0	.0		.0				
	H	100.0	.0		.0				
	SYSTEM	99.9	42.0	98.2	4.3		744	75	32 12.6

6/81	A	99.7	100.0	98.6	19.6				
	B	99.3	100.0	96.5	19.2				
	C	99.0	100.0	94.3	16.0				
	D	99.2	100.0	95.8	19.0				
	E	79.4	20.2	12.9	3.1				
	F	99.6	100.0	97.9	19.3				
	G	99.9	20.6	95.8	3.2				
	H	100.0	.0		.0				
	SYSTEM	97.0	67.6	84.5	12.4		720	109	89 4.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE, MODULE E WAS UNAVAILABLE FOR 572 HOURS AS A RESULT OF PROBLEMS ENCOUNTERED WITH THE VENTURI PUMP MOTOR.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
7/81	A	96.9	95.8	95.4	64.2					
	B	97.2	93.0	95.7	62.4					
	C	97.4	73.9	95.1	49.6					
	D	96.0	89.4	93.7	59.9					
	E	96.1	82.2	93.4	55.1					
	F	98.0	69.1	95.8	46.4					
	G	97.2	75.8	95.0	50.8					
	H	97.8	60.5	95.0	40.6					
	SYSTEM	97.1	80.0	94.9	53.6		744	499	399	37.0
8/81	A	94.4	100.0	93.3	77.8					
	B	95.9	100.0	95.4	86.0					
	C	93.1	100.0	91.3	72.5					
	D	94.9	100.0	94.0	79.9					
	E	94.3	97.5	92.5	70.4					
	F	96.2	100.0	95.0	73.2					
	G	95.9	99.4	94.7	71.8					
	H	96.4	93.4	94.9	67.4					
	SYSTEM	95.1	100.0	95.1	74.9		744	537	557	57.7
9/81	A	30.6	100.0	91.2	27.9					
	B	29.5	100.0	88.5	29.5					
	C	31.6	100.0	94.8	31.6					
	D	30.4	100.0	91.3	30.2					
	E	32.3	97.8	96.1	26.9					
	F	32.3	100.0	96.6	30.5					
	G	32.4	95.6	96.6	26.3					
	H	32.9	83.7	98.4	23.0					
	SYSTEM	31.5	100.0	93.9	28.4		720	198	203	13.8
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTHS OF JULY AND AUGUST.										
DURING SEPTEMBER THE FGD SYSTEM WAS OFF-LINE 504 HOURS FOR A SCHEDULED OVERHAUL.										
10/81	A	50.8	100.0	97.9	40.3					
	B	48.3	100.0	92.6	41.7					
	C	51.4	100.0	99.4	40.9					
	D	51.6	100.0	100.0	42.0					
	E	48.3	83.8	98.8	30.0					
	F	47.3	90.0	99.3	32.2					
	G	51.5	74.3	99.8	26.6					
	H	51.5	72.9	99.7	26.1					
	SYSTEM	50.6	97.9	98.2	35.0		744	266	260	19.3
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING OCTOBER THE SYSTEM WAS OFF-LINE 345 HOURS TO COMPLETE A SCHEDULED OVERHAUL.										
11/81	A	97.4	100.0	97.0	85.6					
	B	95.9	100.0	95.1	79.6					
	C	92.3	100.0	90.3	71.8					
	D	92.9	100.0	91.8	79.8					
	E	96.0	100.0	94.6	69.6					
	F	90.1	97.3	86.4	62.7					
	G	94.1	98.4	91.6	63.4					
	H	91.8	100.0	89.1	66.9					
	SYSTEM	93.8	100.0	92.1	72.4		720	464	521	41.6

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

12/81	A	96.4	100.0	95.6	78.7				
	B	93.4	100.0	91.0	66.6				
	C	98.7	100.0	98.0	64.9				
	D	98.2	100.0	97.2	62.5				
	E	99.3	100.0	98.6	51.5				
	F	98.7	94.2	97.4	46.4				
	G	99.1	83.0	98.0	41.1				
	H	99.4	73.3	98.4	36.2				
	SYSTEM	97.9	93.8	96.8	56.0	744	386	417	25.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD PROBLEMS WERE ENCOUNTERED DURING DECEMBER.

1/82	A	88.0	78.5	81.8	53.9				
	B	93.2	98.7	90.9	67.8				
	C	95.9	100.0	95.2	80.1				
	D	91.5	100.0	89.2	70.3				
	E	92.3	83.1	88.2	57.1				
	F	85.0	94.7	81.2	65.0				
	G	97.0	75.6	94.5	52.0				
	H	97.3	100.0	96.5	73.2				
	SYSTEM	92.5	91.3	89.7	64.9	744	511	483	33.4

2/82	A	94.7	100.0	92.1	60.9				
	B	96.9	100.0	95.7	68.1				
	C	96.8	100.0	95.3	64.8				
	D	98.1	100.0	97.0	64.0				
	E	95.7	100.0	93.7	62.8				
	F	95.5	83.2	90.6	43.1				
	G	96.5	73.8	91.6	38.2				
	H	97.1	67.4	92.2	34.9				
	SYSTEM	96.4	90.6	93.5	58.3	672	348	367	24.0

3/82	A	97.3	100.0	96.6	77.5				
	B	95.1	100.0	93.2	67.7				
	C	96.4	100.0	95.0	69.2				
	D	91.5	100.0	87.8	61.0				
	E	95.2	95.8	92.1	56.8				
	F	98.0	100.0	100.0	96.8				
	G	95.4	59.0	88.4	35.0				
	H	97.7	95.3	96.1	56.5				
	SYSTEM	95.8	93.8	93.2	60.4	744	441	449	33.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1982 THE UTILITY REPORTED EXPERIENCING NO MAJOR FGD-RELATED PROBLEMS.

4/82	A	97.7	100.0	94.9	42.4				
	B	98.5	100.0	96.4	41.3				
	C	99.2	100.0	98.2	42.4				
	D	98.9	100.0	97.4	41.2				
	E	99.0	100.0	97.6	40.3				
	F	99.7	96.9	99.2	38.0				
	G	99.4	68.1	97.9	26.7				

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
	H	98.7	92.4	96.7	36.2				
	SYSTEM	98.9	94.7	97.3	38.6		720	282	278 20.5

** PROBLEMS/SOLUTIONS/COMMENTS

ON APRIL 16 THRU APRIL 30 THE UNIT WAS OUT OF SERVICE FOR AN OVERHAUL.

5/82	SYSTEM	100.0			.0		744	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE UNIT WAS SHUT DOWN FOR A SCHEDULED MAINTENANCE OUTAGE. DURING THIS TIME GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM; HOWEVER, THE SYSTEM WAS AVAILABLE FOR OPERATION IF NEEDED.

6/82	A	99.2	94.3	97.1	25.8					
	B	98.7	100.0	95.8	30.2					
	C	95.0	98.2	84.3	26.9					
	D	99.5	100.0	98.7	36.3					
	E	99.5	90.0	98.1	24.6					
	F	89.9	68.6	64.9	18.8					
	G	99.2	100.0	97.7	34.8					
	H	98.9	100.0	96.7	31.9					
	SYSTEM	97.5	93.9	91.7	28.7		720	197	206	13.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/82	A	97.5	100.0	97.4	90.9					
	B	95.4	100.0	94.9	85.8					
	C	95.8	100.0	95.3	86.3					
	D	97.1	100.0	96.7	85.4					
	E	98.1	98.5	97.7	79.4					
	F	95.1	92.2	93.8	74.3					
	G	97.3	97.7	96.7	78.8					
	H	97.3	100.0	96.9	83.2					
	SYSTEM	96.7	100.0	96.2	83.0		744	600	618	53.8

8/82	A	98.0	100.0	97.6	82.6					
	B	96.9	100.0	96.6	86.7					
	C	97.6	100.0	97.4	86.9					
	D	97.3	100.0	96.9	83.1					
	E	98.7	100.0	98.5	86.3					
	F	98.1	100.0	97.8	85.4					
	G	96.7	100.0	96.2	83.0					
	H	98.5	99.0	98.1	76.4					
	SYSTEM	97.7	100.0	97.4	83.8		744	574	623	46.2

9/82	A	92.1	100.0	90.7	77.2					
	B	97.2	100.0	96.3	72.0					
	C	96.2	100.0	95.3	77.3					
	D	91.7	100.0	89.7	72.5					
	E	98.0	100.0	97.2	71.0					
	F	97.2	100.0	96.1	70.1					
	G	96.2	100.0	94.9	71.9					
	H	96.9	91.2	95.4	63.6					
	SYSTEM	95.7	100.0	94.5	71.9		720	502	518	43.7

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING THE JULY - SEPTEMBER PERIOD.

10/82	A	97.0	100.0	96.2	76.0				
	B	96.8	100.0	95.6	70.4				
	C	97.0	100.0	96.1	74.1				
	D	97.8	100.0	97.2	74.3				
	E	98.4	100.0	97.6	68.0				
	F	98.5	100.0	97.7	64.4				
	G	98.1	100.0	96.9	59.8				
	H	97.2	100.0	95.7	63.0				
	SYSTEM	97.6	100.0	96.6	68.8	744	440	512	35.2

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED BY THE UTILITY
 DURING OCTOBER.

11/82	A	13.2	79.2	99.0	13.2				
	B	13.2	79.2	99.5	13.2				
	C	13.1	78.3	98.5	13.1				
	D	12.8	76.7	96.5	12.8				
	E	12.8	77.1	95.9	12.8				
	F	12.8	77.1	96.7	12.8				
	G	12.8	76.7	95.8	12.8				
	H	13.3	79.6	99.5	13.3				
	SYSTEM	13.0	78.0	97.7	13.0	720	120	94	11.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED TURBINE GENERATOR PROBLEMS DURING NOVEMBER.

12/82	SYSTEM	.0		.0		744	0	0	.0
1/83	SYSTEM	.0		.0		744	0	0	.0
2/83	SYSTEM	.0		.0		672	0	0	.0
3/83	SYSTEM	.0		.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS TAKEN OUT OF SERVICE ON NOVEMBER 7, 1982 FOR AN EXTENDED
 OVERHAUL. THE OUTAGE CONTINUED THROUGH MARCH 1983.

4/83	SYSTEM	.0		.0		720	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN MOST OF APRIL DUE TO EXTENSIVE BOILER REPAIRS. REPAIRS
 INCLUDED THE REPLACEMENT OF BOILER FLOORING, SIDE WALLS, AND SEVERAL
 CYCLONES.

5/83	SYSTEM	.0		.0		744	0	0	.0
6/83	SYSTEM	.0		.0		720	0	0	.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCHEDULED OUTAGE CONTINUED THROUGH THE SECOND QUARTER OF 1983 WITH TURBINE AND GENERATOR WORK BEING COMPLETED.

7/83	A	60.1	91.1	96.1	45.3			
	B	61.2	88.6	92.8	44.1			
	C	61.7	95.4	94.5	47.4			
	D	62.9	94.3	96.9	46.9			
	E	63.3	93.5	97.7	46.5			
	F	62.8	82.4	96.2	41.0			
	G	63.3	99.2	97.6	49.3			
	H	63.7	92.7	98.4	46.1			
	SYSTEM	62.4	92.2	96.3	45.8	744	370	341

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY ATTRIBUTED LOW BOILER HOURS DURING JULY TO START-UP TIME AND TESTS REQUIRED FOLLOWING THE EXTENDED OUTAGE.

8/83	A	76.1	100.0	98.1	68.0			
	B	76.2	100.0	98.3	68.1			
	C	75.7	100.0	97.6	67.6			
	D	75.9	100.0	97.8	65.9			
	E	75.4	98.1	97.0	62.5			
	F	75.9	94.7	97.6	60.3			
	G	75.4	94.9	96.8	60.5			
	H	76.6	94.5	98.6	60.2			
	SYSTEM	75.9	97.8	97.7	64.1	744	474	477 17.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY ATTRIBUTED LOW FGD SYSTEM AVAILABILITY DURING AUGUST TO CONTINUED TESTING ON THE BOILER AND SCRUBBER.

9/83	A				.0			
	B				.0			
	C				.0			
	D				.0			
	E				.0			
	F				.0			
	G				.0			
	H				.0			
	SYSTEM				.0	720	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

A FORCED OUTAGE OCCURRED DURING SEPTEMBER DUE TO TURBINE GENERATOR PROBLEMS. THE UTILITY HOPED TO BE BACK IN SERVICE BY NOVEMBER, 1983.

10/83	SYSTEM	744
11/83	SYSTEM	720
12/83	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN THE ENTIRE FOURTH QUARTER OF 1983 DUE TO CONTINUED BOILER AND TURBINE REPAIRS. THE UTILITY HOPES TO BE BACK IN SERVICE BY THE END OF JANUARY, 1984.

1/84	SYSTEM	744
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
2/84	SYSTEM							696	
3/84	SYSTEM							744	
4/84	SYSTEM							720	
5/84	SYSTEM							744	
6/84	SYSTEM							720	
7/84	SYSTEM							744	
8/84	SYSTEM							744	
9/84	SYSTEM							720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED NO MAJOR FGD-RELATED OUTAGES DURING THE FIRST THREE
 QUARTERS OF 1984. FGD SYSTEM AVAILABILITY WAS ESTIMATED AT 95%.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	JEFFREY	
UNIT NUMBER	1	
CITY	WAMEGO	
STATE	KANSAS	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	322.	(.750 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	2720	
GROSS UNIT GENERATING CAPACITY - MW	720	
NET UNIT GENERATING CAPACITY W/FGD - MW	680	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	540	
*** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1312.35	(2781000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	135.6	(276 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.9	(26.0 FT)
*** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	18899.	(8125 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****	
AVERAGE ASH CONTENT - %	5.80	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	30.00	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	.32	
RANGE SULFUR CONTENT - %	*****	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	*****	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	2	
TYPE	COLD SIDE	
SUPPLIER	C.E. WALTHER	
INLET FLUE GAS CAPACITY - CU.M/S	664.0	(1407000 ACFM)
INLET FLUE GAS TEMPERATURE - C	160.0	(320 F)
PRESSURE DROP - KPA	.3	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	98.6	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
*** FGD SYSTEM		

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	60.00
CURRENT STATUS	1
COMMERCIAL START-UP	8/78
INITIAL START-UP	8/78
CONTRACT AWARDED	7/73

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	6	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	907.	(14400 GPM)
L/G RATIO - L/CU.M	5.3	(39.7 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.0	(4.0 IN-H2O)
INLET GAS FLOW - CU. M/S	171.30	(363000 ACFM)
INLET GAS TEMPERATURE - C	135.6	(276 F)
SO2 REMOVAL EFFICIENCY - %	60.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRECOLLECTOR
NUMBER PER SYSTEM	6
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	BULK SEPARATION
SPECIFIC TYPE	BAFFLE SLATS
TRADE NAME/COMMON TYPE	BULK ENTRAINMENT SEPARATOR
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	1
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	NR

** REHEATER

NUMBER	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	25.0	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS TEMPERATURE - C	48.9	(120 F)
OUTLET FLUE GAS TEMPERATURE - C	76.7	(170 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

** FANS	
NUMBER	4
NUMBER OF SPARES	1
DESIGN	CENTRIFUGAL
SUPPLIER	GREEN FAN
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS TEMPERATURE - C	135.6 (276 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	LOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER OUTLET TO REHEAT ZONE
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	COAL TAR EPOXY
** DUCTWORK	
LOCATION	REHEAT ZONE TO STACK
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	CHEMICALLY-BONDED CONCRETE
** DUCTWORK	
LOCATION	BYPASS
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

DEVICE TYPE	NR	
NUMBER	3	
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	10.9	(12 TPH)
PRODUCT QUALITY - % SOLIDS	60.0	
** TANKS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECYCLE	4	
SLUDGE STORAGE	****	
SLUDGE TRANSFER	****	
MIST ELIMINATOR WASH	****	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECIRCULATION	6	
ABSORBER BLEED	****	
SLUDGE	****	
POND RETURN	****	
ADDITIVE FEED	4	
ADDITIVE TRANSFER	3	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE	NONE	
*** SLUDGE		
** TREATMENT		
METHOD	FORCED OXIDATION	
DEVICE	AIR SPARGERS IN REACTION TANK	
PROPRIETARY PROCESS	N/A	
** DISPOSAL		
NATURE	FINAL	
TYPE	POND	
LOCATION	ON-SITE	
SITE TRANSPORTATION METHOD	PIPELINE	
SITE TREATMENT	CLAY LINING	
SITE DIMENSIONS	230 ACRES/80 FT	
SITE SERVICE LIFE - YRS	30	
** PROCESS CONTROL AND INSTRUMENTATION		
CHEMICAL PARAMETERS	SO2	
MONITOR TYPE	DUPONT & LEAR SIEGLER	
** WATER BALANCE		
WATER LOOP TYPE	CLOSED	
MAKEUP WATER ADDITION - LITERS/S	36.4	(577 GPM)
** CHEMICALS AND CONSUMPTION		
FUNCTION	ABSORBENT	
NAME	LIMESTONE	
CONSUMPTION	12130 LB/HR	
POINT OF ADDITION	BALL MILL	
** FGD SPARE CAPACITY INDICES		
ABSORBER - %	20.0	
** FGD SPARE COMPONENT INDICES		
ABSORBER	1.0	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR
8/78	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE BOILER AND TURBINE WERE SYNCHRONIZED ON JUNE 11 AND THE BOILER IS NOW OPERATIONAL.									
THE FGD SYSTEM IS IN THE SHAKEDOWN PHASE OF OPERATION. EACH OF THE SIX MODULES OPERATED DURING THIS PERIOD. NO MAJOR PROBLEMS WERE REPORTED. INTEGRATED OPERATION OF THE SYSTEM IS EXPECTED DURING THE FIRST HALF OF OCTOBER.									
9/78	SYSTEM						720		
10/78	SYSTEM						744		
11/78	SYSTEM						720		
12/78	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
INTEGRATED OPERATION FOR THIS UNIT HAS NOT YET BEEN ACHIEVED. A CERTIFICATION TEST WHICH HAD BEEN SCHEDULED WAS CANCELLED DUE TO A BOILER OUTAGE. AT THIS TIME THE COLD WEATHER HAS FORCED POSTPONMENT OF THE TEST INDEFINITELY. INTERMITTENT FGD OPERATIONS ARE CONTINUING.									
1/79	SYSTEM						744		
2/79	SYSTEM						672		
3/79	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
NO BOILER OR FGD SYSTEM PROBLEMS WERE REPORTED FOR FEBRUARY OR MARCH.									
4/79	SYSTEM				.0		720	0	0 .0
5/79	SYSTEM				.0		744	0	0 .0
** PROBLEMS/SOLUTIONS/COMMENTS									
THE BOILER WAS SHUT DOWN FOR WARRANTY INSPECTION ON APRIL 1 AND REMAINED OUT OF SERVICE DURING MAY.									
6/79	SYSTEM						720		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT THE UNIT RETURNED TO SERVICE THE FIRST WEEK OF JUNE AND HAS SUFFERED NO OPERATIONAL DIFFICULTIES SINCE RESTART.									
7/79	SYSTEM						744		
8/79	SYSTEM						744		
9/79	SYSTEM						720		

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO UNUSUAL BOILER OR FGD SYSTEM PROBLEMS WERE ENCOUNTERED DURING JULY OR AUGUST. THE UNIT PASSED THE COMPLIANCE TEST DURING THE JUNE-JULY PERIOD. THE UNIT WILL SHUT DOWN IN MID-SEPTEMBER FOR THE NORMAL TWO WEEK INSPECTION AND MAINTENANCE OUTAGE. THE UNIT IS EXPECTED BACK ON LINE ON OCTOBER 1.

10/79	SYSTEM									744
11/79	SYSTEM									720
12/79	SYSTEM									744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS REPORTED THAT THERE HAS BEEN NO MAJOR OPERATING PROBLEMS DURING THIS REPORT PERIOD. EXCESSIVE BALL WEAR IN THE LIMESTONE BALL MILL WAS DETECTED.

AGITATOR FAILURES IN THE REACTION TANK HAVE OCCURRED. THE AGITATORS HAVE EXPERIENCED MOTOR FAILURES, PADDLE ARM DETACHMENTS AND SHAFT BREAKING.

1/80	SYSTEM									744	
2/80	SYSTEM									696	
3/80	SYSTEM	100.0	100.0	100.0	67.7				744	504	504

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WENT OFF LINE FOR TEN DAYS IN MARCH FOR A SCHEDULED INSPECTION. DURING THE BOILER OUTAGE GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM. OTHER THAN THIS OUTAGE, THE FGD UNIT OPERATED 100% OF THE TIME IN MARCH.

4/80	SYSTEM	100.0	100.0	100.0	100.0				720	720	720
5/80	SYSTEM	100.0	100.0	100.0	100.0				744	744	744
6/80	SYSTEM	100.0	100.0	100.0	100.0				720	720	720

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE APRIL THROUGH JUNE PERIOD THE FGD SYSTEM OPERATED 100% OF THE TIME.

7/80	SYSTEM	100.0	100.0	100.0	69.1				744	514	514	49.3
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY A 230 HOUR OUTAGE OCCURRED DUE TO AN AIR PREHEATER TUBE LEAK IN THE BOILER. NO FGD-RELATED PROBLEMS OCCURRED DURING THE MONTH.

8/80	SYSTEM	100.0	100.0	100.0	84.8				744	631	631	42.8
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS TAKEN OUT OF SERVICE FOR PART OF AUGUST SO REPAIRS COULD BE CONDUCTED ON BOILER AIR PREHEATER TUBES.

9/80	SYSTEM	100.0	100.0	100.0	100.0				720	720	720	67.7
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO PROBLEMS WITH THE BOILER OR THE FGD SYSTEM WERE ENCOUNTERED DURING
 SEPTEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/80	SYSTEM	100.0	100.0	100.0	37.4		744	278	278	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THE BOILER DID NOT OPERATE FOR APPROXIMATELY 466 HOURS DUE
 TO A SCHEDULED INSPECTION.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/80	SYSTEM	99.9	99.8	99.8	86.8		720	626	625	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE APPROXIMATELY 94 HOURS DUE TO BOILER
 INSPECTION AND BEARING FAILURES.

THE FGD SYSTEM WAS DOWN APPROXIMATELY ONE HOUR DUE TO AN AUTOMATIC DAMPER
 MALFUNCTION.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/80	SYSTEM	100.0	100.0	100.0	98.5		744	733	733	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER THE FGD SYSTEM WAS AVAILABLE 100%.

A BOILER OUTAGE DURING THE MONTH WAS DUE TO A AIR PREHEATER PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/81	SYSTEM						744			

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/81	SYSTEM						672			

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/81	SYSTEM						744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OPERATED VERY LITTLE DURING THE FIRST QUARTER OF 1981.
 THE UTILITY FIRED LOW SULFUR COAL DURING THE PERIOD.

DURING THE MONTH OF MARCH THE SYSTEM WAS DOWN FOR A PERIOD OF TWO WEEKS
 DUE TO A SCHEDULED MAINTENANCE OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/81	SYSTEM						720			

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/81	SYSTEM						744			

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/81	SYSTEM						720			

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/81	SYSTEM						744			

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/81	SYSTEM						744			

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/81	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE JEFFREY 1 FGD SYSTEM OPERATED INTERMITTENTLY DURING THE SECOND AND
 THIRD QUARTERS OF 1981. FLUE GAS GENERATED FROM THE LOW SULFUR CONTENT
 COAL BURNED THROUGHOUT MUCH OF THE PERIOD DID NOT REQUIRE SCRUBBING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/81	SYSTEM						720			

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
11/81	SYSTEM						720		
12/81	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER.									
1/82	SYSTEM						744		
2/82	SYSTEM						672		
3/82	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1982. SOMETIME DURING THE FIRST AND/OR SECOND QUARTER 1982, THE UNIT WILL BE SHUTDOWN FOR A SCHEDULED 2 WEEK SPRING OUTAGE.									
4/82	SYSTEM						720		
5/82	SYSTEM						744		
6/82	SYSTEM						720		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.									
7/82	SYSTEM						744		
8/82	SYSTEM						744		
9/82	SYSTEM						720		
10/82	SYSTEM						744		
11/82	SYSTEM						720		
12/82	SYSTEM						744		
1/83	SYSTEM						744		
2/83	SYSTEM						672		
3/83	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE JEFFREY 1 AND 2 FGD SYSTEMS HAVE NOT BEEN OPERATED SINCE THE FALL OF 1982 WHILE THE FINAL INSTALLATION WORK WAS COMPLETED ON THE JEFFREY 3 FGD SYSTEM.									
THE REACTION TANKS HAVE EXPERIENCED CORROSION RELATED TO FLEXING OF THE STEEL TANK BASES. THIS HAS BEEN EVIDENCED PARTICULARLY AROUND THE MIXERS. KP&L IS NOW PUTTING IN CONCRETE TANK FLOORS TO ELIMINATE THE PROBLEM.									
THE JEFFREY 1 AND 2 FGD SYSTEMS HAVE BEEN SHOWING CORROSION IN THE DOWNSTREAM DUCTWORK PARTICULARLY IN THE REHEAT MIXING ZONE. THE PROBLEM HAS NOT YET BECOME SERIOUS.									

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

-----PERFORMANCE DATA-----							
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER FGD CAP. HOURS HOURS HOURS FACTOR

4/83	SYSTEM	100.0			.0		720 0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE JEFFREY 1 FGD SYSTEM REMAINED DOWN WHILE FINAL INSTALLATION WORK ON JEFFREY 3 WAS COMPLETED.

5/83	SYSTEM	100.0			.0		744 0
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6/83	SYSTEM	100.0			.0		720 0
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7/83	SYSTEM	100.0			.0		744 0
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8/83	SYSTEM	100.0			.0		744 0
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9/83	SYSTEM	100.0			.0		720 0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE JEFFREY 1 FGD SYSTEM WAS REPORTED TO HAVE BEEN AVAILABLE DURING THE PERIOD OF MAY THROUGH SEPTEMBER. HOWEVER, DURING THIS TIME, THE FGD SYSTEM WAS ONLY OPERATED FOR 1 MONTH DUE TO A SUMMER PEAK LOAD PERIOD.

THE NEXT UNIT OUTAGE IS SCHEDULED FOR THE FIRST OF DECEMBER. DURING THIS OUTAGE, THE UTILITY PLANS TO DO SOME PATCH WORK ON THE ABSORBER OUTLET DUCTING.

10/83	SYSTEM						744
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11/83	SYSTEM						720
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12/83	SYSTEM						744
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** PROBLEMS/SOLUTIONS/COMMENTS

JEFFREY 1 WAS OUT OF SERVICE DURING THE FOURTH QUARTER OF 1983 DUE TO EXTENSIVE DUCTWORK REPAIRS.

1/84	SYSTEM						744
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2/84	SYSTEM						696
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3/84	SYSTEM						744
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4/84	SYSTEM						720
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5/84	SYSTEM						744
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6/84	SYSTEM						720
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7/84	SYSTEM						744
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8/84	SYSTEM						744
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9/84	SYSTEM						720
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** PROBLEMS/SOLUTIONS/COMMENTS

JEFFREY 1 WAS OFF LINE DURING 1984. THE UTILITY REPORTED THAT THE REPLACEMENT OF CORRODING OUTLET DUCTWORK IS PLANNED FOR THE NEXT SIX MONTHS.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	JEFFREY	
UNIT NUMBER	2	
CITY	WAMEGO	
STATE	KANSAS	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	322.	(.750 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	2720	
GROSS UNIT GENERATING CAPACITY - MW	720	
NET UNIT GENERATING CAPACITY W/FGD - MW	680	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	540	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1312.35	(2781000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	135.6	(276 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.9	(26.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	18899.	(8125 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****	
AVERAGE ASH CONTENT - %	5.80	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	30.00	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	.32	
RANGE SULFUR CONTENT - %	*****	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	*****	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	2
TYPE	COLD SIDE
SUPPLIER	C.E. WALTHER
INLET FLUE GAS CAPACITY - CU.M/S	664.0 (1407000 ACFM)
INLET FLUE GAS TEMPERATURE - C	160.0 (320 F)
PRESSURE DROP - KPA	.3 (1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	98.6

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	60.00
CURRENT STATUS	1
COMMERCIAL START-UP	5/80
INITIAL START-UP	1/80
CONTRACT AWARDED	7/73

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

NUMBER	0
--------	---

** ABSORBER

NUMBER	6	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	907.	(14400 GPM)
L/G RATIO - L/CU.M	5.3	(39.7 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.0	(4.0 IN-H2O)
INLET GAS FLOW CU. M/S	171.30	(363000 ACFM)
INLET GAS TEMPERATURE - C	135.6	(276 F)
SO2 REMOVAL EFFICIENCY - %	60.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRECOLLECTOR
NUMBER PER SYSTEM	6
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	BULK SEPARATION
SPECIFIC TYPE	BAFFLE SLATS
TRADE NAME/COMMON TYPE	BULK ENTRAINMENT SEPARATOR
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	1
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	NR

** REHEATER

NUMBER	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	25.0	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS TEMPERATURE - C	48.9	(120 F)
OUTLET FLUE GAS TEMPERATURE - C	76.7	(170 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

** FANS	
NUMBER	4
NUMBER OF SPARES	1
DESIGN	CENTRIFUGAL
SUPPLIER	GREEN FAN
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS TEMPERATURE - C	135.6 (276 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	LOUVER
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER OUTLET TO REHEAT ZONE
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	COAL TAR EPOXY
** DUCTWORK	
LOCATION	REHEAT ZONE TO STACK
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	CHEMICALLY-BONDED CONCRETE
** DUCTWORK	
LOCATION	BYPASS
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

DEVICE TYPE	NR	
NUMBER	3	
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	10.9	(12 TPH)
PRODUCT QUALITY - % SOLIDS	60.0	
** TANKS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECYCLE	4	
SLUDGE STORAGE	****	
SLUDGE TRANSFER	****	
MIST ELIMINATOR WASH	****	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECIRCULATION	6	
ABSORBER BLEED	****	
SLUDGE	****	
POND RETURN	****	
ADDITIVE FEED	4	
ADDITIVE TRANSFER	3	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE	NONE	
*** SLUDGE		
** TREATMENT		
METHOD	FORCED OXIDATION	
DEVICE	AIR SPARGERS IN REACTION TANK	
PROPRIETARY PROCESS	N/A	
** DISPOSAL		
NATURE	FINAL	
TYPE	POND	
LOCATION	ON-SITE	
SITE TRANSPORTATION METHOD	PIPELINE	
SITE TREATMENT	CLAY LINING	
SITE DIMENSIONS	230 ACRES/80 FT	
SITE SERVICE LIFE - YRS	30	
** PROCESS CONTROL AND INSTRUMENTATION		
CHEMICAL PARAMETERS	SO2	
MONITOR TYPE	DUPONT & LEAR SIEGLER	
** WATER BALANCE		
WATER LOOP TYPE	CLOSED	
MAKEUP WATER ADDITION - LITERS/S	36.4	(577 GPM)
** CHEMICALS AND CONSUMPTION		
FUNCTION	ABSORBENT	
NAME	LIMESTONE	
CONSUMPTION	12130 LB/HR	
POINT OF ADDITION	BALL MILL	
** FGD SPARE CAPACITY INDICES		
ABSORBER - %	20.0	
** FGD SPARE COMPONENT INDICES		
ABSORBER	1.0	

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM						744			
2/80	SYSTEM						696			
3/80	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
INITIAL OPERATIONS AT JEFFREY 2 BEGAN IN JANUARY 1980. NO MAJOR PROBLEMS HAVE BEEN ENCOUNTERED SINCE STARTUP.										
4/80	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING APRIL THE SYSTEM WAS STILL IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.										
5/80	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0		720	720	720	
** PROBLEMS/SOLUTIONS/COMMENTS										
COMMERCIAL OPERATIONS BEGAN ON MAY 1, 1980. SINCE THEN THERE HAVE BEEN NO PROBLEMS ENCOUNTERED WITH THE FGD SYSTEM. THE UNIT HAS OPERATED 100% OF THE TIME.										
7/80	SYSTEM	100.0	100.0	100.0	95.3		744	709	709	81.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JULY A 35 HOUR OUTAGE OCCURRED DUE TO AN AIR PREHEATER TUBE LEAK IN THE BOILER. NO FGD-RELATED OUTAGES OCCURRED DURING THE MONTH.										
8/80	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	80.1
9/80	SYSTEM	100.0	100.0	100.0	100.0		720	720	720	73.3
** PROBLEMS/SOLUTIONS/COMMENTS										
NO PROBLEMS WERE ENCOUNTERED WITH THE BOILER OR THE FGD SYSTEM DURING THE AUGUST AND SEPTEMBER PERIOD.										
10/80	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF OCTOBER.										
11/80	SYSTEM	100.0	100.0	100.0	56.1		720	404	404	
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING NOVEMBER NO MAJOR FGD-RELATED PROBLEMS OCCURRED. HOWEVER, THE BOIL- ER WAS OUT OF SERVICE APPROXIMATELY 316 HOURS DUE TO A SCHEDULE OUTAGE.										
12/80	SYSTEM	100.0	100.0	100.0	62.9		744	468	468	

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER THE BOILER WAS OUT OF SERVICE DUE TO SUPERHEATER TUBE PROBLEMS. DURING THIS TIME THE FGD SYSTEM WAS 100% AVAILABLE.

1/81	SYSTEM							744	
2/81	SYSTEM							672	
3/81	SYSTEM							744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS NOT OPERATED MUCH DURING THE FIRST QUARTER OF 1981 BECAUSE THE UTILITY WAS ABLE TO MEET COMPLIANCE USING ONLY LOW SULFUR COAL.

THE UNIT WAS SHUT DOWN ALL OF MARCH AND PART OF FEBRUARY (SIX WEEKS) FOR AN EQUIPMENT WARRANTY INSPECTION.

4/81	SYSTEM							720	
5/81	SYSTEM							744	
6/81	SYSTEM							720	
7/81	SYSTEM							744	
8/81	SYSTEM							744	
9/81	SYSTEM							720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE JEFFREY 2 FGD SYSTEM OPERATED INTERMITTENTLY DURING THE SECOND AND THIRD QUARTERS OF 1981. FLUE GAS GENERATED FROM THE LOW SULFUR CONTENT COAL BURNED THROUGHOUT MUCH OF THE PERIOD DID NOT REQUIRE SCRUBBING.

10/81	SYSTEM							744	
11/81	SYSTEM							720	
12/81	SYSTEM							744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER.

1/82	SYSTEM							744	
2/82	SYSTEM							672	
3/82	SYSTEM							744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1982. SOMETIME DURING THE FIRST AND/OR SECOND QUARTER 1982, THE UNIT WILL BE SHUTDOWN FOR A SCHEDULED 2 WEEK SPRING OUTAGE.

4/82	SYSTEM							720	
5/82	SYSTEM							744	

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

6/82 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.

7/82 SYSTEM 744

8/82 SYSTEM 744

9/82 SYSTEM 720

10/82 SYSTEM 744

11/82 SYSTEM 720

12/82 SYSTEM 744

1/83 SYSTEM 744

2/83 SYSTEM 672

3/83 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE JEFFREY 1 AND 2 FGD SYSTEMS HAVE NOT BEEN OPERATED SINCE THE FALL OF 1982 WHILE THE FINAL INSTALLATION WORK WAS COMPLETED ON THE JEFFREY 3 FGD SYSTEM.

THE REACTION TANKS HAVE EXPERIENCED CORROSION RELATED TO FLEXING OF THE STEEL TANK BASES. THIS HAS BEEN EVIDENCED PARTICULARLY AROUND THE MIXERS. KP&L IS NOW PUTTING IN CONCRETE TANK FLOORS TO ELIMINATE THE PROBLEM.

THE JEFFREY 1 AND 2 FGD SYSTEMS HAVE BEEN SHOWING CORROSION IN THE DOWNSTREAM DUCTWORK PARTICULARLY IN THE REHEAT MIXING ZONE. THE PROBLEM HAS NOT YET BECOME SERIOUS.

4/83 SYSTEM 100.0 .0 720 0

** PROBLEMS/SOLUTIONS/COMMENTS

THE JEFFREY 2 FGD SYSTEM REMAINED DOWN WHILE FINAL INSTALLATION WORK ON JEFFREY 3 WAS COMPLETED.

5/83 SYSTEM 100.0 .0 744 0

6/83 SYSTEM 100.0 .0 720 0

7/83 SYSTEM 100.0 .0 744 0

8/83 SYSTEM 100.0 .0 744 0

9/83 SYSTEM 100.0 .0 720 0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT ALTHOUGH THE FGD SYSTEM WAS AVAILABLE THROUGHOUT THE PERIOD BETWEEN MAY AND SEPTEMBER, THE SYSTEM WAS NOT REQUIRED TO OPERATE.

THE NEXT UNIT OUTAGE IS SCHEDULED FOR NOVEMBER. DURING THIS OUTAGE, THE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

UTILITY PLANS TO DO SOME PATCH WORK ON THE ABSORBER OUTLET DUCTING.

10/83	SYSTEM					744
11/83	SYSTEM					720
12/83	SYSTEM					744

** PROBLEMS/SOLUTIONS/COMMENTS

JEFFREY 2 WAS OUT OF SERVICE DURING THE FOURTH QUARTER OF 1983, HOWEVER THE FGD SYSTEM WAS CONSIDERED 100% AVAILABLE.

1/84	SYSTEM					744
2/84	SYSTEM					696
3/84	SYSTEM					744
4/84	SYSTEM					720
5/84	SYSTEM					744
6/84	SYSTEM					720
7/84	SYSTEM					744
8/84	SYSTEM					744
9/84	SYSTEM					720

** PROBLEMS/SOLUTIONS/COMMENTS

OVERALL FGD SYSTEM AVAILABILITY FOR THE FIRST THREE QUARTERS OF 1984 WAS ESTIMATED AT OVER 85%. NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	JEFFREY	
UNIT NUMBER	3	
CITY	WAMEGO	
STATE	KANSAS	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	2720	
GROSS UNIT GENERATING CAPACITY - MW	730	
NET UNIT GENERATING CAPACITY W/FGD - MW	680	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	540	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1312.35	(2781000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	135.6	(276 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.9	(26.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	18899.	(8125 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****	
AVERAGE ASH CONTENT - %	5.80	
RANGE ASH CONTENT - %	*****	
AVERAGE MOISTURE CONTENT - %	30.00	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	.32	
RANGE SULFUR CONTENT - %	*****	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	*****	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	2	
TYPE	COLD SIDE	
SUPPLIER	C.E. WALTHER	
INLET FLUE GAS CAPACITY - CU.M/S	664.0	(1407000 ACFM)
INLET FLUE GAS TEMPERATURE - C	160.0	(320 F)
PRESSURE DROP - KPA	.3	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	98.6	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
*** FGD SYSTEM		
** GENERAL DATA		
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT	
SO2 REMOVAL MODE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
A-E FIRM	BLACK & VEATCH	
DEVELOPMENT LEVEL	FULL SCALE	
NEW/RETROFIT	NEW	
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 3 (CONT.)

UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	60.00	
CURRENT STATUS	1	
COMMERCIAL START-UP	5/83	
INITIAL START-UP	5/83	
** DESIGN AND OPERATING PARAMETERS		
** ABSORBER		
NUMBER	4	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	907.	(14400 GPM)
L/G RATIO - L/CU.M	5.3	(39.7 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.0	(4.0 IN-H2O)
INLET GAS FLOW - CU. M/S	171.30	(363000 ACFM)
INLET GAS TEMPERATURE - C	135.6	(276 F)
SO2 REMOVAL EFFICIENCY - %	60.0	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRECOLLECTOR	
NUMBER PER SYSTEM	6	
NUMBER OF SPARES PER SYSTEM	1	
NUMBER PER MODULE	1	
GENERIC TYPE	BULK SEPARATION	
SPECIFIC TYPE	BAFFLE SLATS	
TRADE NAME/COMMON TYPE	BULK ENTRAINMENT SEPARATOR	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	1	
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	NR	
** REHEATER		
NUMBER	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	25.0	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS TEMPERATURE - C	48.9	(120 F)
OUTLET FLUE GAS TEMPERATURE - C	76.7	(170 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	4	
NUMBER OF SPARES	1	
DESIGN	CENTRIFUGAL	
SUPPLIER	GREEN FAN	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS TEMPERATURE - C	135.6	(276 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
FUNCTION	SHUT-OFF	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	

KANSAS POWER & LIGHT: JEFFREY 3 (CONT.)

LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
FUNCTION	SHUT-OFF
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
FUNCTION	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER OUTLET TO REHEAT ZONE
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	COAL TAR EPOXY
** DUCTWORK	
LOCATION	REHEAT ZONE TO STACK
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	CHEMICALLY-BONDED MORTAR
** DUCTWORK	
LOCATION	BYPASS
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
NUMBER	3
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	10.9 (12 TPH)
PRODUCT QUALITY - % SOLIDS	60.0
** TANKS	
SERVICE	NUMBER
-----	-----
SLUDGE STORAGE	****
SLUDGE TRANSFER	****
MIST ELIMINATOR WASH	****
ABSORBER RECYCLE	4
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	6
ABSORBER BLEED	****
SLUDGE	****
POND RETURN	****

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: JEFFREY 3 (CONT.)

ADDITIVE FEED	4
ADDITIVE TRANSFER	3
** SOLIDS CONCENTRATING/DEWATERING DEVICE	NONE
*** SLUDGE	
** TREATMENT METHOD	FORCED OXIDATION
DEVICE	AIR SPARGERS IN REACTION TANK
PROPRIETARY PROCESS	N/A
** DISPOSAL NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	230 ACRES/80 FT
SITE SERVICE LIFE - YRS	30
** WATER BALANCE WATER LOOP TYPE	CLOSED
** CHEMICALS AND CONSUMPTION FUNCTION	ABSORBENT
NAME	LIMESTONE
CONSUMPTION	12130LB/HR
POINT OF ADDITION	BALL MILL

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/83	SYSTEM							744		
6/83	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE JEFFREY 3 FGD SYSTEM COMMENCED OPERATION IN MAY AND IS CURRENTLY IN THE STARTUP PHASE OF OPERATION.

THE JEFFREY 3 FGD SYSTEM IS SIMILIAR TO UNITS 1 AND 2 EXCEPT THAT THE OUTLET FROM THE ABSORBERS FEED INTO A COMMON BYPASS DUCT (FOR CONTINUOUS REHEAT) WHICH THEN EXITS INTO THE STACK. UNITS 1 AND 2 HAVE MIXING CHAMBER SECTIONS WHICH IN THE PAST HAVE CAUSED CORROSION PROBLEMS.

7/83	SYSTEM	744
8/83	SYSTEM	744
9/83	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT SINCE START UP, AT LEAST THREE OF THE FOUR AB-SORBER SPRAY TOWERS HAVE OPERATED FULL TIME.

A UNIT OUTAGE FOR UNIT 3 BEGAN ON SEPTEMBER 17 AND WAS SCHEDULED TO LAST TWO WEEKS. HOWEVER, DUE TO SOME UNEXPECTED TURBINE PROBLEMS, THE UNIT OUTAGE MAY NOW LAST THREE WEEKS.

10/83	SYSTEM	744
11/83	SYSTEM	720

KANSAS POWER & LIGHT: JEFFREY 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

12/83	SYSTEM									744
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** PROBLEMS/SOLUTIONS/COMMENTS

JEFFREY 3 WAS DOWN DURING PART OF DECEMBER DUE TO PROBLEMS BROUGHT ABOUT BY THE EXTREME COLD WEATHER CONDITIONS.

1/84	SYSTEM									744
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2/84	SYSTEM									696
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3/84	SYSTEM									744
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4/84	SYSTEM									720
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5/84	SYSTEM									744
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6/84	SYSTEM									720
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7/84	SYSTEM									744
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8/84	SYSTEM									744
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9/84	SYSTEM									720
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** PROBLEMS/SOLUTIONS/COMMENTS

OVERALL FGD SYSTEM AVAILABILITY FOR THE FIRST THREE QUARTERS OF 1984 WAS ESTIMATED AT OVER 85%. NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	LAWRENCE	
UNIT NUMBER	4	
CITY	LAWRENCE	
STATE	KANSAS	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	129.	(.300 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	576	
GROSS UNIT GENERATING CAPACITY - MW	125	
NET UNIT GENERATING CAPACITY W/FGD - MW	115	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	125	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	CYCLING	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	190.18	(403000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	137.8	(280 F)
STACK HEIGHT M	61.	(200 FT)
STACK SHELL	CARBON STEEL	
STACK TOP DIAMETER - M	2.4	(8.0 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	*****	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****	
AVERAGE ASH CONTENT - %	9.80	
RANGE ASH CONTENT - %	9.8-16	
AVERAGE MOISTURE CONTENT - %	11.80	
RANGE MOISTURE CONTENT - %	*****	
AVERAGE SULFUR CONTENT - %	.55	
RANGE SULFUR CONTENT - %	0.55-0.90	
AVERAGE CHLORIDE CONTENT - %	.03	
RANGE CHLORIDE CONTENT - %	*****	
 *** PARTICLE CONTROL		
 ** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
 ** ESP		
NUMBER	0	
TYPE	NONE	
 ** PARTICLE SCRUBBER		
NUMBER	2	
INITIAL START-UP DATE	1/76	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/VERTICALLY-ADJUSTABLE ROD DECKS	
TRADE NAME/COMMON NAME	ROD SCRUBBER	
SUPPLIER	COMBUSTION ENGINEERING	
DIMENSIONS - FT	3.0 X 23.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	NORYL-CLAD FRP RODS	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	226.8	(3600 GPM)
L/G RATIO - LITER/CU.M	2.4	(17.9 GAL/1000ACF)
PRESSURE DROP - KPA	2.2	(9.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	15.2	(50.0 FT/S)
INLET GAS FLOW RATE CU.M/S	95.1	(201500 ACFM)
INLET GAS TEMPERATURE C	137.8	(280 F)

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

PARTICLE REMOVAL EFFICIENCY - % 99.0

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	98.90
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	73.00
CURRENT STATUS	1
COMMERCIAL START-UP	1/77
INITIAL START-UP	1/77
CONTRACT AWARDED	12/68

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

NUMBER 0

** ABSORBER

NUMBER	2
GENERIC TYPE	SPRAY TOWER
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY
TRADE NAME/COMMON TYPE	N/A
SUPPLIER	COMBUSTION ENGINEERING
SHELL GENERIC MATERIAL	STAINLESS STEEL
SHELL SPECIFIC MATERIAL	AUSTENITIC
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L
LINER GENERIC MATERIAL	NONE
LINER SPECIFIC MATERIAL	N/A
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	2
LIQUID RECIRCULATION RATE - LITER/S	334. (5300 GPM)
L/G RATIO - L/CU.M	4.1 (30.4 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP KPA	.6 (2.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	1.8 (6.0 FT/S)
INLET GAS FLOW - CU. M/S	82.35 (174500 ACFM)
INLET GAS TEMPERATURE C	51.1 (124 F)
SO2 REMOVAL EFFICIENCY - %	73.0

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	2
NUMBER OF PASSES PER STAGE	2
FREEBOARD DISTANCE - M	.09 (.3 FT)
DISTANCE BETWEEN STAGES - CM	30.48 (12.0 IN)
DISTANCE BETWEEN VANES CM	8.9 (3.50 IN)
VANE ANGLES - DEGREES	90
PRESSURE DROP - KPA	.2 (1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	1.8 (6.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	POND RECYCLE
WASH FREQUENCY	ONCE/DAY
WASH RATE - L/S	12.6 (200 GAL/MIN)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

** REHEATER		
NUMBER	2	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	HOT WATER	
TRADE NAME/COMMON TYPE	FIN TUBE	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	13.9	(25 F)
INLET FLUE GAS FLOW RATE - CU. M/S	171.30	(363000 ACFM)
INLET FLUE GAS TEMPERATURE - C	51.7	(125 F)
OUTLET FLUE GAS TEMPERATURE - C	65.6	(150 F)
NUMBER OF HEAT EXCHANGER BANKS	2	
NUMBER OF TUBES PER BUNDLE	66	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
** FANS		
NUMBER	2	
DESIGN	CENTRIFUGAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	80.22	(170000 ACFM)
FLUE GAS TEMPERATURE C	62.8	(145 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	SCRUBBER INLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	SCRUBBER OUTLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	BYPASS	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	5.4 (6 TPH)
PRODUCT QUALITY % SOLIDS	60.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	2
SCRUBBER RECYCLE	2
WASTE SLURRY BLEED	2
REAGENT PREP PRODUCT	1
MILL SUMP/PRODUCT	****
RECLAIMED WATER	****
** PUMPS	
SERVICE	NUMBER
-----	-----
ADDITIVE FEED	6
MIST ELIMINATOR WASH	****
VENTURI RECIRCULATION	2
ASSORBER RECIRCULATION	2
MILL SLURRY	****
ADDITIVE TRANSFER	****
ADDITIVE STORAGE	****
EFFLUENT BLEED	****
THICKENER UNDERFLOW	2
MAKEUP WATER RECIRCULATION	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY (HSLA)
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	COLLECTION TANK
FEED STREAM CHARACTERISTICS	8-10% SOLIDS
OUTLET STREAM CHARACTERISTICS	30-35% SOLIDS
OUTLET STREAM DISPOSITION	TO POND
OVERFLOW STREAM DISPOSITION	RECLAIMED WATER TANK
*** SLUDGE	
** TREATMENT	
METHOD	FORCED OXIDATION
DEVICE	REACTION TANK
PROPRIETARY PROCESS	N/A
INLET QUALITY - %	10.0
** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	OVERFLOW FROM INTERIM SLUDGE POND
SITE TREATMENT	NONE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

** PROCESS CONTROL AND INSTRUMENTATION
 CHEMICAL PARAMETERS PH, SO2 CONCENTRATION
 PHYSICAL VARIABLES PERCENT SOLIDS, SLURRY FLOW
 CONTROL LEVELS PH 6.5
 MONITOR LOCATION PH PROBES IN REACTION TANKS
 PROCESS CONTROL MANNER AUTOMATIC
 PROCESS CHEMISTRY MODE FEEDBACK

** WATER BALANCE
 WATER LOOP TYPE CLOSED

** CHEMICALS AND CONSUMPTION
 FUNCTION ABSORBENT
 NAME LIMESTONE
 PRINCIPAL CONSTITUENT 93% CaCO3, 7% MgCO3
 CONSUMPTION 1.5 TPH
 POINT OF ADDITION BALL MILL

** FGD SPARE CAPACITY INDICES
 ABSORBER - % .0

** FGD SPARE COMPONENT INDICES
 ABSORBER .0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

0/69 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH THE FGD SYSTEM ON BOILER NO. 4 INCLUDED BUILDUP AND PLUGGING OF THE INLET DUCT WHERE HOT GASES ENTER THE SCRUBBERS, EROSION OF SCRUBBER WALLS, CORROSION OF SCRUBBERS INTERNALS, BUILDUP ON ID FAN ROTORS, AND PLUGGING OF DRAIN LINES, MARBLE BEDS, AND MIST ELIMINATORS. LOW SO2 REMOVAL WAS CAUSED BY OVERBURNING OF THE LIMESTONE AND DROPOUT OF THE LIME WITH THE ASH IN THE BOTTOM OF THE SCRUBBER.

THE SCRUBBERS WERE MODIFIED IN 1969 BY RAISING THE MIST ELIMINATOR AND ADDING SOOT BLOWERS IN THE INLET DUCT AND REHEATER TO REDUCE PLUGGING. NEW SPRAY NOZZLES WERE ALSO INSTALLED. REHEATER PLUGGING WAS ELIMINATED BY REPLACING COPPER REHEAT COILS WITH A CARBON STEEL UNIT HAVING WIDELY SPACED FINS.

0/70 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

MAJOR MODIFICATIONS IN 1970 WERE SANDBLASTING AND COATING OF THE INTERIOR OF THE SCRUBBERS, REPLACEMENT OF ALL INTERNAL STEEL PIPES WITH PLASTIC AND FIBERGLASS, AND REPLACEMENT OF STAINLESS STEEL MIST ELIMINATORS WITH FIBERGLASS. SINCE MIST ELIMINATOR PLUGGING WAS NOT COMPLETELY STOPPED, THE UNIT WAS WASHED MANUALLY EVERY NIGHT TO MAINTAIN THE REQUIRED MODULE SERVICE.

0/72 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

THE MODIFICATIONS IN THE SUMMER OF 1972 ON THE TWO FGD MODULES INCLUDED ENLARGEMENT OF THE CRYSTALLIZATION TANK, AND INSTALLATION OF NEW PLASTIC SPRAY NOZZLES, NEW SLURRY PUMPS AND STRAINERS, AND NEW MULTIPLE MIXERS IN THE TANK. PROBLEMS THAT REMAINED INCLUDED CORROSION, INEFFICIENT DAMPERS, EXPANSION JOINT FAILURE, MIST ELIMINATOR FOULING, RAPID EROSION OF THE SLURRY PUMP, AND VALVE FAILURE.

0/73 SYSTEM

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

OPERATION OF THE FGD SYSTEM SINCE THE FALL OF 1973 HAS BEEN THE MOST SUCCESSFUL TO DATE.

0/74 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

IN 1974 THIS UNIT WAS AVAILABLE FOR OPERATION 343 DAYS. 50% OF THE FUEL CONSUMED WAS COAL, 2% FUEL OIL, AND 48% NATURAL GAS.

0/75 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

DURING 1975 THIS UNIT WAS AVAILABLE FOR OPERATION 333 DAYS. 64% OF THE FUEL CONSUMED WAS COAL, 33% FUEL OIL, AND 33% NATURAL GAS.

THE UTILITY COMPLETED NEGOTIATIONS FOR A LOW-SULFUR COAL SUPPLY FROM SOUTHEAST WYOMING (MEDICINE BOW) IN 1974. THE HIGH-SULFUR KANSAS COAL WAS COMPLETELY PHASED OUT BY LATE SPRING OF 1975. THIS IMPROVED SCRUBBER OPERATIONS BECAUSE OF REDUCED SULFUR REMOVAL REQUIREMENTS AND THE ALKALINE SPECIES IN THE NEW COAL REDUCED THE AMOUNT OF NECESSARY LIMESTONE ADDITION.

6/75 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

STATION LOAD IS REDUCED TO 50% EVERY NIGHT. THEREFORE, ONE OF THE MODULES CAN BE TAKEN OFF-LINE NIGHTLY FOR CLEANING OR REPAIR. WYOMING COAL (0.5% SULFUR) IS NOW BEING BURNED IN THE BOILER FURNACE. SOME NATURAL GAS HAS BEEN BURNED SINCE JUNE 20, 1975.

7/75 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

EACH MODULE HAS BEEN SHUT DOWN ONCE PER WEEK FOR INSPECTION AND CLEAN-UP.

8/75 SYSTEM

744

9/75 SYSTEM

720

10/75 SYSTEM

744

11/75 SYSTEM

720

12/75 SYSTEM

744

1/76 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY IS REPLACING THE LIMESTONE INJECTION FGD SYSTEM WITH A ROD-DECK VENTURI/SPRAY TOWER FGD SYSTEM. THE NEW SYSTEM WILL BE BROUGHT ON LINE IN EARLY JANUARY 1977.

2/76 SYSTEM

696

3/76 SYSTEM

744

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

4/76	SYSTEM					720
5/76	SYSTEM					744
6/76	SYSTEM					720
7/76	SYSTEM					744
8/76	SYSTEM					744
9/76	SYSTEM					720

** PROBLEMS/SOLUTIONS/COMMENTS

A SCHEDULED UNIT OUTAGE BEGAN IN MID-SEPTEMBER FOR A TURBINE OVERHAUL.
 THE UNIT IS SCHEDULED TO COME BACK ON LINE IN EARLY JANUARY.

10/76	SYSTEM					744
11/76	SYSTEM					720
12/76	SYSTEM					744
1/77	SYSTEM					744

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEW LIMESTONE FGD SYSTEM BECAME COMMERCIALY OPERABLE IN EARLY
 JANUARY 1977. THE UTILITY REPORTED THAT BOTH PARTICULATE AND SO2 REMOVALS
 IN THE ROD-DECK VENTURI/SPRAY TOWER SCRUBBING UNIT ARE QUITE SATISFACTORY.

2/77	SYSTEM					672
3/77	SYSTEM					744

** PROBLEMS/SOLUTIONS/COMMENTS

MINOR PROBLEMS HAVE BEEN RELATED TO MAINTAINING DESIRED SOLIDS LEVEL IN
 THE MAKE-UP TANK. MODIFICATION PLANS INCLUDE CESSATION OF SLURRY DILU-
 TION, WHICH CURRENTLY PRECEDES THE INTRODUCTION OF THE FRESH LIMESTONE
 SLURRY INTO THE RECIRCULATION LOOP. THE UTILITY PLANS TO PUMP THE 35%
 SOLIDS SLURRY DIRECTLY FROM THE SLURRY TANK INTO THE RECIRCULATION LOOP.

CURRENTLY SEVERAL DIFFERENT MAKES OF SLURRY PUMPS ARE BEING USED. ALL
 ARE FUNCTIONING WELL SO FAR. THE PUMPS HAVE NOT BEEN IN SERVICE LONG
 ENOUGH FOR COMPARISONS TO BE DRAWN.

4/77	SYSTEM					720
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER WAS NOT REQUIRED FOR SERVICE DURING THE REPORT PERIOD BECAUSE
 NATURAL GAS WAS FIRED IN THE BOILER.

5/77	SYSTEM					744
6/77	SYSTEM					720

** PROBLEMS/SOLUTIONS/COMMENTS

MIST ELIMINATOR CRACKS HAVE BEEN A PROBLEM.

A COMPRESSOR BREAKDOWN IN THE RECYCLE TANK AIR AGITATION SYSTEM AND THE

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

RECYCLE TANK STRAINER SCREEN WASH HAVE BEEN PROBLEM AREAS. THE WASH SYSTEM HAS BEEN TWISTING OFF UNDER WATER PRESSURE.

SOOT BLOWER PROBLEMS WERE ENCOUNTERED.

THE DENVER SLURRY PUMPS ARE EXPERIENCING SOME ON-GOING PROBLEMS, WHILE THE ALLEN-SHERMAN-HOFF PUMPS ARE OPERATING SATISFACTORILY.

7/77 SYSTEM 744

8/77 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER BURNED NATURAL GAS THROUGHOUT AUGUST.

THE MIST ELIMINATOR CRACKS HAVE BEEN REPAIRED.

THE RECYCLE TANK STRAINER PROBLEMS PERSISTED AND THE AIR AGITATION SYSTEM COMPRESSOR WAS MALFUNCTIONING RESULTING IN SOLIDS SETTLING IN THE RECYCLE TANK.

THE DENVER SLURRY PUMPS ARE FUNCTIONING ADEQUATELY AT PRESENT. THE PUMP GLAND PACKINGS ARE BEING REDESIGNED.

9/77 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE NO. 4 BOILER HAS BEEN FIRING 100% NATURAL GAS FOR ALL BUT 8 TO 10 DAYS SINCE THE BEGINNING OF APRIL 1977. AS OF SEPTEMBER 15 THE UNIT BEGAN BURNING COAL AGAIN.

10/77 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM LOAD WAS CUT BACK TO 50% IN OCTOBER BECAUSE A NEW COOLING TOWER IS BEING CONSTRUCTED.

11/77 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

ON NOVEMBER 15 A MAJOR FGD SYSTEM OVERHAUL TOOK PLACE WHILE THE TURBINE WAS DOWN FOR INSPECTION AND THE NEW COOLING TOWER WAS BEING CONNECTED.

12/77 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT CAME BACK ON LINE DECEMBER 20 AT FULL CAPACITY. THE TURBINES WERE BALANCED DURING DECEMBER.

1/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED WITHOUT ANY PROBLEMS OTHER THAN SOME FREEZING OF THE PIPELINES.

THICKENER DISCHARGE LINE FREEZING CAUSED CLARIFIER PLUGGING.

2/78 SYSTEM 672

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE THICKENER UNDERFLOW LINE IS STILL FROZEN AND TWO 3 INCH DIAMETER FIRE HOSES ARE BEING USED TO PUMP THE UNDERFLOW SOLIDS TO THE POND.

3/78	SYSTEM				744			
4/78	A	100.0	100.0	100.0				
	B	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	720	720	720	
5/78	A	100.0	100.0	100.0				
	B	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	744	744	744	
6/78	A	100.0	100.0	100.0				
	B	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	720	720	720	
7/78	A	100.0	100.0	100.0				
	B	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM BOTH OPERATED THROUGHOUT JUNE AND JULY WITHOUT ANY FORCED OUTAGES.

8/78	A	100.0	100.0	100.0				
	B	100.0	100.0	100.0				
	SYSTEM	100.0	100.0	100.0	744	744	744	
9/78	A	100.0	100.0	63.0				
	B	100.0	100.0	63.0				
	SYSTEM	100.0	100.0	63.0	720	456	456	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SYSTEM RAN WITH NO FORCED OUTAGES DURING AUGUST AND SEPTEMBER.

THE UNIT WAS DOWN THE LAST WEEK AND A HALF IN SEPTEMBER FOR A SCHEDULED FALL TURBINE/BOILER OUTAGE. ROUTINE MAINTENANCE INCLUDED BOILER AND TURBINE CLEANING AND REPAIR.

10/78	SYSTEM				744	576		
11/78	SYSTEM				720	720		
12/78	SYSTEM				744	744		

** PROBLEMS/SOLUTIONS/COMMENTS

AN EPA SPONSORED CONTINUOUS MONITORING TEST BEGAN AT THIS UNIT AT THE BEGINNING OF DECEMBER AND WILL CONTINUE THROUGH THE END OF JANUARY. THE TEST INVOLVES 24 HOUR MONITORING OF SO2, OPACITY AND NOX.

1/79	SYSTEM				744			
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KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

AN ID FAN WAS FORCED OUT OF SERVICE ON JANUARY 5 FORCING THE UNIT TO
 OPERATE AT 50% CAPACITY. THE FAN IS EXPECTED TO BE REPLACED BY
 JANUARY 12.

2/79	A	96.0	96.0	96.0				
	B	71.0	71.0	71.0				
	SYSTEM	84.0	84.0	84.0	672	672	564	

** PROBLEMS/SOLUTIONS/COMMENTS

ONE MODULE WAS FORCED OUT OF SERVICE FOR TWO DAYS WHEN ITS TANK AGITATOR
 FAILED.

ONE MODULE WAS FORCED OUT OF SERVICE FOR AN EIGHT DAY PERIOD DUE TO A FAN
 MOTOR MALFUNCTION

3/79	SYSTEM				744			
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** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 4 EXPERIENCED A MOTOR FAILURE ON AN ID FAN DURING THE FEBRUARY-
 MARCH PERIOD.

4/79	SYSTEM				720			
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5/79	SYSTEM				744			
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6/79	SYSTEM				720			
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SYSTEM RAN WELL. THE ONLY FGD SYSTEM RELATED
 OUTAGES WERE DUE TO A MIXER FAILURE AND GENERAL MAINTENANCE.

7/79	SYSTEM				744			
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8/79	SYSTEM				744			
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9/79	SYSTEM				720			
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE THIRD QUARTER AN OUTAGE WAS CAUSED BY MIXER MOTOR AND OTHER
 MIXER RELATED PROBLEMS. DURING THE OUTAGE MAINTENANCE WAS DONE ON THE
 BOILER AND SCRUBBERS AND REPAIR WORK WAS DONE ON THE MIXERS.

10/79	SYSTEM				744			
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OPERATED AT HALF LOAD DURING THE LAST WEEK OF SEPTEMBER AND
 WAS SHUT DOWN COMPLETELY IN EARLY OCTOBER FOR THE ANNUAL FALL OUTAGE.

11/79	SYSTEM				720			
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12/79	SYSTEM				744			
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-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FOR APPROXIMATELY 10 DAYS OF SCHEDULED OUTAGE FOR FALL MAINTENANCE.

SOME AGITATOR SHAFT FAILURES OCCURRED IN THE REACTION TANK CAUSING MAINTENANCE ATTENTION.

1/80	SYSTEM	100.0	100.0		100.0	744	744	744
2/80	SYSTEM	100.0	100.0		100.0	696	696	696
3/80	SYSTEM	100.0	100.0		100.0	744	744	744

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS WERE REPORTED FOR THE LAWRENCE 4 SCRUBBER DURING THE FIRST QUARTER 1980.

4/80	SYSTEM	100.0	100.0	100.0	80.0	720	576	576
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OFF LINE FOR SIX DAYS IN APRIL FOR A SCHEDULED INSPECTION. DURING THE BOILER OUTAGE GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.

5/80	SYSTEM	100.0	100.0	100.0	100.0	744	744	744
6/80	SYSTEM	100.0	100.0	100.0	100.0	720	720	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED 100% OF THE TIME IN MAY AND JUNE.

7/80	SYSTEM	96.8	96.8	96.8	96.8	744	744	720 54.8
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** PROBLEMS/SOLUTIONS/COMMENTS

A STORAGE TANK ERODED COMPLETELY THROUGH CAUSING A TWO DAY OUTAGE IN JULY.

8/80	SYSTEM	100.0	100.0	100.0	100.0	744	744	744 50.2
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** PROBLEMS/SOLUTIONS/COMMENTS

NO PROBLEMS WERE ENCOUNTERED WITH THE FGD SYSTEM OR THE BOILER DURING AUGUST.

9/80	SYSTEM	96.9	100.0	100.0	40.3	720	290	290 16.4
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE FOR APPROXIMATELY 17 DAYS FOR A BOILER INSPECTION.

ECONOMIZER WELD REPAIRS CAUSED THE SYSTEM TO REMAIN OUT OF SERVICE FOR 22 HOURS.

10/80	SYSTEM	100.0	100.0	100.0	100.0	744	744	744
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KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF OCTOBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FGD FACTOR
11/80	SYSTEM	100.0	100.0	100.0	89.7		720	646	646		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER THE BOILER WAS OUT OF SERVICE APPROXIMATELY 74 HOURS DUE TO TUBE LEAKS. THE FGD SYSTEM WAS AVAILABLE 100% DURING THIS TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FGD FACTOR
12/80	SYSTEM	100.0	100.0	100.0	98.1		744	730	730		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER 14 HOURS OF OUTAGE TIME WAS DUE TO TRANSFORMER PROBLEMS. THE FGD SYSTEM WAS AVAILABLE THE ENTIRE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FGD FACTOR
1/81	SYSTEM						744				
2/81	SYSTEM						672				
3/81	SYSTEM						744				

** PROBLEMS/SOLUTIONS/COMMENTS

LAWRENCE 4 WAS ON COLD STANDBY MUCH OF THE JANUARY-MARCH PERIOD AND THEREFORE DID NOT SEE MUCH OPERATION. UTILITY REPORTED THERE WERE NO FGD SYSTEM RELATED OUTAGES DURING THE QUARTER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FGD FACTOR
4/81	SYSTEM						720				
5/81	SYSTEM						744				
6/81	SYSTEM						720				
7/81	SYSTEM						744				
8/81	SYSTEM						744				
9/81	SYSTEM						720				

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF SEPTEMBER, LAWRENCE 4 WAS ON COLD STANDBY FROM THE THIRD TO THE TWENTY FIRST. NO FGD SYSTEM-RELATED PROBLEMS WERE REPORTED FOR THIS UNIT DURING THE SECOND AND THIRD QUARTERS OF 1981.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FGD FACTOR
10/81	SYSTEM						744				
11/81	SYSTEM						720				
12/81	SYSTEM						744				

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT BOILER OPERATIONS WERE NOT CURTAILED OR REDUCED AS A RESULT OF THE FGD SYSTEM DURING THE ENTIRE FOURTH QUARTER 1981.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FGD FACTOR
1/82	SYSTEM						744				
2/82	SYSTEM						672				

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

3/82 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1982. SOMETIME DURING THE FIRST AND/OR SECOND QUARTER 1982, THE UNIT WILL BE SHUTDOWN FOR A SCHEDULED 2 WEEK SPRING OUTAGE.

4/82 SYSTEM 720

5/82 SYSTEM 744

6/82 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.

7/82 SYSTEM 744

8/82 SYSTEM 744

9/82 SYSTEM 720

10/82 SYSTEM 744

11/82 SYSTEM 720

12/82 SYSTEM 744

1/83 SYSTEM 744

2/83 SYSTEM 672

3/83 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

OVER THE PAST YEAR THE LAWRENCE 4 AND 5 FGD SYSTEMS HAVE OPERATED WITH NO MAJOR PROBLEMS. THERE HAVE BEEN SOME CHRONIC MINOR PROBLEMS WITH SPRAY HEADER PLUGGING. THERE MAY BE SOME MODIFICATIONS PERFORMED AT SOME POINT IN THE FUTURE TO MINIMIZE THE PROBLEM.

THE DOWNSTREAM DUCTWORK IN BOTH THE LAWRENCE 4 AND 5 FGD SYSTEMS HAS BEEN EXPERIENCING CORROSION THAT WILL REQUIRE SOME DEGREE OF REPLACEMENT. THE CORROSION IS NOT RELATED TO CHLORIDES. A TIME TABLE FOR THE REPAIR WORK WAS NOT REPORTED BY THE UTILITY.

4/83 SYSTEM 720

5/83 SYSTEM 744

6/83 SYSTEM 720

7/83 SYSTEM 744

8/83 SYSTEM 744

9/83 SYSTEM 720

[illegible]

THE NEXT UNIT OUTAGE IS SCHEDULED TO BEGIN ON OCTOBER 23 AND LAST FROM TWO TO THREE WEEKS. DURING THE OUTAGE, THE UTILITY PLANS TO DO SOME TEMPORARY PATCH WORK ON THE ABSORBER OUTLET DUCTING. THE UTILITY STATED THAT THIS DUCTWORK WILL EVENTUALLY NEED SOME MAJOR REPLACEMENT WORK (PLANNED FOR SOMETIME IN 1984).

THE UTILITY REPORTED THAT OVERALL FGD SYSTEM AVAILABILITY FOR THE FIRST THREE QUARTERS OF 1984 WAS ABOVE 90%.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT
PLANT NAME	LAWRENCE
UNIT NUMBER	5
CITY	LAWRENCE
STATE	KANSAS
REGULATORY CLASSIFICATION	C
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	215. (.500 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	576
GROSS UNIT GENERATING CAPACITY - MW	420
NET UNIT GENERATING CAPACITY W/FGD - MW	400
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	420
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	CYCLING
DESIGN BOILER FLUE GAS FLOW - CU.M/S	599.78 (1271000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9 (300 F)
STACK HEIGHT - M	107. (350 FT)
STACK SHELL	CARBON STEEL
STACK TOP DIAMETER - M	4.9 (16.0 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	23260. (10000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****
AVERAGE ASH CONTENT - %	9.80
RANGE ASH CONTENT - %	9.8-16.0
AVERAGE MOISTURE CONTENT - %	11.80
RANGE MOISTURE CONTENT - %	*****
AVERAGE SULFUR CONTENT - %	.55
RANGE SULFUR CONTENT - %	0.55-0.90
AVERAGE CHLORIDE CONTENT - %	.03
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	0
TYPE	NONE
** PARTICLE SCRUBBER	
NUMBER	2
NUMBER OF SPARES	0
INITIAL START-UP DATE	4/78
GENERIC TYPE	VENTURI TOWER
SPECIFIC TYPE	VARIABLE-THROAT/VERTICALLY-ADJUSTABLE ROD DECKS
TRADE NAME/COMMON NAME	ROD SCRUBBER
SUPPLIER	COMBUSTION ENGINEERING
DIMENSIONS - FT	5.0 X 37.0
SHELL GENERIC MATERIAL	STAINLESS STEEL
SHELL SPECIFIC MATERIAL	AUSTENITIC
LINER GENERIC MATERIAL	NONE
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	TYPE 316L STAINLESS STEEL RODS
NUMBER OF CONTACTING ZONES	1
LIQUID RECIRCULATION RATE - LITER/S	655.2 (10400 GPM)
L/G RATIO - LITER/CU.M	2.2 (16.4 GAL/1000ACF)
PH CONTROL ADDITIVE	LIMESTONE SLURRY
PRESSURE DROP - KPA	2.2 (9.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	15.2 (50.0 FT/S)

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

INLET GAS FLOW RATE - CU.M/S	299.7	(635000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
PARTICLE REMOVAL EFFICIENCY - %	99.0	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	BLACK & VEATCH
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	98.90
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	52.00
CURRENT STATUS	1
COMMERCIAL START-UP	4/78
INITIAL START-UP	4/78
CONTRACT AWARDED	9/69

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	655.	(10400 GPM)
L/G RATIO - L/CU.M	2.6	(19.1 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.2	(.8 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	1.8	(6.0 FT/S)
INLET GAS FLOW - CU. M/S	256.71	(544000 ACFM)
INLET GAS TEMPERATURE - C	52.2	(126 F)
SO2 REMOVAL EFFICIENCY - %	70.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	2	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	2	
FREEBOARD DISTANCE - M	.09	(.3 FT)
DISTANCE BETWEEN STAGES - CM	30.48	(12.0 IN)
DISTANCE BETWEEN VANES - CM	8.9	(3.50 IN)
VANE ANGLES - DEGREES	90	
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	1.8	(6.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	POND RECYCLE	
WASH FREQUENCY	ONCE/DAY	

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

WASH RATE - L/S	12.6	(200 GAL/MIN)
** REHEATER		
NUMBER	2	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	HOT WATER	
TRADE NAME/COMMON TYPE	FIN TUBE	
TEMPERATURE INCREASE - C	13.9	(25 F)
INLET FLUE GAS FLOW RATE - CU. M/S	551.18	(1168000 ACFM)
INLET FLUE GAS TEMPERATURE - C	51.7	(125 F)
OUTLET FLUE GAS TEMPERATURE - C	65.6	(150 F)
NUMBER OF BUNDLES PER BANK	2	
NUMBER OF TUBES PER BUNDLE	66	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
** FANS		
NUMBER	2	
DESIGN	CENTRIFUGAL	
SUPPLIER	AMERICAN STANDARD	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	283.14	(600000 ACFM)
FLUE GAS TEMPERATURE - C	65.6	(150 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	SCRUBBER INLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	SCRUBBER OUTLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	BYPASS	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	HIGH STRENGTH LOW ALLOY [HSLA]	
LINER GENERIC MATERIAL TYPE	NONE	

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
NUMBER	2
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	21.8 (24 TPH)
PRODUCT QUALITY - % SOLIDS	60.0
** TANKS	
SERVICE	NUMBER
-----	-----
VENTURI & ABSORBER RECYCLE	1
ADDITIVE STORAGE	1
ADDITIVE DILUTION	****
MILL SUMP	****
MILL PRODUCT	****
RECLAIMED WATER	****
** PUMPS	
SERVICE	NUMBER
-----	-----
REACTION/RECYCLE TANK BLEED	****
VENTURI RECIRCULATION	2
MIST ELIMINATOR WASH	****
MILL SLURRY	2
ADDITIVE DILUTION	2
ABSORBER RECIRCULATION	2
ADDITIVE TRANSFER	****
ADDITIVE STORAGE	****
ADDITIVE FEED	6
RECLAIMED WATER	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	FORCED OXIDATION
DEVICE	REACTION TANK
PROPRIETARY PROCESS	N/A
INLET QUALITY - %	10.0
** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	OVERFLOW FROM INTERIM SLUDGE POND
SITE TREATMENT	NONE
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH, SO2 CONCENTRATION
PHYSICAL VARIABLES	PERCENT SOLIDS, SLURRY FLOW, PRESSURE CHANGE ACR
CONTROL LEVELS	PH 6.5
MONITOR LOCATION	PH PROBES IN REACTION TANKS
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

** WATER BALANCE
WATER LOOP TYPE CLOSED

** CHEMICALS AND CONSUMPTION
FUNCTION ABSORBENT
NAME LIMESTONE
PRINCIPAL CONSTITUENT 93% CaCO₃, 7% MgCO₃
SOURCE/SUPPLIER LAWRENCE, KANSAS
CONSUMPTION 4 TPH
POINT OF ADDITION BALL MILL

** FGD SPARE CAPACITY INDICES
ABSORBER - % .0

** FGD SPARE COMPONENT INDICES
ABSORBER .0

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO₂ PART. HOURS HOURS HOURS HOURS FACTOR

0/74 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

THE LAWRENCE 5 BOILER WAS ORIGINALLY EQUIPPED WITH A LIMESTONE INJECTION FGD SYSTEM MODELED AFTER THE FGD SYSTEM RETROFITTED ONTO THE LAWRENCE 4 BOILER. CONSTRUCTION OF THE LAWRENCE 5 BOILER AND SCRUBBING SYSTEM BEGAN IN MARCH 1968 AND PROCEEDED SIMULTANEOUSLY WITH THE RETROFIT WORK ON LAWRENCE 4. INITIAL OPERATION OF THE LAWRENCE 5 BOILER AND SCRUBBING SYSTEM OCCURRED IN MARCH 1977. COMMERCIAL OPERATIONS WERE ACHIEVED IN NOVEMBER 1971 WITH THE COMPLETION OF THE SHAKEDOWN PHASE OF OPERATIONS.

THE LIMESTONE INJECTION FGD SYSTEM INCLUDED FACILITIES FOR PULVERIZING LIMESTONE AND THEN INJECTING IT INTO THE BOILER FURNACE CHAMBER FOR CALCINATION. THE FLUE GAS TRANSPORTS THE CALCINED LIMESTONE AND FLYASH TO THE SCRUBBER MODULES, EACH CONSISTING OF A SINGLE MARBLE BED EQUIPPED WITH OVERFLOW POTS FOR DRAINAGE OF RECIRCULATING SLURRY, FOR PARTICLE AND SULFUR DIOXIDE REMOVAL. THE CLEANED GASES THEN PASSED THROUGH A SET OF MIST ELIMINATORS, REHEATERS, AND INDUCED DRAFT FANS BEFORE BEING DISCHARGED THROUGH THE STACKS TO THE ATMOSPHERE.

ALTHOUGH THE CONFIGURATION OF THIS ORIGINAL SYSTEM WAS FAIRLY SIMPLE, MANY OPERATING PROBLEMS AND DESIGN INADEQUACIES WERE ENCOUNTERED. IN THE INJECTION PROCESS IT WAS DIFFICULT TO ACHIEVE SATISFACTORY CONTROL OF THE LIMESTONE CALCINATION AS WELL AS THE AMOUNT OF LIME/LIMESTONE CARRIED BY THE FLUE GAS INTO THE TAIL-END SCRUBBERS. THIS PROBLEM WAS FURTHER COMPLICATED WHEN THE BOILER WAS FIRED WITH A VARIABLE COMBINATION OF COAL, NATURAL GAS AND OIL.

THE FGD SYSTEM WAS MODIFIED A NUMBER OF TIMES THROUGHOUT ITS LIFE AND WAS LATER ABANDONED FOR A NEW SECOND-GENERATION SCRUBBER DESIGN DEVELOPED BY THE SYSTEM SUPPLIER. THE LIMESTONE INJECTION SYSTEM OPERATED UNTIL MARCH 20, 1978 WHEN IT WAS SHUTDOWN TO TIE THE NEW ROD DECK-VENTURI/SPRAY TOWER SCRUBBING SYSTEM INTO THE FLUE GAS PATH.

8/74 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

ONE MODULE WAS ISOLATED TO PERFORM FLOW DISTRIBUTION TESTS THROUGH THE MARBLE BED IN AUGUST.

THE MIST ELIMINATOR WASH SYSTEM IS NOT EFFECTIVE. THE MIST ELIMINATORS HAVE HAD TO BE CLEANED MANUALLY.

THE BOILER IS CURRENTLY BEING FIRED WITH GAS AND OIL.

9/74 SYSTEM

720

10/74 SYSTEM

744

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT OPERATED ON GAS AND OIL UNTIL OCTOBER 12 WHEN COAL WAS BURNED AGAIN.

POOR GAS DISTRIBUTION THROUGH THE MARBLE BEDS AND AMONG THE EIGHT MODULES IS STILL A PROBLEM AREA. THE SYSTEM SUPPLIER HAS COMPLETED THE GAS DISTRIBUTION TEST AND IS CURRENTLY MODIFYING THE GAS FLOW PATTERN THROUGH THE MODULES.

11/74 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE NEARLY 100% OF NOVEMBER. GAS DISTRIBUTION PROBLEMS ARE CONTINUING.

12/74 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

SINCE OCTOBER 12 THE UNIT HAS OPERATED ON A BLEND OF KANSAS AND WYOMING COAL. THE FGD SYSTEM HAS BEEN AVAILABLE APPROXIMATELY 97% OF THE OCTOBER-DECEMBER PERIOD. SO2 REMOVAL EFFICIENCY HAS BEEN APPROXIMATELY 75%.

MODIFICATIONS TO IMPROVE GAS DISTRIBUTION WITHIN AND AMONG THE MODULES HAVE NOT COMPLETELY SOLVED THE PROBLEM.

PUMP RUBBER LINING FAILURES OCCURRED DURING DECEMBER. SCRAPS OF RUBBER WERE DISCOVERED AT THE DISCHARGE PIPE OF THE SLURRY RECYCLE PUMPS.

1/75 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT BURNED A MIXTURE OF 70% WYOMING AND 30% KANSAS COAL DURING JANUARY.

2/75 SYSTEM

672

3/75 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT BURNED WYOMING COAL HAVING 0.5% SULFUR DURING MARCH.

4/75 SYSTEM

720

5/75 SYSTEM

744

6/75 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM SHUTDOWN FOR MOST OF JUNE FOR A MAJOR REBUILD OF THE SPRAY SYSTEMS IN ALL EIGHT MODULES. THE BOILER WAS FIRED WITH OIL AND THE FGD SYSTEM WAS BYPASSED.

7/75 SYSTEM

.0

744 744

0

8/75 SYSTEM

.0

744 744

0

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

OIL AND GAS WERE FIRED IN JULY AND AUGUST, RESULTING IN NO FGD OPERATION.

9/75	SYSTEM							720	
10/75	SYSTEM							744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SEPTEMBER-OCTOBER PERIOD THE BOILER WAS SHUT DOWN FOR A SHORT TIME TO PERFORM A BOILER INSPECTION AND TO MAKE SOME TURBINE REPAIRS. DURING PART OF THE PERIOD GAS AND OIL WERE BURNED IN THE BOILER FURNACE.

SLURRY RECYCLE TANK SCREENS WERE REPLACED DURING THE SEPTEMBER-OCTOBER PERIOD.

11/75	SYSTEM							720	
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** PROBLEMS/SOLUTIONS/COMMENTS

PROJECTIONS BY THE UTILITY FOR THIS UNIT CALL FOR 330 DAYS OF OPERATION ON 1976 WITH FUEL CONSUMPTION BEING 60% COAL, 25% FUEL OIL, AND 15% NATURAL GAS.

LIKE UNIT 4 THIS UNIT MAY BE CONVERTED TO A ROD-DECK VENTURI AND SPRAY TOWER SCRUBBING SYSTEM.

12/75	SYSTEM							744	
1/76	SYSTEM							744	
2/76	SYSTEM							696	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS DECIDED TO INSTALL A NEW ROD DECK-VENTURI/SPRAY TOWER FGD SYSTEM AT LAWRENCE 5.

3/76	SYSTEM							744	
4/76	SYSTEM							720	
5/76	SYSTEM							744	
6/76	SYSTEM							720	
7/76	SYSTEM							744	
8/76	SYSTEM							744	
9/76	SYSTEM							720	
10/76	SYSTEM							744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE INSTALLATION OF THE NEW ROD AND SPRAY TOWER SCRUBBING SYSTEM IS NOW IN PROGRESS. THE SYSTEM WILL CONSIST OF TWO SCRUBBING TRAINS EACH HANDLING 50% OF THE FLUE GAS CAPACITY. FOUNDATION AND STRUCTURAL STEEL ERECTION HAS BEEN COMPLETED, AND SOME OF THE BREECHING HAS BEEN INSTALLED. THE UNIT WILL OPERATE IN A FULLY AUTOMATIC MODE.

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

THE BOILER HAS BEEN OPERATING NO. 2 FUEL OIL IN ADDITION TO LOW SULFUR WYOMING COAL WHILE THE NEW SCRUBBING FACILITIES ARE BEING INSTALLED. THE ORIGINAL LIMESTONE INJECTION AND TAIL-END SCRUBBING SYSTEM IS STILL AVAILABLE FOR SERVICE AND IS OPERATED WHEN THE UNIT FIRES COAL. THE SYSTEM TREATS FLUE GAS RESULTING FROM THE BURNING OF LOW SULFUR (0.5%) WYOMING COAL.

THE UTILITY REPORTED THAT C-E HAS ENCOUNTERED SOME PROBLEMS WORKING OUT AND FINE TUNING SOME OF THE INSTRUMENTATION LOGIC CIRCUITS.

11/76 SYSTEM 720

12/76 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

KP&L REPORTED THAT CONSTRUCTION OF THE NEW SCRUBBING SYSTEM IS STILL IN PROGRESS. THE ERECTION OF THE STRUCTURAL STEEL AND BREECHING IS CONTINUING. THE MODULES ARE NOW BEING ERECTED AT THE PLANT SITE, PARALLEL TO THE EXISTING MARBLE-BED SYSTEM.

1/77 SYSTEM 744

2/77 SYSTEM 672

3/77 SYSTEM 744

4/77 SYSTEM 720

5/77 SYSTEM 744

6/77 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

OPERATION OF THE EXISTING MARBLE BED SCRUBBERS HAS BEEN QUITE SATISFACTORY AND NEARLY PROBLEM FREE. THE CONNECTING DUCTWORK IS CURRENTLY BEING INSTALLED AS CONSTRUCTION CONTINUES ON THE NEW FGD SYSTEM. THE TWO PARALLEL SCRUBBING MODULES EACH DESIGNED TO HANDLE 200 MW OF GENERATING CAPACITY ARE INSTALLED, AS ARE THE REHEATER TUBE BUNDLES. THE EXISTING MARBLE BED SCRUBBERS WILL BE REMOVED WHEN THE NEW SCRUBBING SYSTEM IS READY FOR SCRUBBING OPERATION.

7/77 SYSTEM 744

8/77 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

SOME OF THE NEW DUCTWORK IS IN PLACE. THE NEW SCRUBBER MODULES ARE IN PLACE AS ARE THE REHEATER TUBES. THE NO. 1 AND 8 MARBLE BED MODULES WILL SOON BE REMOVED BECAUSE THE SPACE IS NEEDED FOR FURTHER CONSTRUCTION.

OPERATIONS OF THE EXISTING FGD SYSTEM THROUGHOUT AUGUST HAVE BEEN GOOD.

9/77 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE CONSTRUCTION ON THE NEW SCRUBBER PLANT IS CONTINUING ACCORDING TO SCHEDULE AND IS EXPECTED TO BE COMPLETE BY APRIL 1978.

10/77 SYSTEM 744

11/77 SYSTEM 720

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM OPERATED ACCEPTABLY THROUGHOUT OCTOBER AND NOVEMBER.

12/77 SYSTEM 744

1/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE CONSTRUCTION OF THE ROD-DECK SCRUBBERS IS NOW COMPLETE. THE INLET DUCTWORK IS BEING INSTALLED, AND THE OUTLET DUCTWORK WILL BE INSTALLED ALONG WITH ADDITIONAL CONTROLS DURING THE SCHEDULED OUTAGE IN APRIL 1978,

THE EXISTING FGD SYSTEM OPERATED WITHOUT SERIOUS PROBLEMS THROUGHOUT DECEMBER AND JANUARY. ONLY SIX MODULES ARE LEFT ON THE EXISTING SYSTEM. TWO WERE REMOVED TO MAKE ROOM FOR THE NEW SYSTEM.

2/78 SYSTEM 672

3/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE ORIGINAL FGD SYSTEM WAS PULLED OFF LINE ON MARCH 20 SO THAT THE NEW SCRUBBER-ABSORBER SYSTEM COULD BE TIED INTO THE GAS PATH. THIS NEW SYSTEM CONSISTS OF TWO MODULES EACH WITH A ROD SECTION FOR PARTICULATE REMOVAL AND A SPRAY TOWER FOR SO2 REMOVAL. THE CAPACITY IS 210 MW EACH MODULE. INITIAL OPERATION SHOULD BEGIN BY THE FIRST OF MAY.

4/78 SYSTEM 720

5/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEW UNIT WENT IN SERVICE ON APRIL 14 AND HAS OPERATED WITH NO OUTAGES SINCE START-UP.

6/78 SYSTEM 100.0 100.0 100.0 720

7/78 SYSTEM 100.0 100.0 100.0 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER OPERATED ALL BUT TWO DAYS OF THE JUNE-JULY PERIOD, WHEN A BOILER DRAIN LINE LEAK CAUSED AN OUTAGE.

THE FGD SYSTEM OPERATED THE ENTIRE TIME THE BOILER WAS ON-LINE, WITH NO REPORTED PROBLEMS.

8/78 SYSTEM 744

9/78 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM OPERATED WITH NO FORCED OUTAGES DURING THE AUGUST-SEPTEMBER PERIOD. THE UNIT WAS TAKEN OUT OF SERVICE AT THE END OF SEPTEMBER FOR A SCHEDULED TURBINE/BOILER INSPECTION. ROUTINE MAINTENANCE IS BEING PERFORMED ON THE BOILER AND TURBINE.

10/78 SYSTEM 744

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/78	SYSTEM							720		
** PROBLEMS/SOLUTIONS/COMMENTS										
THE FGD SYSTEM OPERATED THROUGHOUT OCTOBER AND NOVEMBER WITH ONLY ONE OUTAGE IN OCTOBER FOR AN ANNUAL ONE-WEEK BOILER/TURBINE INSPECTION.										
12/78	SYSTEM				95.5		744		642	
1/79	SYSTEM						744			
2/79	SYSTEM						672			
** PROBLEMS/SOLUTIONS/COMMENTS										
A 30 HOUR OUTAGE WAS REQUIRED IN FEBRUARY TO REPAIR A RUPTURED PIPE IN THE FGD SYSTEM.										
3/79	SYSTEM						744			
4/79	SYSTEM						720			
5/79	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS BROUGHT DOWN TO 50% CAPACITY FOR A SCHEDULED THREE WEEK OUTAGE IN MAY TO REBUILD AN AIR PREHEATER FAN MOTOR.										
6/79	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT THE SYSTEM OPERATED WELL THROUGH JUNE. THE ONLY FGD SYSTEM RELATED OUTAGES WERE DUE TO RECYCLE TANK AGITATOR FAILURE AND GENERAL MAINTENANCE.										
7/79	SYSTEM						744			
8/79	SYSTEM						744			
9/79	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT OPERATED NORMALLY THROUGHOUT THE THIRD QUARTER OF 1979. THE UNIT WILL BE SHUT DOWN FOR AN ANNUAL FALL OUTAGE ON OCTOBER 15. DURING THE OUTAGE SOME BOILER WORK WILL BE DONE. THE SCRUBBER WILL BE CLEANED AND MAINTENANCE WORK WILL BE PERFORMED ON THE RECYCLE TANK AGITATORS. THE OUTAGE IS TO LAST TWO WEEKS.										
10/79	SYSTEM						744			
11/79	SYSTEM						720			
12/79	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS DOWN FOR APPROXIMATELY 10 DAYS OF SCHEDULED OUTAGE FOR FALL MAINTENANCE DURING THE SECOND QUARTER OF 1979.										
SOME AGITATOR SHAFT FAILURES OCCURRED IN THE REACTION TANK CAUSING										

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

MAINTENANCE ATTENTION DURING THE PERIOD.										
1/80	SYSTEM	100.0	100.0		100.0			744	744	744
2/80	SYSTEM		100.0		51.7			696	360	360
3/80	SYSTEM		100.0		54.8			744	408	408
** PROBLEMS/SOLUTIONS/COMMENTS										
THE FGD SYSTEM OPERATED WITHOUT ANY MAJOR PROBLEMS DURING THE FIRST QUARTER OF 1980. THE BOILER WAS DOWN FROM MID-FEBRUARY TO MID-MARCH FOR TURBINE REPAIRS, DURING WHICH TIME GENERAL SCRUBBER MAINTENANCE WAS PERFORMED.										
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720
5/80	SYSTEM	100.0	100.0	100.0	80.6			744	600	600
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WAS DOWN FOR SIX DAYS DURING MAY FOR A SCHEDULED INSPECTION. DURING THIS TIME GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM. OTHER THAN THIS TIME, THE FGD SYSTEM OPERATED 100% OF THE TIME DURING THE APRIL-JUNE PERIOD.										
7/80	SYSTEM	100.0	100.0	100.0	96.1			744	715	715 54.0
** PROBLEMS/SOLUTIONS/COMMENTS										
A 29 HOUR OUTAGE OCCURRED AS A RESULT OF A REHEATER TUBE LEAK IN THE BOILER. NO FGD SYSTEM-RELATED PROBLEMS OCCURRED DURING JULY.										
8/80	SYSTEM	100.0	100.0	100.0	81.5			744	606	606 43.3
** PROBLEMS/SOLUTIONS/COMMENTS										
THE OUTAGE TIME IN AUGUST WAS DUE TO NECESSARY REPAIR OF A BOILER AIR PREHEATER TUBE.										
9/80	SYSTEM	100.0	100.0	100.0	95.7			720	689	689 38.7
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WAS OUT OF SERVICE FOR APPROXIMATELY 31 HOURS FOR A SCHEDULED INSPECTION.										
10/80	SYSTEM	100.0	100.0	100.0	65.2			744	485	485
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING OCTOBER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.										
THE BOILER WAS OUT OF SERVICE 259 HOURS DUE TO A SCHEDULED INSPECTION.										
11/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720
12/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER AND DECEMBER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS OCCURRED.

1/81	SYSTEM									744
2/81	SYSTEM									672
3/81	SYSTEM									744

** PROBLEMS/SOLUTIONS/COMMENTS

UTILITY REPORTED THAT NO FGD-RELATED OUTAGES OCCURRED THROUGHOUT THE FIRST QUARTER OF 1981.

THE UNIT WAS SHUT DOWN FOR 17-HOURS IN MARCH DUE TO A SUPERHEATER FAILURE.

4/81	SYSTEM									720
5/81	SYSTEM									744
6/81	SYSTEM									720
7/81	SYSTEM									744
8/81	SYSTEM									744
9/81	SYSTEM									720

** PROBLEMS/SOLUTIONS/COMMENTS

LAWRENCE 5 WAS REPORTED TO BE AVAILABLE 100% OF THE TIME DURING THE THIRD QUARTER 1981. NO FGD SYSTEM-RELATED PROBLEMS WERE REPORTED FOR EITHER THE SECOND OR THIRD QUARTERS.

10/81	SYSTEM									744
11/81	SYSTEM									720
12/81	SYSTEM									744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT BOILER OPERATIONS WERE NOT CURTAILED OR REDUCED AS A RESULT OF THE FGD SYSTEM DURING THE FOURTH QUARTER 1981.

1/82	SYSTEM									744
2/82	SYSTEM									672
3/82	SYSTEM									744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1982. SOMETIME DURING THE FIRST AND/OR SECOND QUARTER 1982, THE UNIT WILL BE SHUTDOWN FOR A SCHEDULED 2 WEEK SPRING OUTAGE.

4/82	SYSTEM									720
5/82	SYSTEM									744

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER BOILER HOURS	FGD CAP. HOURS FACTOR
6/82	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.									
7/82	SYSTEM							744	
8/82	SYSTEM							744	
9/82	SYSTEM							720	
10/82	SYSTEM							744	
11/82	SYSTEM							720	
12/82	SYSTEM							744	
1/83	SYSTEM							744	
2/83	SYSTEM							672	
3/83	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
OVER THE PAST YEAR THE LAWRENCE 4 AND 5 FGD SYSTEMS HAVE OPERATED WITH NO MAJOR PROBLEMS. THERE HAVE BEEN SOME CHRONIC MINOR PROBLEMS WITH SPRAY HEADER PLUGGING. THERE MAY BE SOME MODIFICATIONS PERFORMED AT SOME POINT IN THE FUTURE TO MINIMIZE THE PROBLEM.									
THE DOWNSTREAM DUCTWORK IN BOTH THE LAWRENCE 4 AND 5 FGD SYSTEMS HAS BEEN EXPERIENCING CORROSION THAT WILL REQUIRE SOME DEGREE OF REPLACEMENT. THE CORROSION IS NOT RELATED TO CHLORIDES. A TIME TABLE FOR THE REPAIR WORK WAS NOT REPORTED BY THE UTILITY.									
4/83	SYSTEM							720	
5/83	SYSTEM							744	
6/83	SYSTEM							720	
7/83	SYSTEM							744	
8/83	SYSTEM							744	
9/83	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED FORCED OUTAGES WERE ENCOUNTERED DURING THE PERIOD OF APRIL THROUGH SEPTEMBER.									
THE NEXT UNIT OUTAGE IS SCHEDULED TO BEGIN THE FIRST WEEK OF OCTOBER AND LAST FROM TWO TO THREE WEEKS. DURING THE OUTAGE, THE UTILITY PLANS TO DO SOME TEMPORARY PATCH WORK ON THE ABSORBER OUTLET DUCTING. THIS TEMPORARY PATCH WORK IS HOPED BY THE UTILITY TO LAST THROUGH 1984.									
10/83	SYSTEM							744	
11/83	SYSTEM							720	
12/83	SYSTEM							744	

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING THE FOURTH QUARTER OF 1983. FGD SYSTEM AVAILABILITY WAS 100%.

1/84	SYSTEM	744
2/84	SYSTEM	696
3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT OVERALL FGD SYSTEM AVAILABILITY FOR THE FIRST THREE QUARTERS OF 1984 WAS ABOVE 90%. NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KENTUCKY UTILITIES
PLANT NAME	GREEN RIVER
UNIT NUMBER	1-3
CITY	CENTRAL CITY
STATE	KENTUCKY
REGULATORY CLASSIFICATION	C
PARTICULATE EMISSION LIMITATION - NG/J	62. (.145 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	387. (.900 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	264
GROSS UNIT GENERATING CAPACITY - MW	65
NET UNIT GENERATING CAPACITY W/FGD - MW	59
NET UNIT GENERATING CAPACITY WO/FGD - MW	62
EQUIVALENT SCRUBBED CAPACITY - MW	65
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	PEAK
DESIGN BOILER FLUE GAS FLOW - CU.M/S	169.88 (360000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	404.4 (760 F)
STACK HEIGHT - M	50. (165 FT)
STACK SHELL	CARBON STEEL
STACK TOP DIAMETER - M	4.9 (16.0 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	26167. (11250 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	10900-11600
AVERAGE ASH CONTENT - %	9.85
RANGE ASH CONTENT - %	8.85-10.85
AVERAGE MOISTURE CONTENT - %	11.00
RANGE MOISTURE CONTENT - %	10.0-12.0
AVERAGE SULFUR CONTENT - %	2.23
RANGE SULFUR CONTENT - %	2.0-2.7
AVERAGE CHLORIDE CONTENT - %	*****
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	3
NUMBER OF SPARES	0
TYPE	CYCLONE [MULTIPLE] 280/COLLECTOR
SUPPLIER	WESTERN PREC. DIVISION, JOY
INLET FLUE GAS CAPACITY - CU.M/S	49.5 (105000 ACFM)
INLET FLUE GAS TEMPERATURE C	176.7 (350 F)
PRESSURE DROP - KPA	.5 (2. IN-H2O)
PARTICLE REMOVAL EFFICIENCY -%	80.0
** ESP	
NUMBER	0
TYPE	NONE
** PARTICLE SCRUBBER	
NUMBER	1
NUMBER OF SPARES	0
INITIAL START-UP DATE	9/75
GENERIC TYPE	VENTURI
SPECIFIC TYPE	VARIABLE-THROAT/TOP-ENTRY PLUMB BOB
TRADE NAME/COMMON NAME	N/A
SUPPLIER	AMERICAN AIR FILTER
SHELL GENERIC MATERIAL	CARBON STEEL; STAINLESS STEEL
SHELL SPECIFIC MATERIAL	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL	INORGANIC
LINER SPECIFIC MATERIAL	HYDRAULICALLY-BONDED MORTAR
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	1

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

LIQUID RECIRCULATION RATE - LITER/S	129.1	(2050 GPM)
L/G RATIO - LITER/CU.M	.8	(5.7 GAL/1000ACF)
PRESSURE DROP - KPA	1.7	(7.0 IN-H2O)
INLET GAS FLOW RATE - CU.M/S	169.9	(360000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
PARTICLE REMOVAL EFFICIENCY - %	98.0	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	AMERICAN AIR FILTER
A-E FIRM	SARGENT & LUNDY
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	98.00
ENERGY CONSUMPTION - %	4.6
CURRENT STATUS	1
COMMERCIAL START-UP	6/76
INITIAL START-UP	9/75
CONTRACT AWARDED	6/73

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	3.80	
DESIGN COAL HEAT CONTENT - J/G	25818.6	(11100 BTU/LB)
DESIGN COAL ASH CONTENT - %	14.00	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	48.0	

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	1	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	ENTRAINED PACKING	
TRADE NAME/COMMON TYPE	MOBILE BED CONTACTOR	
SUPPLIER	AMERICAN AIR FILTER	
DIMENSIONS - FT	20.0 X 20.0 X 3.0	
SHELL GENERIC MATERIAL	CARBON STEEL; STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110; AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A; TYPE 316	
LINER GENERIC MATERIAL	INORGANIC	
LINER SPECIFIC MATERIAL	HYDRAULICALLY-BONDED MORTAR	
LINER MATERIAL TRADE NAME/COMMON TYPE	NR	
GAS CONTACTING DEVICE TYPE	PLASTIC/RUBBER MOBILE BALLS	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	614.	(9750 GPM)
L/G RATIO - L/CU.M	3.6	(27.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.7	(3.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
INLET GAS FLOW - CU. M/S	142.99	(303000 ACFM)
INLET GAS TEMPERATURE - C	46.7	(116 F)
SO2 REMOVAL EFFICIENCY - %	80.0	
PARTICLE REMOVAL EFFICIENCY - %	98.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	1
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	CENTRIFUGAL
SPECIFIC TYPE	RADIAL VANE
TRADE NAME/COMMON TYPE	RADIAL BAFFLE
MANUFACTURER	AMERICAN AIR FILTER
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

NUMBER OF PASSES PER STAGE	1	
FREEBOARD DISTANCE - M	4.11	(13.5 FT)
DISTANCE BETWEEN VANES - CM	7.6	(3.00 IN)
PRESSURE DROP - KPA	.6	(2.3 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	8.4	(27.5 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
WASH WATER SOURCE	FRESH	
WASH FREQUENCY	CONTINUOUS	
WASH RATE - L/S	2.8	(45 GAL/MIN)
** REHEATER		
NUMBER	1	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	EXTERNAL HEAT EXCHANGER	
TRADE NAME/COMMON TYPE	STEAM TUBE BUNDLE	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	22.2	(40 F)
INLET FLUE GAS FLOW RATE - CU. M/S	142.99	(303000 ACFM)
INLET FLUE GAS TEMPERATURE - C	46.7	(116 F)
OUTLET FLUE GAS TEMPERATURE - C	68.9	(156 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
** FANS		
NUMBER	1	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	169.88	(360000 ACFM)
FLUE GAS TEMPERATURE - C	148.9	(300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	10	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
MODULATION	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DAMPERS		
NUMBER	3	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR	
MODULATION	OPEN/CLOSED	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	INLET	
CONFIGURATION	RECTANGULAR	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	OUTLET	
CONFIGURATION	CIRCULAR	

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** DUCTWORK	
LOCATION	RETROFIT DUCT TO FGD BOOSTER FAN
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	BATCH
DEVICE TYPE	AGITATED TANK
NUMBER	1
NUMBER OF SPARES	0
PRODUCT QUALITY - % SOLIDS	20.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	1
REAGENT PREP PRODUCT	3
** PUMPS	
SERVICE	NUMBER
-----	-----
SCRUBBER/ABSORBER RECIRCULATION	3
SLURRY TRANSFER	2
POND RETURN	2
BLEED STREAM	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING [NATURALLY OCCURRING]
SITE DIMENSIONS	9 ACRES/25 FT
SITE CAPACITY - CU.M	203629 (166.5 ACRE-FT)
SITE SERVICE LIFE - YRS	12
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	REACTION TANK [PH]
CHEMICAL PARAMETERS	SO ₂ , PH
PHYSICAL VARIABLES	GAS FLOW, PRESSURE DROP, PERCENT SOLIDS
CONTROL LEVELS	PH 5.5-6.0; SOLIDS 10%
MONITOR TYPE	UNIFLO
MONITOR LOCATION	PH-REACTANT TANK; DENSITY METERS-RECYCLE LINE
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
MAKEUP WATER ADDITION - LITERS/S	4.7 (75 GPM)
SOURCE OF MAKEUP WATER	RIVER WATER

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	LIME
CONSUMPTION	2 TPH
POINT OF ADDITION	SLAKER

** FGD SPARE CAPACITY INDICES

SCRUBBER - %	.0
ABSORBER - %	.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	.0
SLAKER - %	.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP - %	33.0

** FGD SPARE COMPONENT INDICES

SCRUBBER	.0
ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
SLAKER	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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9/75 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM BECAME OPERATIONAL SEPTEMBER 13, 1975 ON A HALF-LOAD BASIS
BECAUSE OF A TURBINE OVERHAUL. LOGGING OF OPERATING DATA BEGAN DECEMBER
1975.

10/75 SYSTEM 744

11/75 SYSTEM 720

12/75 SYSTEM 74.0 65.0 78.0 35.0 744 398 257

1/76 SYSTEM 42.0 11.0 14.0 9.0 744 572 64

** PROBLEMS/SOLUTIONS/COMMENTS

A MAJOR PROBLEM WAS FAILURE OF THE RECYCLE PUMPS.

THAWING AND REPAIR OF NUMEROUS FROZEN LINES WAS REQUIRED.

SHUTDOWN OF SUMP PUMPS WAS NECESSARY.

A MAJOR PROBLEM AREA WAS THE FEED TANK AGITATOR.

2/76 SYSTEM 70.0 42.0 42.0 30.0 696 499 211

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS WERE MADE TO THE TANK AGITATORS, SLAKE TANKS AND MIX-HOLD TANKS
CONTRIBUTING TO OUTAGE TIME.

REPAIRS AND CLEANOUT OF REACTANT PUMPS CONTRIBUTED TO OUTAGE TIME.

3/76 SYSTEM 97.0 85.0 95.0 52.0 744 458 386

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

ALL RUBBER-LINED IMPELLERS WERE REPLACED IN THE PUMPS.

4/76	SYSTEM	90.0	100.0	100.0	77.0		720	552	552	
5/76	SYSTEM	81.0	100.0	100.0	61.0		744	456	456	
6/76	SYSTEM	100.0	99.0	99.0	82.0		720	597	589	
7/76	SYSTEM	90.0	98.0	99.0	77.0		744	584	574	
8/76	SYSTEM	97.0	97.0	97.0	97.0		744	744	722	

** PROBLEMS/SOLUTIONS/COMMENTS

VIBRATION IN THE SCRUBBER BOOSTER ID FAN NECESSITATED A 22 HOUR SYSTEM SHUTDOWN FOR REPAIR DURING AUGUST.

9/76	SYSTEM	86.0	100.0	100.0	79.0		720	571	571	
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** PROBLEMS/SOLUTIONS/COMMENTS

MINOR FAN PROBLEMS OCCURRED BUT NO FORCED OUTAGE TIME WAS REQUIRED.

HALF-LOAD OPERATIONS WERE CONDUCTED THROUGHOUT THE PERIOD BECAUSE OF BEARING PROBLEMS WITH ONE OF THE TWO TURBINE GENERATING UNITS.

10/76	SYSTEM	100.0	100.0	100.0	94.0		744	699	699	
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** PROBLEMS/SOLUTIONS/COMMENTS

MINOR FAN PROBLEMS OCCURRED BUT NO FORCED OUTAGE TIME WAS REQUIRED.

HALF-LOAD OPERATIONS WERE CONDUCTED THROUGHOUT THE PERIOD BECAUSE OF BEARING PROBLEMS WITH ONE OF THE TWO TURBINE GENERATING UNITS.

11/76	SYSTEM	100.0	100.0	98.0	98.0		720	704	704	
12/76	SYSTEM	73.0	97.0	87.0	70.0		744	536	517	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER AND DECEMBER, 1976 SOME FLUE GAS WAS BY-PASSED AROUND THE SYSTEM WHILE THE UTILITY CONDUCTED A CHECKOUT OF THE SCRUBBER INTERNAL AND REPLACED SOME OF THE PACKING SPHERES IN THE MOBILE BED.

1/77	SYSTEM	94.0	94.0	94.0	94.0		744	744	698	
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF JANUARY NO PROBLEMS OCCURRED.

2/77	SYSTEM	36.0	91.0	91.0	36.0		672	266	243	
3/77	SYSTEM	.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF FEBRUARY IT WAS FOUND THAT THE CARBOLINE STACK LINER WAS BADLY DETERIORATED. SCRUBBER AND BOILER OPERATIONS WERE TERMINATED UNTIL THE STACK LINING WAS REPAIRED. THE STACK WAS REPAIRED FIRST BY WELDING A BACKUP METAL PLATE TO THE PORTIONS OF THE STACK WHERE PITTING

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

OCCURRED. THE ENTIRE STACK WAS THEN LINED WITH A REFRACTORY COATING CALLED PRECRETE G-8 BY AAF. THE REPAIRS WERE COMPLETED MARCH 7.

THE BOILER IS NOT OPERATED WITHOUT THE SCRUBBER BECAUSE THERE IS NO ESP FOR PARTICULATE CONTROL.

4/77	SYSTEM	40.0	98.0	98.0	23.0	720	167	164
5/77	SYSTEM	99.0	98.0	98.0	69.0	744	527	513
6/77	SYSTEM	100.0	100.0	100.0	5.0	720	34	34

** PROBLEMS/SOLUTIONS/COMMENTS

WORK ON THE SCRUBBER MODULE INCLUDED REPAIRS TO THE UNDERBED DAMPER SYSTEM AND LEAKING IN THE VENTURI.

LIME SLAKING OPERATIONS WAS REPAIRED.

7/77	SYSTEM	100.0			.0	744	0	0 .0
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** PROBLEMS/SOLUTIONS/COMMENTS

A STRIKE BY PLANT OPERATING PERSONNEL RESULTED IN BOILER AND FGD SYSTEM SHUTDOWN WHICH CONTINUED THROUGH THE END OF OCTOBER.

8/77	SYSTEM	100.0			.0	744	0	0 .0
9/77	SYSTEM	100.0			.0	720	0	0 .0
10/77	SYSTEM	100.0			.0	744	0	0 .0
11/77	SYSTEM	86.0	91.0	91.0	41.0	720	332	301

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WERE ENCOUNTERED WITH LEAKS IN RECYCLE PUMP IMPELLER COATINGS AND PUMP FAILURES. TWO PUMPS WERE DOWN AND BEING BYPASSED.

SUMP PUMP FAILURES WERE NOTED.

LEAKS IN THE PACKING WERE NOTED.

12/77	SYSTEM	50.0	63.0	91.0	50.0	744	596	375
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** PROBLEMS/SOLUTIONS/COMMENTS

NUMEROUS FREEZE UPS WERE ENCOUNTERED DURING DECEMBER CAUSING FGD SYSTEM OUTAGE TIME.

1/78	SYSTEM	31.0	32.0	32.0	23.0	744	537	170
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WENT DOWN AFTER APPROXIMATELY 170 HOURS OF OPERATION IN JANUARY. THIS WAS CAUSED BY THE FREEZING OF THE SLURRY LINE TO THE POND.

2/78	SYSTEM	97.0	.0		.0	672	672	0
3/78	SYSTEM	97.0	.0		.0	744	669	0

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM COULD HAVE BEEN CONSIDERED AVAILABLE THROUGHOUT MOST OF THE WINTER PERIOD BUT BECAUSE EMERGENCY CONDITIONS THE UTILITY CHOSE TO CONCENTRATE THEIR MAINTENANCE CREWS ON POWER GENERATION RATHER THAN FGD OPERATION. UNDER NORMAL CONDITIONS THE RELATIVELY MINOR FGD SYSTEM PROBLEMS WOULD HAVE BEEN SOLVED MORE QUICKLY.

DURING THE FREEZE UPS NUMEROUS GASKETS WERE TORN THROUGHOUT THE SYSTEM. THE SYSTEM WAS SHUT DOWN COMPLETELY FOR REPAIR WORK DURING FEBRUARY AND MARCH.

4/78	SYSTEM	41.0	99.0	99.0	41.0	720	296	295
5/78	SYSTEM	64.0	100.0	98.0	64.0	744	474	474

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCREENS ON THE SUCTION SIDE OF THE PUMPS THAT PUMP THE SLURRY FROM THE PREP ROOM TO THE NOZZLES EXPERIENCED PLUGGING PROBLEMS. THE SCREENS GET PLUGGED WITH LARGE GRIT IN THE SLURRY AND ARE SUCKED OUT OF POSITION BY THE PUMPS. THE UTILITY REPORTED THAT THIS TENDS TO BE A RECURRING PROBLEM.

6/78	SYSTEM	73.0	100.0	100.0	73.0	720	525	524
7/78	SYSTEM	13.0	96.0	100.0	13.0	744	103	99

** PROBLEMS/SOLUTIONS/COMMENTS

BOILER AND FGD SYSTEM OUTAGES DURING JUNE AND JULY WERE FOR ROUTINE MAINTENANCE.

8/78	SYSTEM	61.0	99.0	99.0	28.0	744	207	205
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FROM AUGUST 1 THROUGH AUGUST 12 AS A RESULT OF BLEED PUMP PROBLEMS.

9/78	SYSTEM	76.0	98.0	100.0	41.0	720	303	298
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** PROBLEMS/SOLUTIONS/COMMENTS

BECAUSE OF PLUGGING PROBLEMS THE FGD SYSTEM WAS OPERATED AT APPROXIMATELY ONE THIRD OF TOTAL CAPACITY THE LAST TWO WEEKS OF SEPTEMBER.

10/78	SYSTEM	30.0	94.0	96.0	30.0	744	236	222
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM EXPERIENCED RECYCLE TANK SCREEN PLUGGING.

THE FGD SYSTEM EXPERIENCED VIBRATING FAN PROBLEMS.

11/78	SYSTEM	24.0	100.0	74.0	24.0	720	175	175
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN THE LAST TWO WEEKS OF NOVEMBER DUE TO LOW LOAD DEMAND.

12/78	SYSTEM	.0			.0	744	0	0 .0
1/79	SYSTEM	.0	.0	.0	.0	744	1	0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984
 KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
2/79	SYSTEM	.0			.0		672	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS									
THE FGD SYSTEM WAS UNAVAILABLE IN DECEMBER, JANUARY AND FEBRUARY AS A RESULT OF FREEZING WEATHER WHICH CAUSED FROZEN PIPES, ETC.									
3/79	SYSTEM	11.2	100.0	100.0	11.2		744	83	83
4/79	SYSTEM	18.2	100.0	100.0	18.2		720	131	131
** PROBLEMS/SOLUTIONS/COMMENTS									
THE LOW OPERATIONAL HOURS FOR MARCH AND APRIL WERE DUE TO RECYCLE PUMP PROBLEMS.									
5/79	SYSTEM	100.0			.0		744	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS									
THE BOILER WAS TAKEN DOWN IN MAY FOR REPAIRS THAT ARE PROJECTED TO LAST THROUGH THE END OF SEPTEMBER. DURING THIS OUTAGE AN INDIRECT STEAM REHEAT SYSTEM WILL BE INSTALLED TO BOOST THE TEMPERATURE OF THE EXITING FLUE GAS. THIS WAS FOUND TO BE NECESSARY DUE TO EXCESSIVE MOISTURE IN THE AREA.									
6/79	SYSTEM	100.0			.0		720	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UNIT REMAINED OUT OF SERVICE DURING JUNE FOR BOILER REPAIRS. IT IS NOT EXPECTED TO RETURN TO SERVICE UNTIL OCTOBER OR NOVEMBER.									
7/79	SYSTEM	100.0			.0		744	0	.0
8/79	SYSTEM	100.0			.0		744	0	.0
9/79	SYSTEM	100.0			.0		720	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS									
THE BOILER REMAINED OUT OF SERVICE DURING JULY, AUGUST AND SEPTEMBER. THE BOILER TEMPERATURE VALVES AND PIPING BETWEEN THE PRIMARY AND SECONDARY SUPERHEATERS MUST STILL BE REPLACED. THE BOILER IS NOT EXPECTED TO RETURN ON LINE UNTIL THE FIRST OF THE YEAR OR POSSIBLY AS LATE AS MARCH.									
THE NEW INDIRECT REHEAT SYSTEM IS IN PLACE AND READY FOR OPERATION AS SOON AS THE BOILER RETURNS TO SERVICE.									
10/79	SYSTEM	100.0			.0		744	0	.0
11/79	SYSTEM	100.0			.0		720	0	.0
12/79	SYSTEM	100.0			.0		744	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS									
WORK IS CONTINUING ON THE REPAIRS OF THE OLD BOILER. THE UNIT MAY BE SHUT DOWN INTO MARCH 1980. THE FGD SYSTEM WAS AVAILABLE THROUGHOUT THE PERIOD BUT WAS NOT OPERATED.									
1/80	SYSTEM	100.0			.0		744	0	.0
2/80	SYSTEM	100.0			.0		696	0	.0

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM	100.0			.0		744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER REMAINED OUT OF SERVICE DUE TO BOILER REPAIRS. THE UNIT IS EXPECTED TO BE OPERATING IN MAY.										
4/80	SYSTEM	100.0			.0		720	0	0	.0
5/80	SYSTEM	100.0			.0		744	0	0	.0
6/80	SYSTEM	100.0			.0		720	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE FGD SYSTEM REMAINED OFF LINE DURING THE SECOND QUARTER OF 1980 AS A RESULT OF THE ON-GOING BOILER REPAIRS. COMPLETION OF THE BOILER REPAIRS HAS BEEN DELAYED BY THE UNAVAILABILITY OF SOME NEEDED PARTS.										
7/80	SYSTEM	100.0			.0		744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER REPAIRS HAVE BEEN COMPLETED; HOWEVER, THE BOILER DID NOT OPERATE DUE TO REPAIR WORK BEING DONE ON THE TURBINE.										
8/80	SYSTEM	100.0			.0		744	0	0	.0
9/80	SYSTEM	100.0			.0		720	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
TURBINE REPAIRS CONTINUED THROUGH AUGUST AND SEPTEMBER. THE FGD SYSTEM WAS AVAILABLE FOR OPERATION.										
10/80	SYSTEM	100.0			.0		744	0	0	.0
11/80	SYSTEM	100.0			.0		720	0	0	.0
12/80	SYSTEM	100.0			.0		744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING THE FOURTH QUARTER THE TURBINE REPAIRS CONTINUED. AN ATTEMPT TO RESTART THE BOILER IN MID-DECEMBER RESULTED IN A BLOWN GENERATOR CAUSED BY FAULTY INSULATORS. THE UTILITY IS PRESENTLY WAITING ON NEW INSULATORS.										
DURING THE PERIOD THE BOILER CONTROL VALVES HAD TO BE REPLACED.										
THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME DURING THE FOURTH QUARTER.										
1/81	SYSTEM	100.0			.0		744	0	0	.0
2/81	SYSTEM	100.0			.0		672	0	0	.0
3/81	SYSTEM	100.0			.0		744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING MARCH AN ATTEMPT TO RUN A FULL LOAD COMPLIANCE TEST FAILED DUE TO BLOWN INSULATORS. THE UTILITY IS PRESENTLY WAITING ON NEW INSULATORS.										
THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME DURING THE FIRST QUARTER.										

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----							
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER FGD CAP. HOURS HOURS HOURS FACTOR
4/81	SYSTEM	100.0			.0	720	0 0 .0
5/81	SYSTEM	100.0			.0	744	0 0 .0
6/81	SYSTEM	100.0			.0	720	0 0 .0
** PROBLEMS/SOLUTIONS/COMMENTS							
THE FGD SYSTEM DID NOT OPERATE DURING THE SECOND QUARTER 1981. THE UTILITY IS WAITING FOR NEW GENERATOR TERMINAL LEADS. THE FGD SYSTEM WAS AVAILABLE, HOWEVER, FOR OPERATION.							
7/81	SYSTEM	100.0			.0	744	0 0 .0
8/81	SYSTEM	100.0			.0	744	0 0 .0
9/81	SYSTEM	100.0			.0	720	0 0 .0
** PROBLEMS/SOLUTIONS/COMMENTS							
THE GREEN RIVER UNITS 1-3 REMAINED OFF LINE DURING THE SECOND QUARTER 1981. THE FGD SYSTEM WAS AVAILABLE FOR OPERATION BUT WAS NOT NEEDED.							
10/81	SYSTEM	100.0			.0	744	0 0
11/81	SYSTEM	100.0			.0	720	0 0
12/81	SYSTEM	100.0			.0	744	0 0
** PROBLEMS/SOLUTIONS/COMMENTS							
THE BOILER WAS DOWN THROUGHOUT THE FOURTH QUARTER. THE UTILITY HAS INTENDED TO OPERATE THE BOILER FOR A SHORT TIME HOWEVER, THE FGD SYSTEM LIQUID CIRCUITS FROZE DUE TO THE WEATHER. BY THE TIME THE SYSTEM WAS THAWED THE UTILITY NO LONGER REQUIRED THE POWER.							
1/82	SYSTEM	100.0			.0	744	0 0 .0
2/82	SYSTEM	100.0			.0	672	0 0 .0
3/82	SYSTEM	100.0			.0	744	0 0 .0
** PROBLEMS/SOLUTIONS/COMMENTS							
DURING THE FIRST QUARTER THE SYSTEM WAS AVAILABLE FOR OPERATION; HOWEVER, DUE TO A LACK OF POWER DEMAND THE SYSTEM DID NOT OPERATE.							
4/82	SYSTEM	100.0			.0	720	0 0 .0
** PROBLEMS/SOLUTIONS/COMMENTS							
THE SYSTEM DID NOT OPERATE DURING APRIL DUE TO A LACK OF POWER DEMAND.							
5/82	SYSTEM	100.0			5.0	744	39 39
** PROBLEMS/SOLUTIONS/COMMENTS							
DURING MAY THE SYSTEM OPERATED APPROXIMATELY 39 HOURS IN PREPARATION FOR TESTS SCHEDULED FOR JUNE.							
6/82	SYSTEM	100.0			14.7	720	106 106

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE SYSTEM OPERATED APPROXIMATELY 106 HOURS IN WHICH TIME COMPLIANCE TESTS WERE PERFORMED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
7/82	SYSTEM	100.0	100.0	100.0	8.5		744	63	63	6.9	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM OPERATED ONLY 63 HOURS DURING JULY DUE TO LOW POWER DEMAND.

8/82	SYSTEM	100.0			.0		744	0	0	.0
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9/82	SYSTEM	100.0			.0		720	0	0	.0
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10/82	SYSTEM	100.0			.0		744	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM DID NOT OPERATE DURING AUGUST, SEPTEMBER, OR OCTOBER DUE TO LOW POWER DEMAND.

11/82	SYSTEM	100.0	100.0	100.0	1.5		720	11	11	.5
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM OPERATED ONLY 11 HOURS DURING NOVEMBER DUE TO LOW POWER DEMAND.

12/82	SYSTEM	100.0			.0		744	0	0	.0
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1/83	SYSTEM	100.0			.0		744	0	0	.0
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2/83	SYSTEM	100.0			.0		672	0	0	.0
------	--------	-------	--	--	----	--	-----	---	---	----

3/83	SYSTEM	100.0			.0		744	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM DID NOT OPERATE DURING THE PERIOD OF DECEMBER 1982 THROUGH MARCH 1983 DUE TO LOW POWER DEMAND.

4/83	SYSTEM	100.0			.0		720	0	0	.0
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5/83	SYSTEM	100.0			.0		744	0	0	.0
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6/83	SYSTEM	100.0			.0		720	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SYSTEM DID NOT OPERATE DURING THE SECOND QUARTER DUE TO LOW POWER DEMAND.

7/83	SYSTEM	100.0	100.0	100.0	34.4		744	256	256	11.1
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY.

8/83	SYSTEM	97.8	100.0	100.0	87.2		744	649	649	29.9
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS BROUGHT DOWN DURING AUGUST DUE TO LACK OF POWER DEMAND AND REPAIRS WERE MADE ON A LEAKING FLOODED ELBOW PRECEDING THE MOBILE BED CONTACTOR.

9/83	SYSTEM	98.6	100.0	97.1	46.0		720	331	331	12.9
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS DOWN DURING PART OF SEPTEMBER DUE TO THE CONTINUED PROBLEM WITH THE LEAKING FLOODED ELBOW.

10/83	SYSTEM	100.0			.0		744	0	0	.0
11/83	SYSTEM	100.0	100.0	100.0	7.4		720	53	53	2.1
12/83	SYSTEM	100.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS DOWN DURING MOST OF THE FOURTH QUARTER DUE TO LOW POWER DEMAND.

1/84	SYSTEM	.0			.0		744	0	0	.0
2/84	SYSTEM	.0			.0		696	0	0	.0
3/84	SYSTEM	100.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNITS WERE OFF LINE DURING THE FIRST QUARTER OF 1984 DUE TO LOW POWER DEMAND. IN ADDITION, BECAUSE OF SEVERE WEATHER CONDITIONS AND THE INTERMITTENT MODE OF OPERATION OF THE UNITS, THE FGD SYSTEM WAS NOT AVAILABLE UNTIL MARCH.

4/84	SYSTEM						720			
5/84	SYSTEM						744			
6/84	SYSTEM						720			
7/84	SYSTEM						744			
8/84	SYSTEM						744			
9/84	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE SECOND AND THIRD QUARTER OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LAKELAND UTILITIES	
PLANT NAME	MCINTOSH	
UNIT NUMBER	3	
CITY	LAKELAND	
STATE	FLORIDA	
REGULATORY CLASSIFICATION	C	
PARTICULATE EMISSION LIMITATION - NG/J	19.	(.044 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	570	
GROSS UNIT GENERATING CAPACITY - MW	364	
NET UNIT GENERATING CAPACITY W/FGD - MW	350	
NET UNIT GENERATING CAPACITY WO/FGD - MW	495	
EQUIVALENT SCRUBBED CAPACITY - MW	364	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	*****	(***** ACFM)
BOILER FLUE GAS TEMPERATURE - C	143.3	(290 F)
STACK HEIGHT - M	76.	(250 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	*****	(***** FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		11200-13500
AVERAGE ASH CONTENT - %	10.00	
RANGE ASH CONTENT - %	7.0-17.0	
AVERAGE MOISTURE CONTENT - %	6.00	
RANGE MOISTURE CONTENT - %	4.2-9.5	
AVERAGE SULFUR CONTENT - %	2.56	
RANGE SULFUR CONTENT - %	1.3-3.6	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	0.01-0.14	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** FABRIC FILTER		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	2	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	BABCOCK & WILCOX	
INLET FLUE GAS CAPACITY - CU.M/S	251.9	(533800 ACFM)
INLET FLUE GAS TEMPERATURE - C	138.9	(282 F)
PARTICLE REMOVAL EFFICENCY - %	99.6	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	

LAKELAND UTILITIES: MCINTOSH 3 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	C.T. MAIN
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
CURRENT STATUS	1
COMMERCIAL START-UP	9/82
INITIAL START-UP	7/82
CONTRACT AWARDED	3/78

** DESIGN AND OPERATING PARAMETERS

SPACE REQUIREMENTS - SQ M	1858.0	(20000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	24.0	

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	BABCOCK & WILCOX	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	2520.	(40000 GPM)
L/G RATIO - L/CU.M	10.7	(80.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.9	(7.5 IN-H2O)
INLET GAS FLOW - CU. M/S	584.64	(1238898 ACFM)
INLET GAS TEMPERATURE - C	54.4	(130 F)
SO2 REMOVAL EFFICIENCY - %	85.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	2	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
DISTANCE BETWEEN VANES - CM	114.3	(45.00 IN)
PRESSURE DROP - KPA	.1	(.5 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	VINYL ESTER	
WASH FREQUENCY	CONTINUOUS	
WASH RATE L/S	14.4	(229 GAL/MIN)

** REHEATER

NUMBER	1	
GENERIC TYPE	INDIRECT HOT AIR	
SPECIFIC TYPE	EXTERNAL HEAT EXCHANGER	
TRADE NAME/COMMON TYPE	STEAM TUBE BUNDLE	
TEMPERATURE INCREASE - C	22.2	(40 F)
INLET FLUE GAS FLOW RATE - CU. M/S	73.55	(155858 ACFM)

LAKELAND UTILITIES: MCINTOSH 3 (CONT.)

INLET FLUE GAS TEMPERATURE - C	193.9	(381 F)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	TLT-BABCOCK	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
PRESSURE DROP - KPA	6.4	(20.9 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	4	
SUPPLIER	TLT-BABCOCK	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	GREEN FAN	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
PRESSURE DROP - KPA	10.1	(33.1 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
LOCATION	ID FAN DISCHARGE TO STACK	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	INERT FLAKE-FILLED VINYL ESTER	
** DUCTWORK		
LOCATION	2 BYPASS STREAMS	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	INORGANIC	
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	WET BALL MILL	
DEVICE	COMPARTMENTED	
DEVICE TYPE	NR	
NUMBER	1	
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	13.6	(15 TPH)
** TANKS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECYCLE	2	
QUENCHER	2	
THICKENER OVERFLOW	1	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LAKELAND UTILITIES: MCINTOSH 3 (CONT.)

** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	8
QUENCHER RECIRCULATION	4
CLARIFIED RECIRCULATION WATER	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	3
NUMBER OF SPARES	0
CAPACITY	1080 TON/DAY
FEED STREAM CHARACTERISTICS	30% SOLIDS
OUTLET STREAM CHARACTERISTICS	55% SOLIDS
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	140.0 DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
FEED STREAM CHARACTERISTICS	15% SOLIDS
OUTLET STREAM CHARACTERISTICS	30% SOLIDS
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	28.8 (31.7 TPH)
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
INLET QUALITY - %	55.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	NONE
SITE DIMENSIONS	125 ACRES X 40 FT
SITE CAPACITY CU.M	6115000 (5000.0 ACRE-FT)
SITE SERVICE LIFE - YRS	30
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH, DENSITY, GAS FLOW, SO2
CONTROL LEVELS	PH 5.5-6.0
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEED FORWARD
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	20.3 (322 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	303
MAKEUP WATER ADDITION - LITERS/S	14.4 (228 GPM)
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIMESTONE
PRINCIPAL CONSTITUENT	CACO3
CONSUMPTION	96000 TONS/YR
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.0

LAKELAND UTILITIES: MCINTOSH 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/82	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
INITIAL FGD OPERATIONS BEGAN AT THIS FACILITY DURING JULY. THE SYSTEM IS CURRENTLY UNDERGOING SHAKEDOWN/DEBUGGING OPERATIONS.										
8/82	SYSTEM						744			
9/82	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE MCINTOSH 3 UNIT (BOILER AND FGD SYSTEM) COMMENCED COMMERCIAL OPERATION ON SEPTEMBER 1, 1982.										
10/82	SYSTEM						744			
11/82	SYSTEM						720			
12/82	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER 1982.										
1/83	SYSTEM						744			
2/83	SYSTEM						672			
3/83	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT IT WAS PLEASED WITH THE OPERATION OF THE UNIT AND FGD SYSTEM. THE FGD SYSTEM AVAILABILITY IS REPORTED TO BE GREATER THAN 95%.										
NOTE: IN ADDITION TO HAVING THE CAPABILITY OF BURNING APPROXIMATELY 140 TONS/HR OF BITUMINOUS COAL WITH ASH CONTENTS RANGING FROM 7 TO 17 %, THE BOILER IS ALSO DESIGNED TO BURN REFUSE DERIVED FUEL (RDF). THE UNIT IS CURRENTLY BURNING 300 TONS/DAY OF RDF COLLECTED FROM THE NEARBY CITY OF LAKELAND, FLORIDA. THE RDF IS CONSUMED NORMALLY WITHIN ONE 8 HOUR SHIFT. THE REPORTED HEAT CONTENT OF THE RDF IS APPROXIMATELY 5000 BTU/LB COMPARED TO THE AVERAGE 11500 BTU/LB FOR THE COAL. THE RDF PLANT AND BOILER HAVE THE CAPACITY OF BURNING AN ADDITIONAL 8 TO 12 HOURS OF RDF (300 TO 450 TONS). THE UTILITY CURRENTLY RECEIVES \$6/TON FOR RDF DISPOSAL.										
4/83	SYSTEM						720			
5/83	SYSTEM						744			
6/83	SYSTEM						720			
** PROBLEMS/SOLUTIONS/COMMENTS										
INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF APRIL THROUGH JUNE, 1983.										
7/83	NORTH	100.0	100.0	100.0	97.3					
	SOUTH	77.3	79.3	100.0	78.9					
	SYSTEM	100.0	89.7	100.0	87.3		744	724	655	83.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LAKELAND UTILITIES: MCINTOSH 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/83	NORTH	100.0	100.0	100.0	97.3					
	SOUTH	77.3	79.3	100.0	78.9					
	SYSTEM	100.0	89.7	100.0	87.3		744	724	655	83.0
9/83	NORTH	100.0	100.0	100.0	97.3					
	SOUTH	77.3	79.3	100.0	78.9					
	SYSTEM	100.0	89.7	100.0	87.3		720	701	634	83.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER 1983.

10/83	NORTH	56.5	100.0	100.0	56.5					
	SOUTH	46.4	82.0	100.0	46.4					
	SYSTEM	51.5	91.0	100.0	51.5		744	421	383	69.4
11/83	NORTH	56.5	100.0	100.0	56.5					
	SOUTH	46.4	82.1	100.0	46.4					
	SYSTEM	51.4	91.0	100.0	51.4		720	407	370	69.4
12/83	NORTH	56.5	100.0	100.0	56.5					
	SOUTH	46.4	82.0	100.0	46.4					
	SYSTEM	51.5	91.0	100.0	51.5		744	421	383	69.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER OF 1983.

1/84	SOUTH	100.0	100.0	100.0	100.0					
	NORTH									
	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	87.3
2/84	SOUTH	100.0	100.0	100.0	44.8					
	NORTH									
	SYSTEM	100.0	100.0	100.0	44.8		696	264	312	25.8
3/84	SOUTH	19.4	100.0	100.0	19.4					
	NORTH									
	SYSTEM	19.4	100.0	100.0	19.4		744	144	144	8.5

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD RELATED PROBLEMS WERE REPORTED DURING THE FIRST THREE QUARTERS OF 1984.

4/84	SOUTH	100.0	100.0	101.8	98.4					
	NORTH									
	SYSTEM						720	696		78.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING APRIL.

5/84	SOUTH	96.8	100.0	102.4	95.8					
	NORTH									
	SYSTEM	96.8	100.0	100.0	95.8		744	696	713	75.6

LAKELAND UTILITIES: MCINTOSH 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING MAY.

6/84	SOUTH	100.0	100.0	102.6	99.2					
	NORTH									
	SYSTEM	100.0	100.0	100.0	99.2		720	672	714	74.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING JUNE.

NORTH MODULE DATA WAS NOT REPORTED DURING THE FIRST TWO QUARTERS OF 1984
DUE TO SUSPECTED PROBLEMS WITH AN ELAPSED TIME METER.

7/84	SYSTEM						744			
8/84	SYSTEM						744			
9/84	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	CANE RUN	
UNIT NUMBER	4	
CITY	LOUISVILLE	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	50.	(.116 LB/MMBTU)
SO2 EMISSION LIMITATION NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	992	
GROSS UNIT GENERATING CAPACITY - MW	188	
NET UNIT GENERATING CAPACITY W/FGD - MW	175	
NET UNIT GENERATING CAPACITY WO/FGD - MW	178	
EQUIVALENT SCRUBBED CAPACITY - MW	188	
*** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	CYCLING	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	346.37	(734000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	160.0	(320 F)
STACK HEIGHT - M	76.	(250 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.8	(19.0 FT)
*** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26284.	(11300 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10400-11900
AVERAGE ASH CONTENT - %	15.00	
RANGE ASH CONTENT - %	10.0-20.0	
AVERAGE MOISTURE CONTENT - %	9.00	
RANGE MOISTURE CONTENT - %	8.0-10.8	
AVERAGE SULFUR CONTENT - %	3.87	
RANGE SULFUR CONTENT - %	3.5-4.0	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	0.03-0.06	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	2	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY - CU.M/S	172.2	(365000 ACFM)
INLET FLUE GAS TEMPERATURE - C	160.0	(320 F)
PRESSURE DROP - KPA	.0	(0. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.0	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
*** FGD SYSTEM		

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	AMERICAN AIR FILTER
A-E FIRM	FLUOR - PIONEER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	1.6
CURRENT STATUS	1
COMMERCIAL START-UP	8/77
INITIAL START-UP	8/76
CONTRACT AWARDED	4/74

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	25586.0	(11000 BTU/LB)
DESIGN COAL ASH CONTENT - %	15.00	
DESIGN MOISTURE CONTENT - %	12.00	
DESIGN CHLORIDE CONTENT - %	.07	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	304.0	

** QUENCHER/PRESATURATOR

NUMBER	2	
TYPE	WETTED WALL CONICAL FRUSTUM	
SUPPLIER	AMERICAN AIR FILTER	
INLET GAS FLOW - CU. M/S	172.24	(365000 ACFM)
INLET GAS TEMPERATURE - C	160.0	(320 F)
PRESSURE DROP - KPA	.5	(2.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	111.	(1760 GPM)
L/G RATIO - L/CU. M	.6	(4.8 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	ENTRAINED PACKING	
TRADE NAME/COMMON TYPE	MOBILE BED CONTACTOR	
SUPPLIER	AMERICAN AIR FILTER	
DIMENSIONS - FT	20.0 X 20.0 X 27.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	INORGANIC; ORGANIC	
LINER SPECIFIC MATERIAL	HYDRAULICALLY-BONDED MORTAR; INERT FLAKE-FILLED	
LINER MATERIAL TRADE NAME/COMMON TYPE	PRE-KRETE G-8; PLASITE	
GAS CONTACTING DEVICE TYPE	PLASTIC/RUBBER MOBILE BALLS	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1110.	(17625 GPM)
L/G RATIO - L/CU.M	8.1	(60.5 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.5	(6.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
INLET GAS FLOW - CU. M/S	137.56	(291500 ACFM)
INLET GAS TEMPERATURE - C	54.4	(130 F)
SO2 REMOVAL EFFICIENCY - %	87.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
FREEBOARD DISTANCE - M	1.83	(6.0 FT)
DISTANCE BETWEEN VANES - CM	3.0	(1.20 IN)
PRESSURE DROP - KPA	.3	(1.2 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.7	(12.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	FRESH	
WASH FREQUENCY	EVERY 16 MIN.	
WASH RATE - L/S	5.0	(80 GAL/MIN)
** REHEATER		
NUMBER	2	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	DIRECT COMBUSTION	
SPECIFIC TYPE	EXTERNAL COMBUSTION CHAMBER	
TRADE NAME/COMMON TYPE	OIL	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	16.7	(30 F)
INLET FLUE GAS FLOW RATE - CU. M/S	137.56	(291500 ACFM)
INLET FLUE GAS TEMPERATURE - C	54.4	(130 F)
OUTLET FLUE GAS TEMPERATURE - C	71.1	(160 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CAST IRON	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	AMERICAN STANDARD	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	173.19	(367000 ACFM)
FLUE GAS TEMPERATURE - C	162.8	(325 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	173.19	(367000 ACFM)
FLUE GAS TEMPERATURE - C	162.8	(325 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	20	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
MANUFACTURER	AMERICAN AIR FILTER	
MODULATION	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR	
MANUFACTURER	AMERICAN AIR FILTER	
MODULATION	OPEN/CLOSED	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE/SEAL AIR
MANUFACTURER	AMERICAN AIR FILTER
MODULATION	OPEN/CLOSED
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
LOCATION	SCRUBBER INLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	SCRUBBER OUTLET TO REHEATER
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	INERT FLAKE-FILLED VINYL ESTER
** DUCTWORK	
LOCATION	OUTLET FROM REHEATER TO STACK
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	GRINDING OF SOLIDS FOUND IN BARGE DELIVERED CARB
DEVICE	BALL MILL
DEVICE TYPE	TUBE MILL
NUMBER	1
NUMBER OF SPARES	0
PRODUCT QUALITY - % SOLIDS	25.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	2
LIME SLURRY HOLD TANK	1
RECYCLE	1

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

** PUMPS

SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	6
THICKENER UNDERFLOW	2
THICKENER OVERFLOW	2
LIME SLURRY FEED	2
BLEED	4

** SOLIDS CONCENTRATING/DEWATERING

DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	85.0 DIA X 14.0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	10% SOLIDS
OUTLET STREAM CHARACTERISTICS	245 GPM, 25% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	185 GPM
OUTLET STREAM DISPOSITION	VACUUM FILTER
OVERFLOW STREAM DISPOSITION	LIME HOLD TANK & REACTION TANKS

** SOLIDS CONCENTRATING/DEWATERING

DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	1
CONFIGURATION	CIRCULAR
CAPACITY	500 GPM
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
BELT GENERIC MATERIAL TYPE	N/A
BELT SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	25% SOLIDS
OUTLET STREAM CHARACTERISTICS	60% SOLIDS

*** SLUDGE

FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY) 5.7 (6.3 TPH)

** TREATMENT

METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS (POZ-O-TEC)
INLET QUALITY - %	60.0

** DISPOSAL

NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	CLAY LINING
SITE SERVICE LIFE - YRS	10

** PROCESS CONTROL AND INSTRUMENTATION

PROCESS STREAM	RECYCLE LIQUOR
CHEMICAL PARAMETERS	PH
CONTROL LEVELS	PH 6.1-6.2 AT OUTLET & 8.5 AT INLET TO ABSORBER
MONITOR LOCATION	REACTION TANK
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

** WATER BALANCE

WATER LOOP TYPE	OPEN/CLOSED
RECEIVING WATER STREAM	OHIO RIVER
MAKEUP WATER ADDITION - LITERS/S	6.3 (100 GPM)

** CHEMICALS AND CONSUMPTION

FUNCTION	ABSORBENT
NAME	BETZ POLYFLOC 1100
PRINCIPAL CONSTITUENT	CAOH ₂
SOURCE/SUPPLIER	AIRCO
CONSUMPTION	15000 LB/HR DRY CA(OH) ₂ AT FULL LOAD
UTILIZATION - %	100.0
POINT OF ADDITION	RECYCLE TANK

** FGD SPARE CAPACITY INDICES

ABSORBER - %	.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP - %	.0
THICKENER - %	.0
VACUUM FILTER - %	.0

** FGD SPARE COMPONENT INDICES

ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
BALL MILL	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	.0
THICKENER	.0
VACUUM FILTER	.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂ PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/76	SYSTEM	92.3	90.0	91.0	89.5	87.00 99.00	744	740	666	65.0

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS OF THE CANE RUN 4 FGD SYSTEM BEGAN IN AUGUST WITH THE SYSTEM OPERATING 90% OF THE 740 HOURS THE BOILER WAS ON LINE.

OUTAGE TIME DURING THE MONTH WAS DUE PRIMARILY TO EQUIPMENT INSPECTIONS, REPAIR/REPLACEMENT OF AUXILIARY MOTOR PARTS, AND DEPLETION OF ABSORBENT SUPPLY BECAUSE OF A LATE BARGE DELIVERY.

THE SCRUBBING SYSTEM HAS BEEN GENERALLY OPERATING AT APPROXIMATELY 50 TO 80% FLUE GAS CAPACITY.

SOME MINOR PROBLEMS HAVE BEEN ENCOUNTERED WITH AUXILIARY EQUIPMENT MOTORS.

SOME MINOR PROBLEMS HAVE BEEN ENCOUNTERED WITH SPRAY NOZZLES IN THE MOBILE BED CONTACTOR. THE SPRAY NOZZLES ARE SPINNER-VANE COMPONENTS ORIGINALLY CONSTRUCTED OF PLASTIC. OPERATING TEMPERATURES AND PRESSURES HAVE CAUSED THE PLASTIC HOUSING TO EXPAND RESULTING IN THE VANES EXTRUDING OUT THE FRONT END, SUBSEQUENTLY CAUSING A BLOCKAGE OF THE SLURRY FEED. THE NOZZLES HAVE BEEN REPLACED WITH CERAMIC CONSTRUCTED COMPONENTS.

9/76	SYSTEM	91.5	90.0	90.5	90.0	88.00	720	720	648	62.0
10/76	SYSTEM	92.6	90.0	90.7	72.6	90.00	744	600	540	51.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS TAKEN OUT OF SERVICE ON OCTOBER 25, 1976 TO IMPLEMENT ADDITIONAL MODIFICATIONS TO THE SCRUBBING SYSTEM. MAJOR SYSTEM MODIFICATIONS INCLUDE INCREASING PUMP CAPACITY AND DECREASING PRESSURE DROP. THESE TWO PROBLEMS HAVE HINDERED OPERATION OF THE UNIT AT FULL LOAD CAPACITY.

11/76	SYSTEM	96.0	95.0	94.0	79.2	89.00	720	600	570	52.0
12/76	SYSTEM	92.0	90.0	93.0	72.3	85.00	744	598	538	53.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT OPERATED ON CARBIDE LIME DURING THE NOVEMBER-DECEMBER PERIOD.

1/77	SYSTEM	42.0	37.7	40.0	33.7	86.00	744	666	251	32.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DUE TO OHIO RIVER FREEZE UP BARGE DELIVERIES OF LIME CEASED CAUSING THE FGD SYSTEM TO BE TAKEN OFF LINE ON JANUARY 12.

2/77	SYSTEM	100.0			1.2		672	0	8	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY, THE SCRUBBER WAS ONLY OPERATED FOR TWO 4-HOUR PERIODS TO PREVENT TOTAL FREEZE-UP.

3/77	SYSTEM	91.0	82.9	76.0	48.1		744	432	358	51.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER CAME BACK ON-LINE ON MARCH 14, 1977.

DC POWER SUPPLY TO THE BYPASS DAMPER FAILED. THE SCRUBBER SYSTEM WAS BYPASSED WHILE REPAIRS WERE MADE.

4/77	SYSTEM	95.0	92.7	92.0	60.0		720	466	432	49.0
5/77	SYSTEM				.0		744		0	
6/77	SYSTEM				.0		720		0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBING SYSTEM WAS DOWN FOR MODIFICATIONS FROM APRIL 19 TO JULY 17, 1977.

A CHEVRON TYPE MIST ELIMINATOR WAS INSTALLED DURING THE OUTAGE.

A NEW SPRAY HEADER WAS ADDED TO INCREASE THE L/G RATIO DURING THE OUTAGE.

DIRECT OIL-FIRED REHEAT WAS ADDED.

THE LINING IN THE SYSTEM FROM THE MIST ELIMINATOR TO THE STACK WAS REPLACED WITH PLASITE 4005 (THE ORIGINAL LINING WAS BUBBLING, BUT HAD NOT YET FAILED, FAILURE SEEMED IMMINENT WITHIN 4-5 MONTHS). THE NEW LINING WAS INSTALLED BY GENERAL COATINGS.

7/77	SYSTEM	95.0	90.0	90.0	43.5		744	360	324	36.0
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LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS PLACED BACK IN SERVICE ON JULY 17, 1977 AFTER SYSTEM
 MODIFICATIONS WERE COMPLETED.

8/77	SYSTEM	79.0	89.5	90.0	79.0	744	657	588	60.0
9/77	SYSTEM	98.9	99.1	99.0	72.8	720	529	524	59.0

** PROBLEMS/SOLUTIONS/COMMENTS

COMPLIANCE TESTING OCCURED DURING AUGUST AND SEPTEMBER 1977 BY EPA
 PERSONNEL AND WAS OFFICIALLY APPROVED TO HAVE ACHIEVED COMPLIANCE.

10/77	SYSTEM	98.1	97.8	99.0	89.0	744	677	662	51.0
11/77	SYSTEM	69.9	94.0	94.0	62.9	720	483	453	53.0
12/77	SYSTEM	85.0	85.0	100.0	81.7	744	715	608	48.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER, "AIRCO", THE LIME SUPPLIER, HAD 1200 FT OF THEIR FEED
 LINE FREEZE UP CAUSING LIME TO BECOME UNAVAILABLE FOR A SHORT TIME.

1/78	SYSTEM	66.4	66.6	87.0	66.4	744	742	494	50.0
2/78	SYSTEM	100.0			.0	672	0	0	.0
3/78	SYSTEM	100.0	33.5	35.0	33.5	744	744	249	52.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN THE ENTIRE MONTH OF FEBRUARY DUE TO A COAL SHORTAGE
 AND A LACK OF AVAILABLE LIME RESULTING FROM THE SEVERE WINTER WEATHER.
 THE UNIT CAME BACK ON LINE MARCH 21, 1978.

4/78	SYSTEM	100.0	100.0	100.0	42.1	720	303	303	51.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN PART OF APRIL FOR REPAIRS.

5/78	SYSTEM	31.0	32.7	35.0	15.5	744	352	115	42.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN AGAIN DURING PART OF MAY FOR REPAIRS.

DURING THE MAY BOILER OUTAGE A NUMBER OF MODIFICATIONS WERE MADE TO THE
 DAMPERS IN THE FGD SYSTEM.

6/78	SYSTEM	99.3	99.3	99.3	99.3	720	720	715	50.0
7/78	SYSTEM	98.8	98.7	98.7	91.1	744	687	678	44.0
8/78	SYSTEM	100.0	94.2	96.0	94.2	744	744	701	53.0
9/78	SYSTEM	100.0	100.0	100.0	19.2	720	138	138	31.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO FGD FORCED OUTAGES DURING THE AUGUST-SEPTEMBER PERIOD.

THE BOILER WENT DOWN IN SEPTEMBER AFTER 138 HOURS OF OPERATION FOR TUBE REPAIRS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/78	SYSTEM	100.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER REMAINED OFF LINE DURING OCTOBER FOR CONTINUATION OF THE TUBE REPAIRS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/78	SYSTEM	100.0	97.2	98.0	58.3		720	432	420	36.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM CAME BACK ON LINE DURING THE SECOND WEEK OF NOVEMBER WITH NO OPERATIONAL PROBLEMS REPORTED FOR THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/78	SYSTEM	100.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER A TURBINE BECAME UNOPERATIONAL. THE UNIT IS EXPECTED TO BE OFF LINE UNTIL APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/79	SYSTEM	100.0			.0		744	0	0	.0
2/79	SYSTEM	100.0			.0		672	0	0	.0
3/79	SYSTEM	100.0			.0		744	0	0	.0
4/79	SYSTEM	100.0			.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT DID NOT OPERATE DURING THESE MONTHS BECAUSE THE BOILER WAS STILL DOWN FOR TURBINE REPAIR AND TUBE LEAK REPAIRS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/79	SYSTEM	100.0			.0		744	0	0	.0
6/79	SYSTEM	100.0	46.2	46.2	17.1		720	266	123	34.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED DOWN DURING MAY FOR CONTINUED TURBINE AND BOILER TUBE REPAIRS. THE UNIT WAS PLACED BACK IN SERVICE IN JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/79	SYSTEM	98.0	98.7	97.0	93.0		744	701	692	62.0
8/79	SYSTEM	92.0	89.2	89.0	89.2		744	744	664	61.0
9/79	SYSTEM		.0		.0		720	168	0	36.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE ONLY MAJOR PROBLEMS OCCURRED DURING SEPTEMBER. TUBE FAILURES WERE ENCOUNTERED CAUSING THE BOILER OUTAGE AND MECHANICAL FAILURE WITH THE DAMPER GATES CAUSED THE SCRUBBER TO BE OFF LINE DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM	72.0	30.1	70.0	12.0		744	296	89	39.0

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/79	SYSTEM	96.0	93.9	94.0	58.1		720	445	418	42.0
12/79	SYSTEM	91.0	38.5	38.0	20.2		744	390	150	40.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING THE FOURTH QUARTER 1979 THERE WERE NO MAJOR PROBLEMS. THE LOW SCRUBBER HOURS WERE A RESULT OF NECESSARY MAINTENANCE.										
1/80	SYSTEM	100.0	100.0	99.0	95.6		744	711	711	53.0
2/80	SYSTEM	100.0	99.8	99.0	66.7		696	465	464	41.0
3/80	SYSTEM	82.0	80.5	80.0	74.3		744	687	553	55.0
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED FOR THE FIRST QUARTER OF 1980 WITH EITHER THE BOILER OR THE FGD SYSTEM.										
4/80	SYSTEM	99.0	98.8	98.8	79.9		720	582	575	48.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING APRIL SPRAY PUMP PROBLEMS CAUSED SEVEN HOURS OF OUTAGE TIME.										
5/80	SYSTEM	96.8	100.0	100.0	7.0		744	52	52	10.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WAS NOT NEEDED MOST OF MAY, THIS ACCOUNTS FOR THE LOW UTILIZATION OF THE FGD SYSTEM.										
ONE DAY OF OUTAGE TIME IN MAY WAS CAUSED BY A LEAK IN A SPRAY PUMP SEAL.										
6/80	SYSTEM	.0	.0		.0		720	350	0	32.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING PART OF JUNE THE BOILER WAS ON RESERVE, IN WHICH TIME THE SCRUBBER DUCTWORK AND LININGS WERE REPAIRED.										
REPAIRS WERE MADE TO MODULE LININGS AND DUCTWORK. DUCTWORK REPAIRS/ REPLACEMENTS WERE MADE WITH 316 SS.										
ALSO DURING THE DOWN TIME THE EXPANSION JOINT LOCATED AT THE DISCHARGE OF THE BOOSTER PUMP WAS REPLACED.										
7/80	A	85.7	92.8	92.8	85.7					
	B	85.7	92.8	92.8	85.7					
	SYSTEM	85.7	92.8	92.8	85.7		744	687	638	58.0
** PROBLEMS/SOLUTIONS/COMMENTS										
PROBLEMS WERE ENCOUNTERED WITH THE OIL REHEAT SYSTEM DURING JULY.										
SPRAY PUMP AND VALVE FAILURES ENCOUNTERED DURING THE MONTH ACCOUNTED FOR SOME OF THE FGD SYSTEM DOWN TIME.										
8/80	SYSTEM	100.0	99.3	99.3	76.9		744	576	572	50.0
9/80	SYSTEM	100.0	100.0	100.0	35.7		720	257	257	50.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR OUTAGES OCCURRED DURING AUGUST AND SEPTEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/80	SYSTEM	100.0	100.0	100.0	82.1		744	611	611	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF OCTOBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/80	SYSTEM	71.8	52.8	52.8	35.2		720	572	254	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER DUCTWORK FAILURE CAUSED SOME OUTAGE TIME.

ALSO DURING THE MONTH PROBLEMS WERE ENCOUNTERED WHEN THE MIST ELIMINATORS FAILED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/80	SYSTEM	100.0	100.0	100.0	76.8		744	572	572	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS OCCURRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/81	SYSTEM	81.0	81.0	81.0	81.0		744	744	604	35.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE FGD SYSTEM WAS OUT OF SERVICE APPROXIMATELY 140 HOURS DUE TO A LACK OF AVAILABLE LIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/81	SYSTEM	.0	.0	.0	.0		672	268	0	35.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE FGD SYSTEM WAS NOT AVAILABLE DUE TO MIST ELIMINATOR AND DUCTWORK PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/81	SYSTEM	100.0	100.0	100.0	39.0		744	290	290	35.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/81	SYSTEM	100.0			.0		720	0	0	.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/81	SYSTEM	100.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTHS OF APRIL AND MAY THE UNIT DID NOT OPERATE. HOWEVER, THE FGD SYSTEM WAS AVAILABLE 100%.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/81	SYSTEM	84.2	80.4	80.4	63.6		720	570	458	50.0

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF JUNE THE PUMP PIT WAS SUBMERGED IN SLURRY.

7/81	SYSTEM	72.6	100.0	100.0	72.6	744	540	540	50.0
8/81	SYSTEM	39.9	65.9	65.9	39.9	744	451	297	50.0
9/81	SYSTEM	60.8	100.0	100.0	60.8	720	438	438	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

ABSORBER MODULE PLUGGING ACCOUNTED FOR THE MAJORITY OF THE FGD SYSTEM OUTAGE TIME DURING THE THREE MONTH PERIOD.

10/81	SYSTEM	65.4	93.3	93.3	65.4	744	522	487	40.0
11/81	SYSTEM	99.3	99.6	99.6	99.3	720	718	715	40.0
12/81	SYSTEM	65.4	100.0	100.0	65.4	744	487	487	40.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER 1981.

1/82	SYSTEM	11.0	4.0	4.0	3.0	744	557	22	54.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY, LOW SYSTEM DEPENDABILITY PARAMETERS WERE DUE TO COLD WEATHER FREEZING THE MOBILE BALLS AND PLUGGING THE MOBILE BED CONTACTOR.

2/82	SYSTEM	.0	.0	.0	.0	672	0	0	50.0
3/82	SYSTEM	100.0	100.0	100.0	52.8	744	393	393	46.0

** PROBLEMS/SOLUTIONS/COMMENTS

FROM JANUARY 24 TO MARCH 8 THE UNIT AND MODULES WERE DOWN FOR GENERAL REPAIRS.

4/82	SYSTEM	97.1	96.4	96.4	70.6	720	527	506	50.0
5/82	SYSTEM	92.3	91.2	91.2	79.2	744	649	592	50.0
6/82	SYSTEM	94.6	93.8	93.8	81.7	720	627	588	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.

7/82	SYSTEM	74.7	81.5	81.5	74.7	744	682	556	50.0
8/82	SYSTEM	57.4	83.6	83.6	57.4	744	511	427	50.0
9/82	SYSTEM	71.0	94.6	94.6	71.0	720	540	511	50.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS ON THE ABSORBER MOBILE BED CONTACTORS RESULTED IN OUTAGE TIME DURING THE PERIOD OF JULY, AUGUST AND SEPTEMBER, 1982.

DUCTWORK REPAIRS ALSO ACCOUNTED FOR OUTAGE TIME DURING THE MONTHS OF JULY, AUGUST AND SEPTEMBER 1982.

10/82	SYSTEM	61.6	98.7	98.7	61.6	744	464	458	50.0
11/82	SYSTEM	75.6	99.8	99.8	75.6	720	545	544	50.0
12/82	SYSTEM	84.9	100.0	100.0	84.9	744	632	632	50.0
1/83	SYSTEM	72.3	99.1	99.1	72.3	744	543	538	50.0
2/83	SYSTEM	48.1	99.4	99.4	48.1	672	325	323	50.0
3/83	SYSTEM	57.5	95.5	95.5	57.5	744	448	428	50.0
4/83	SYSTEM	19.7	100.0	100.0	19.7	720	142	142	50.0
5/83	SYSTEM	16.1	97.6	97.6	16.1	744	123	120	50.0
6/83	SYSTEM	74.0	100.0	100.0	74.0	720	533	533	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF APRIL THROUGH JUNE 1983.

7/83	SYSTEM	100.0			.0	744	0	0	
8/83	SYSTEM	100.0			.0	744	0	0	
9/83	SYSTEM	100.0	91.7	91.7	3.1	720	24	22	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE THIRD QUARTER OF 1983.

10/83	SYSTEM	100.0	99.3	99.3	55.1	744	413	410	
11/83	SYSTEM	100.0	99.4	99.4	50.1	720	363	361	
12/83	SYSTEM	39.9	36.5	36.5	18.5	744	364	133	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM					744			
2/84	SYSTEM					696			
3/84	SYSTEM					744			
4/84	SYSTEM					720			
5/84	SYSTEM					744			
6/84	SYSTEM					720			

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/84	SYSTEM							744		
8/84	SYSTEM							744		
9/84	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	CANE RUN	
UNIT NUMBER	5	
CITY	LOUISVILLE	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	50.	(.116 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	992	
GROSS UNIT GENERATING CAPACITY - MW	200	
NET UNIT GENERATING CAPACITY W/FGD - MW	192	
NET UNIT GENERATING CAPACITY WO/FGD - MW	195	
EQUIVALENT SCRUBBED CAPACITY - MW	200	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	RILEY STOKER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	CYCLING	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	349.21	(740000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9	(300 F)
STACK HEIGHT - M	76.	(250 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.8	(19.0 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT J/G	25586.	(11000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10400-11900
AVERAGE ASH CONTENT - %	13.90	
RANGE ASH CONTENT - %	10.0-20.0	
AVERAGE MOISTURE CONTENT - %	9.00	
RANGE MOISTURE CONTENT - %	8.0-10.8	
AVERAGE SULFUR CONTENT - %	3.80	
RANGE SULFUR CONTENT - %	3.5-4.0	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	0.03-0.06	
 *** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	2	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH-COTTRELL	
INLET FLUE GAS CAPACITY - CU.M/S	174.6	(370000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP - KPA	.0	(0. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.0	
 ** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	
 *** FGD SYSTEM		

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	FLUOR - PIONEER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	1.5
CURRENT STATUS	1
COMMERCIAL START-UP	7/78
INITIAL START-UP	12/77
CONTRACT AWARDED	4/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	25586.0	(11000 BTU/LB)
DESIGN COAL ASH CONTENT - %	15.00	
DESIGN MOISTURE CONTENT - %	12.00	
DESIGN CHLORIDE CONTENT - %	.07	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	304.0	

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
DIMENSIONS - FT	32.0 X 22.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	STAINLESS STEEL	
LINER SPECIFIC MATERIAL	AUSTENITIC	
LINER MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	3	
LIQUID RECIRCULATION RATE - LITER/S	1102.	(17500 GPM)
L/G RATIO - L/CU.M	9.0	(67.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.5	(2.0 IN-H2O)
SUPERFICAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
INLET GAS FLOW - CU. M/S	123.17	(261000 ACFM)
INLET GAS TEMPERATURE - C	52.2	(126 F)
SO2 REMOVAL EFFICIENCY - %	85.0	
PARTICLE REMOVAL EFFICIENCY - %	76.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	2	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
PRESSURE DROP - KPA	.1	(.5 IN-H2O)
SUPERFICAL GAS VELOCITY - M/S	2.1	(7.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER	
WASH WATER SOURCE	RIVER	
WASH FREQUENCY	ONCE PER SHIFT	

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

WASH RATE - L/S	5.0	(80 GAL/MIN)
** REHEATER		
NUMBER	2	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	STEAM	
TRADE NAME/COMMON TYPE	FIN TUBE	
COMBUSTION FUEL SULFUR CONTENT - %	.0	
LOCATION	10 FT BEYOND THE ABSORBER OUTLET	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	13.9	(25 F)
INLET FLUE GAS FLOW RATE - CU. M/S	265.21	(562000 ACFM)
INLET FLUE GAS TEMPERATURE - C	54.4	(130 F)
OUTLET FLUE GAS TEMPERATURE - C	68.3	(155 F)
NUMBER OF TUBES PER BUNDLE	34	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	165.16	(350000 ACFM)
FLUE GAS TEMPERATURE - C	148.9	(300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS TEMPERATURE - C	68.3	(155 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	
MANUFACTURER	COMBUSTION ENGINEERING	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL [BLADES]	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	
MANUFACTURER	COMBUSTION ENGINEERING	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL [BLADES]	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	2	
FUNCTION	SHUT-OFF	
GENERIC TYPE	LOUVER	
MANUFACTURER	COMBUSTION ENGINEERING	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL/STAINLESS STEEL [BLADES]	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

** DUCTWORK	
LOCATION	INLET TO ABSORBER & OUTLET FROM REHEATER
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET FROM ABSORBER TO REHEATER
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	MICA FLAKE-FILLED POLYESTER
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE TYPE	TUBE MILL
NUMBER	1
NUMBER OF SPARES	0
PRODUCT QUALITY - % SOLIDS	25.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	2
REAGENT PREP PRODUCT	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	2
LIME FEED	2
THICKENER UNDERFLOW	2
WATER RECYCLE	2
MIST ELIMINATOR WASH	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	110.0 DIA
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	7% SOLIDS
OUTLET STREAM CHARACTERISTICS	250 GPM, 25% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	250 GPM
OUTLET STREAM DISPOSITION	VACUUM FILTER
OVERFLOW STREAM DISPOSITION	RECYCLE TANK AND THEN REACTION TANK
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	1
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
BELT GENERIC MATERIAL TYPE	NR
BELT SPECIFIC MATERIAL TYPE	NR
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	25% SOLIDS

*** SLUDGE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY) 14.3 (15.7 TPH)

** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-Q-TEC]
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	CLAY LINING
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	ABSORBER RECYCLE LINE
CHEMICAL PARAMETERS	PH
CONTROL LEVELS	PH 9 AT OUTLET & PH 5.4-5.6 AT INLET TO RECYCLE
MONITOR LOCATION	REACTION TANK
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	OPEN/CLOSED
RECEIVING WATER STREAM	OHIO RIVER
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	CARBIDE LIME
PRINCIPAL CONSTITUENT	CAOH ₂
SOURCE/SUPPLIER	AIRCO
CONSUMPTION	137,000 TPY
UTILIZATION - %	95.0
POINT OF ADDITION	SLURRY FEED TANK
** FGD SPARE CAPACITY INDICES	
ABSORBER %	.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN %	.0
BALL MILL - %	.0
EFFLUENT HOLD TANK %	.0
RECIRCULATION PUMP - %	.0
THICKENER %	.0
VACUUM FILTER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
BALL MILL	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	.0
THICKENER	.0
VACUUM FILTER	.0

-----PERFORMANCE DATA-----						
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL
						SO ₂ PART. HOURS
						PER BOILER FGD CAP.
						HOURS HOURS HOURS FACTOR

12/77 SYSTEM

744

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

OPERATION OF THE FGD SYSTEM, ON A TRIAL BASIS, BEGAN ON DECEMBER 29, 1977. INITIAL OPERATIONS WERE NOT CONTINUOUS AND THE SYSTEM WAS TAKEN OFF LINE FOR NECESSARY MODIFICATIONS.

1/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

MODIFICATIONS, ESPECIALLY TO CONTROLS THAT WERE NOT OPERATING PROPERLY, CONTINUED THROUGH JANUARY AND THE FGD SYSTEM REMAINED OFF LINE.

2/78 SYSTEM

672

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/78	SYSTEM	60.0	50.0	50.0	12.2		744	182	91	27.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE PLANT REMAINED OFF LINE THROUGHOUT FEBRUARY AND RESTARTED ON MARCH 24. VARIOUS INITIAL START-UP PROBLEMS WERE STILL BEING ENCOUNTERED CAUSING FGD SYSTEM OUTAGES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/78	SYSTEM	100.0	96.9	96.0	90.0		720	669	648	52.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/78	SYSTEM	91.0	84.3	84.0	48.9		744	432	364	36.0

** PROBLEMS/SOLUTIONS/COMMENTS

FGD SYSTEM MODIFICATIONS WERE MADE DURING THE APRIL-MAY PERIOD IN PREPARATION FOR PERFORMANCE TESTS. THE TESTS WERE PERFORMED; HOWEVER, THE TEST METHODS WERE NOT FOLLOWED ACCURATELY AND THE DATA WAS INCONCLUSIVE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/78	SYSTEM	86.8	86.1	36.0	81.9		720	685	590	51.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/78	SYSTEM	83.1	80.1	80.0	68.0		744	632	506	48.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE STEAM REHEAT COIL INSTALLATION HAS BEEN A CHRONIC PROBLEM AREA. WELDS HAVE BEEN FAILING EVER SINCE INITIAL OPERATIONS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/78	SYSTEM	76.0	85.9	85.0	62.4		744	540	464	42.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/78	SYSTEM	96.0	79.6	79.0	67.4		720	609	485	44.0

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS CONTINUED WITH THE REHEAT COILS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/78	SYSTEM	96.0	96.2	95.0	68.5		744	530	510	41.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/78	SYSTEM	95.0	93.7	94.0	32.9		720	253	237	40.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE SYSTEM WAS SHUTDOWN IN NOVEMBER FOR REPAIRS TO THE STEAM REHEATER COILS. THE OUTAGE LASTED ABOUT TWO WEEKS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/78	SYSTEM	52.7	46.2	46.0	40.6		744	654	302	47.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/79	SYSTEM	69.6	67.2	67.0	62.8		744	693	467	42.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/79	SYSTEM	77.0	70.6	70.0	50.1		672	477	337	42.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING FEBRUARY FREEZING CAUSED PROBLEMS WITH LIME DELIVERY.										
3/79	SYSTEM	77.0	71.8	71.0	57.5		744	596	428	41.0
4/79	SYSTEM	99.0	99.2	99.0	49.6		720	360	357	45.0
** PROBLEMS/SOLUTIONS/COMMENTS										
SOME PROBLEMS WERE EXPERIENCED WITH DAMPERS AND THERE WERE PUMP FAILURES.										
5/79	SYSTEM	89.0	84.3	84.0	49.1		744	433	365	38.0
** PROBLEMS/SOLUTIONS/COMMENTS										
COMPLIANCE TESTING WAS AGAIN PERFORMED AT THIS UNIT ON MAY 15 AND 19 AND A SO2 REMOVAL EFFICIENCY OF 93% WAS DEMONSTRATED. THE UNIT WAS DECLARED COMMERCIAL UPON COMPLETION OF THE TESTS.										
6/79	SYSTEM	81.0	77.0	77.0	58.2		720	544	419	40.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE ONLY PROBLEMS REPORTED BY THE UTILITY FOR THE MAY-JUNE PERIOD WERE SPRAY PUMP PACKING FAILURES AND WELDING FAILURES ON THE REHEATER.										
7/79	SYSTEM	78.0	72.0	72.0	56.5		744	583	420	38.0
8/79	SYSTEM	90.0	88.1	88.0	72.6		744	613	540	46.0
9/79	SYSTEM	90.0	83.6	82.0	54.4		720	469	392	45.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE WELDING PROBLEMS WITH THE REHEATER WERE ENCOUNTERED IN JULY AND SEPTEMBER. THE FAILURES ARE CONTINUING AND ARE EXPECTED TO BE RESOLVED BY THIS WINTER.										
10/79	SYSTEM	87.0	83.7	85.0	65.6		744	583	488	42.0
11/79	SYSTEM	97.0	95.2	95.0	46.4		720	351	334	41.0
12/79	SYSTEM	86.0	82.2	82.0	63.4		744	574	472	44.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING THE FOURTH QUARTER OF 1979 THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED. THE UNIT REQUIRED ONLY NORMAL MAINTENANCE.										
1/80	SYSTEM	94.0	92.1	92.0	72.2		744	583	537	43.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING JANUARY NO OPERATIONAL PROBLEMS WERE ENCOUNTERED.										
2/80	SYSTEM	81.0	71.9	71.0	49.7		696	481	346	50.0

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

IN FEBRUARY THE UTILITY RAN OUT OF CARBIDE LIME CAUSING INTERRUPTION OF THE FGD SYSTEM OPERATION. THE UNAVAILABILITY OF LIME WAS CAUSED BY FREEZE UPS ENCOUNTERED BY AIRCO, THE LIME SUPPLIER.

3/80	SYSTEM	66.0	44.5	44.0	27.2		744	454	202	29.0
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** PROBLEMS/SOLUTIONS/COMMENTS

REHEATER TUBE PROBLEMS WERE ENCOUNTERED IN FEBRUARY AND CONTINUED THROUGH MARCH. THE UTILITY HOPES TO REPLACE THE TUBE BUNDLES IN THE SUMMER.

4/80	SYSTEM	.0			.0		720	0	0	.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OFF LINE THE ENTIRE MONTH OF APRIL TO INSTALL STAINLESS STEEL (316 SS) IN THE DUCTWORK AND IN THE MODULES.

5/80	SYSTEM	95.3	94.5	94.5	80.2		744	632	597	43.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY ONE DAY OF OUTAGE TIME WAS NECESSARY TO COMPLETE THE INSTALLATION OF THE STAINLESS STEEL IN THE DUCTWORK AND MODULES.

A PUMP SEAL ON THE RECIRCULATION PUMP FAILED CAUSING APPROXIMATELY 10 HOURS OF OUTAGE TIME.

6/80	SYSTEM	78.8	74.4	74.4	61.8		720	598	445	46.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE SYSTEM HAD TO BE TAKEN OFF LINE FOR 153 HOURS DUE TO THE POOR WELDS ON THE TUBE BUNDLES IN THE REHEATER. THE TUBE BUNDLES HAVE BEEN A CONSTANT PROBLEM AND THE MANUFACTURER IS SCHEDULED TO REPLACE THEM IN THE FALL.

7/80	SYSTEM	78.7	87.6	87.6	78.7		744	669	586	50.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY THE REHEAT TUBE EXCHANGERS FAILED. TWO NEW EXCHANGERS ARE NOW ON SITE AND ARE SCHEDULED TO BE INSTALLED IN NOVEMBER OR DECEMBER 1980.

A THREE DAY OUTAGE OCCURRED IN JULY DUE TO A LIMESTONE ROCK DISABLING THE THICKENER.

8/80	SYSTEM	49.6	58.4	58.4	49.6		744	632	369	50.0
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9/80	SYSTEM	87.2	97.5	97.5	87.2		720	644	628	50.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE OUTAGE TIME DURING AUGUST AND SEPTEMBER WAS CAUSED BY A REHEAT TUBE BUNDLE FAILURE. THE BUNDLES ARE PRESENTLY BEING REPLACED IN BOTH MODULES.

10/80	SYSTEM	100.0	100.0	100.0	10.0		744	72	72	50.0
11/80	SYSTEM	100.0	100.0	100.0	25.0		720	177	177	50.0
12/80	SYSTEM	100.0	100.0	100.0	99.8		744	743	742	50.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER BOILER	FGD	CAP.
						SO2 PART.	HOURS	HOURS	HOURS FACTOR
1/81	SYSTEM	100.0	99.7	99.7	89.4		744	667	665 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

2/81	SYSTEM	82.0	77.0	77.0	59.0		672	512	394 50.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY SOME OUTAGE TIME WAS DUE TO FAN PROBLEMS.

ADDITIONAL PROBLEMS WERE ENCOUNTERED DUE TO REHEATER LEAKS.

3/81	SYSTEM	100.0	46.0	46.0	43.0		744	698	319 50.0
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** PROBLEMS/SOLUTIONS/COMMENTS

OUTAGE TIME DURING MARCH WAS DUE TO STRIKING WORKERS AT THE PLANT.

4/81	SYSTEM	100.0	100.0	100.0	51.0		720	367	367 40.0
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5/81	SYSTEM	100.0	95.9	95.9	92.3		744	716	687 45.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTHS OF APRIL AND MAY.

6/81	SYSTEM	100.0			.0		720	0	0 .0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF JUNE THE BOILER DID NOT OPERATE; HOWEVER, THE FGD SYSTEM WAS AVAILABLE 100%.

7/81	SYSTEM	45.6	100.0	100.0	45.6		744	339	339 50.0
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8/81	SYSTEM	49.5	100.0	100.0	49.5		744	368	368 45.0
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9/81	SYSTEM	75.0	100.0	100.0	75.0		720	540	540 45.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO MAJOR FGD RELATED PROBLEMS REPORTED FOR THE THIRD QUARTER 1981.

10/81	SYSTEM	93.4	100.0	100.0	57.7		744	429	429 40.0
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11/81	SYSTEM	88.9	99.5	99.5	57.4		720	415	413 40.0
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12/81	SYSTEM	98.6	99.4	99.4	98.6		744	738	734 40.0
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LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING THE FOURTH QUARTER 1981.

1/82	SYSTEM	100.0	70.4	70.4	59.1	744	625	440	39.0
2/82	SYSTEM	100.0	91.0	91.0	49.6	672	366	333	50.0
3/82	SYSTEM	100.0	83.3	83.3	57.5	744	514	428	35.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING THE FIRST QUARTER 1982.

4/82	SYSTEM	100.0	100.0	100.0	15.6	720	112	112	50.0
5/82	SYSTEM	100.0	100.0	100.0	80.4	744	598	598	50.0
6/82	SYSTEM	96.2	96.0	96.0	89.0	720	668	641	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING THE SECOND QUARTER 1982.

7/82	SYSTEM	87.8	96.2	96.2	87.8	744	679	653	50.0
8/82	SYSTEM	86.3	100.0	100.0	86.3	744	642	642	50.0
9/82	SYSTEM	33.5	97.2	100.0	33.5	720	248	241	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
 DURING THE PERIOD OF JULY 1982 THROUGH SEPTEMBER 1982.

10/82	SYSTEM	.0			.0	744	0	0	50.0
11/82	SYSTEM	.0			.0	720	0	0	50.0
12/82	SYSTEM	.0			.0	744	0	0	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

A UNIT OVERHAUL WAS PERFORMED DURING THE PERIOD OF OCTOBER THROUGH DECEMBER
 1982 FORCING AN FGD SYSTEM OUTAGE.

1/83	SYSTEM	61.3	100.0	100.0	61.3	744	456	456	50.0
2/83	SYSTEM	65.6	99.3	99.3	65.6	672	444	441	50.0
3/83	SYSTEM	59.5	98.7	98.7	59.5	744	449	443	50.0
4/83	SYSTEM	43.6	100.0	100.0	43.6	720	314	314	50.0
5/83	SYSTEM	89.4	99.4	99.4	89.4	744	669	665	50.0
6/83	SYSTEM	73.2	100.0	100.0	73.2	720	527	527	50.0

LOUISVILLE GAS & ELECTRIC: CANE RUN 5 (CONT.)

*** PROBLEMS/SOLUTIONS/COMMENTS

7/83	SYSTEM	69.1	100.0	100.0	69.1	744	514	514	50.0
8/83	SYSTEM	29.0	39.3	39.3	29.0	744	549	216	50.0
9/83	SYSTEM	83.6	97.6	97.6	55.4	720	409	399	50.0

10/83	SYSTEM	10.9	100.0	100.0	2.0	744	15	15
11/83	SYSTEM	67.6	91.2	91.0	53.2	720	420	383
12/83	SYSTEM	44.0	45.1	45.1	25.5	744	421	190

1/84	SYSTEM	744
2/84	SYSTEM	696
3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

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SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	CANE RUN	
UNIT NUMBER	6	
CITY	LOUISVILLE	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	50.	(.116 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	992	
GROSS UNIT GENERATING CAPACITY - MW	299	
NET UNIT GENERATING CAPACITY W/FGD - MW	277	
NET UNIT GENERATING CAPACITY WO/FGD - MW	280	
EQUIVALENT SCRUBBED CAPACITY - MW	299	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	502.57	(1065000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9	(300 F)
STACK HEIGHT - M	158.	(518 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	4.9	(16.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25586.	(11000 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10400-11900
AVERAGE ASH CONTENT - %	17.06	
RANGE ASH CONTENT - %	15.5-24.5	
AVERAGE MOISTURE CONTENT - %	8.95	
RANGE MOISTURE CONTENT - %	8.0-10.8	
AVERAGE SULFUR CONTENT - %	4.80	
RANGE SULFUR CONTENT - %	3.5-6.3	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	0.03-0.06	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** FABRIC FILTER		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	2	
TYPE	COLD SIDE	
INLET FLUE GAS CAPACITY - CU.M/S	251.8	(533500 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9	(300 F)
PARTICLE REMOVAL EFFICIENCY - %	99.4	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	DUAL ALKALI
SYSTEM SUPPLIER	THYSSEN/CEA
A-E FIRM	FLUOR - PIONEER
DEVELOPMENT LEVEL	DEMONSTRATION
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	95.00
ENERGY CONSUMPTION - %	1.0
CURRENT STATUS	1
COMMERCIAL START-UP	4/79
INITIAL START-UP	4/79
CONTRACT AWARDED	10/76

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR

CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER

NUMBER	2
GENERIC TYPE	TRAY TOWER
SPECIFIC TYPE	SIEVE TRAY
TRADE NAME/COMMON TYPE	N/A
SUPPLIER	THYSSEN/CEA
DIMENSIONS - FT	32.0 DIA X 45.0
SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	ASTM A-283
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A
LINER GENERIC MATERIAL	ORGANIC
LINER SPECIFIC MATERIAL	MICA FLAKE-FILLED POLYESTER
LINER MATERIAL TRADE NAME/COMMON TYPE	NR
GAS CONTACTING DEVICE TYPE	PERFORATED TRAYS
NUMBER OF CONTACTING ZONES	2
LIQUID RECIRCULATION RATE - LITER/S	272. (4318 GPM)
L/G RATIO - L/CU.M	1.3 (10.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.5 (9.9 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.7 (9.0 FT/S)
INLET GAS FLOW - CU. M/S	251.52 (533000 ACFM)
INLET GAS TEMPERATURE - C	148.9 (300 F)
SO2 REMOVAL EFFICIENCY - %	94.2

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	4
FREEBOARD DISTANCE - M	1.52 (5.0 FT)
PRESSURE DROP - KPA	.2 (1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY M/S	2.7 (9.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPROPYLENE

** REHEATER

NUMBER	2
GENERIC TYPE	DIRECT COMBUSTION
SPECIFIC TYPE	EXTERNAL COMBUSTION CHAMBER
TRADE NAME/COMMON TYPE	OIL
PERCENT GAS BYPASSED - AVG	.0
TEMPERATURE INCREASE C	27.8 (50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	205.98 (436500 ACFM)

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

INLET FLUE GAS TEMPERATURE - C	51.7	(125 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	2	
DESIGN	CENTRIFUGAL	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	251.52	(533000 ACFM)
FLUE GAS TEMPERATURE - C	148.9	(300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
LOCATION	SCRUBBER INLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	SCRUBBER TO REHEATER	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	FIBER-REINFORCED POLYESTER	
** DUCTWORK		
LOCATION	REHEATER TO STACK	
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	BYPASS/TRANSITION DUCT	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	NR	
DEVICE	NR	
DEVICE TYPE	NR	
** TANKS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECYCLE	2	
SECONDARY REACTION	2	
NR	****	
VACUUM FILTER FILTRATE	3	
THICKENER OVERFLOW	1	
REAGENT PREP PRODUCT	2	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
REACTOR TRANSFER	2	
ABSORBER RECIRCULATION	4	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

THICKENER HOLD TANK TRANSFER	2	
LIME SLURRY	2	
SODA ASH SOLUTION PUMP	2	
THICKENER UNDERFLOW	4	
VACUUM	3	
LIME SLURRY FEED	2	
VACUUM FPUMP	****	
FILTRATE SUMP	2	
SODA ASH	2	
SILENCER OVERFLOW SUMP	2	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE		VACUUM FILTER
NUMBER		3
NUMBER OF SPARES		1
CAPACITY		3 TON/DAY
SHELL GENERIC MATERIAL TYPE		STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE		AUSTENITIC
BELT SPECIFIC MATERIAL TYPE		FIBER-REINFORCED POLYESTER
FEED STREAM CHARACTERISTICS		25% SOLIDS
OUTLET STREAM CHARACTERISTICS		63% SOLIDS
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE		THICKENER
NUMBER		1
CONFIGURATION		CYLINDRICAL
DIMENSIONS - FT		125.0 DIA X 23.0
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
OUTLET STREAM CHARACTERISTICS		25% SOLIDS
*** SLUDGE		
** TREATMENT		
METHOD		FIXATION
DEVICE		PUG MILL
PROPRIETARY PROCESS		CONVERSION SYSTEMS (POZ-O-TEC)
** DISPOSAL		
NATURE		FINAL
TYPE		LANDFILL
LOCATION		ON-SITE
SITE TRANSPORTATION METHOD		TRUCK
SITE TREATMENT		NONE
** PROCESS CONTROL AND INSTRUMENTATION		
PHYSICAL VARIABLES		PH
MONITOR LOCATION		ABSORBER BLEED LIQUOR
PROCESS CONTROL MANNER		AUTOMATIC
PROCESS CHEMISTRY MODE		FEED FORWARD
** WATER BALANCE		
WATER LOOP TYPE		CLOSED
EVAPORATION WATER LOSS - LITER/S		17.5 (278 GPM)
** FGD SPARE CAPACITY INDICES		
ABSORBER - %		20.0
FAN - %		.0
RECIRCULATION PUMP - %		100.0
** FGD SPARE COMPONENT INDICES		
ABSORBER		.3
FAN		.0
RECIRCULATION PUMP		1.0

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM	67.0	49.9	49.0	32.9	92.00	720	475	237	37.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THIS UNIT STARTED OPERATING ON APRIL 4, 1979. COMPLIANCE TESTING IS SCHEDULED FOR THE WEEK OF JUNE 3.										
5/79	SYSTEM	46.0	21.5	21.0	14.7	91.00	744	506	109	42.0
6/79	SYSTEM	27.0	12.3	12.0	10.3	93.00	720	601	74	47.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT THE SYSTEM IS STILL CONSIDERED IN START-UP AND THAT NO UNUSUAL PROCESS PROBLEMS HAVE BEEN ENCOUNTERED. HOWEVER THE SYSTEM IS NOW OUT OF SERVICE DUE TO THE COMPLETE FAILURE OF THE MIST ELIMINATORS. IT IS EXPECTED TO BE DOWN FOR A MONTH.										
7/79	SYSTEM		.0		.0		744	529	0	45.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT DID NOT OPERATE IN JULY AS PROCEDURES CONTINUED TO REPLACE THE MIST ELIMINATORS.										
8/79	SYSTEM	10.0	7.0	7.0	7.0		744	683	51	51.0
9/79	SYSTEM	70.0	60.0	60.0	44.0		720	531	317	46.0
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING AUGUST AND SEPTEMBER THE UNIT DOWNTIME WAS DUE TO THE COMPLETE FAILURE OF FIVE PUMPS. THE PUMP PROBLEMS WERE THE LOSS OF THE IMPELLERS OFF OF THE SHAFTS.										
10/79	SYSTEM	96.0	81.4	81.0	28.9		744	246	215	37.0
11/79	SYSTEM	96.0	97.7	97.0	63.5		720	468	457	41.0
12/79	SYSTEM	98.0	94.9	95.0	89.7		744	703	667	60.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED DURING THE FOURTH QUARTER OF 1979. THE UNIT REQUIRED ONLY NORMAL MAINTENANCE.										
1/80	SYSTEM	86.0	49.0	49.0	13.8		744	210	103	32.0
** PROBLEMS/SOLUTIONS/COMMENTS										
FGD SYSTEM OUTAGE TIME IN JANUARY WAS CAUSED BY A THICKENER FAILURE. THE RAKE BECAME INOPERABLE BECAUSE OF HIGH SOLIDS AND THE THICKENER HAD TO BE CLEANED OUT.										
2/80	SYSTEM	91.0	84.7	84.0	47.0		696	386	327	37.0
3/80	SYSTEM	72.0	70.0	70.0	64.5		744	686	480	51.0
** PROBLEMS/SOLUTIONS/COMMENTS										
IN FEBRUARY AND MARCH OUTAGE TIME WAS CAUSED BY PROBLEMS WITH THE RECYCLE PUMPS.										
4/80	SYSTEM	98.8	91.5	97.7	73.9		720	581	531	37.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER OUTAGES IN APRIL WERE A RESULT OF THE LOSS OF ONE OF THE BOILER FEED PUMPS AND BECAUSE THE LOAD WAS NOT NEEDED.

THE FGD OUTAGES WERE A RESULT OF HIGH BOOSTER FAN SUCTION TRIPS, REPAIRS TO THE IUCS SYSTEM, REPAIRS TO THE THICKENER UNDERFLOW LINE AND A PLANNED INSPECTION OF THE TRAYS. THE TRAY PLUGGING PROBLEM WAS SOLVED BY A SLIGHT PH ADJUSTMENT IN THE REACTORS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTORS
5/80	SYSTEM	99.9	99.9	99.9	99.5		744	741	740	52.0	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE PRESSURE RELIEF VALVE ON THE BOOSTER FAN MALFUNCTIONED FORCING THE FGD SYSTEM OUT OF SERVICE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTORS
6/80	SYSTEM	99.9	99.7	99.9	88.9		720	642	640	50.0	

** PROBLEMS/SOLUTIONS/COMMENTS

A SPRAY PUMP MALFUNCTION CAUSED THE SYSTEM TO SHUTDOWN. APPROXIMATELY ONE HOUR WAS NEEDED TO PUT THE SPARE INTO SERVICE.

THE BOILER WAS OFF FOR REPAIRS TO THE CLINKER GRINDER AND TO REPAIR A BOILER TUBE LEAK.

IMPROVEMENTS TO THE PH CONTROL CIRCUITRY HAVE LEAD TO IMPROVED CARBIDE LIME UTILIZATION.

EXPERIMENTATION WITH A NEW FILTER CLOTH HAS SHOWN AN IMPROVEMENT IN SODA ASH CONSUMPTION.

SULFUR DIOXIDE EMISSIONS AVERAGED LESS THAN 200 PPM FOR JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTORS
7/80	SYSTEM	99.9	99.7	99.9	82.9		744	618	617	52.0	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE PERIOD FROM JULY 17 THROUGH JULY 28 AN ACCEPTANCE TEST WAS RUN. DURING THE TEST THE FGD SYSTEM EXPERIENCED NO MAJOR PROBLEMS OR OUTAGE TIME. THE AVERAGE SO2 REMOVAL EFFICIENCY DURING THE TEST WAS 93.9%.

DURING NORMAL OPERATION IN JULY NO MAJOR FGD RELATED PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTORS
8/80	SYSTEM	99.3	94.6	94.6	84.5		744	665	628	50.0	

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTORS
9/80	SYSTEM	94.0	98.6	98.7	86.9		720	635	626	50.0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED DURING THE MONTHS OF AUGUST AND SEPTEMBER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTORS
10/80	SYSTEM	99.8	99.8	99.8	99.8		744	743	743	33.0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED DURING THE MONTHS OF

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER SO2 PART.	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTORS
11/80	SYSTEM	85.1	96.8	96.8	55.1		720	409	397	33.0	

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER AND NOVEMBER THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
12/80	SYSTEM	60.0	6.0	6.0	1.9		744	240	14	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER THE THICKENER RACK SHAFT WAS SHEARED-OFF CAUSING THE SYSTEM TO SHUTDOWN FOR APPROXIMATELY 226 HOURS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
1/81	SYSTEM	85.7	83.3	83.3	80.2		744	716	597	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY PROBLEMS WITH THE THICKENER RACK SHAFT CONTINUED TO CAUSE OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
2/81	SYSTEM	99.6	99.5	99.5	71.6		672	483	481	45.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
3/81	SYSTEM	99.6	34.2	34.2	28.0		744	607	208	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH OUTAGE TIME WAS DUE TO STRIKING WORKERS AT THE PLANT.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
4/81	SYSTEM	95.0	98.5	100.0	82.6		720	604	595	45.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
5/81	SYSTEM	96.8	96.9	100.0	96.8		744	243	720	55.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
6/81	SYSTEM	88.9	100.0	100.0	26.5		720	191	191	45.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1981.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
7/81	SYSTEM	74.0	69.0	69.0	57.0		744	615	424	50.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
8/81	SYSTEM	80.0	73.0	77.0	68.0		744	693	506	50.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
9/81	SYSTEM	100.0	98.0	98.0	22.0		720	162	158	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

RUPTURE OF THE FRP THICKENER AND ABSORBER BLEED PIPE CAUSED PROBLEMS DURING THE THIRD QUARTER 1981. THE UNIT IS EXPECTED TO BE REMOVED FROM SERVICE IN OCTOBER FOR A THREE MONTH TURBINE OVERHAUL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
10/81	SYSTEM	100.0			.0		720	0	0	.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
11/81	SYSTEM	100.0			.0		720	0	0	.0

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL	PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS
12/81	SYSTEM	100.0			.0		744	0	0	.0

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

[illegible]

DURING THE FOURTH QUARTER THE BOILER WAS DOWN FOR A TURBINE OVERHAUL.

** PROBLEMS/SOLUTIONS/COMMENTS

4/82	SYSTEM	100.0	99.6	100.0	68.2	720	493	491	50.0
5/82	SYSTEM	100.0	99.7	100.0	96.4	744	719	717	50.0
6/82	SYSTEM	98.6	98.3	100.0	82.6	720	605	595	50.0

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE SECOND QUARTER 1982.

7/82	SYSTEM	15.2	17.1	17.1	15.2	744	661	113	50.0
8/82	SYSTEM	42.6	50.6	50.6	42.6	744	626	317	50.0
9/82	SYSTEM	60.6	86.5	86.5	60.6	720	504	436	50.0
10/82	SYSTEM	87.0	94.9	94.9	87.0	744	682	647	50.0
11/82	SYSTEM	68.6	99.8	99.8	68.6	720	495	494	50.0
12/82	SYSTEM	62.9	95.1	95.1	62.9	744	492	468	50.0

THE UTILITY REPORTED THAT A MIST ELIMINATOR COLLAPSED DURING THE PERIOD OF JULY THROUGH DECEMBER 1982.

1/83	SYSTEM	52.8	99.7	99.7	52.8	744	394	393	50.0
2/83	SYSTEM	.0			.0	672	0	0	50.0
3/83	SYSTEM	.0			.0	744	0	0	50.0
4/83	SYSTEM	3.3	12.0	12.0	3.3	720	200	24	50.0
5/83	SYSTEM	32.1	51.6	51.6	32.1	744	463	239	50.0
6/83	SYSTEM	38.3	52.6	52.6	38.3	720	525	276	50.0

A TURBINE OVERHAUL WAS PERFORMED DURING THE PERIOD OF JANUARY THROUGH JUNE 1983 ACCOUNTING FOR SOME OF THE OUTAGE TIME DURING THAT PERIOD.

THE FAILURE OF A BOOSTER FAN ACCOUNTED FOR OUTAGE TIME DURING THE PERIOD OF JANUARY THROUGH JUNE 1983.

7/83	SYSTEM	80.2	95.1	95.1	80.4	744	629	598	50.0
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: CANE RUN 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
8/83	SYSTEM	39.5	43.6	43.6	39.5			744	675	294 50.0
9/83	SYSTEM	89.9	84.5	84.5	40.3			720	343	290 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

SLURRY PIPING REPAIRS WERE MADE DURING THE THIRD QUARTER OF 1983.

10/83	SYSTEM	60.8	93.2	93.2	40.3			744	322	300
11/83	SYSTEM	92.4	100.0	100.0	7.1			720	51	51
12/83	SYSTEM	64.5	50.2	50.2	16.5			744	245	123

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM							744		
2/84	SYSTEM							696		
3/84	SYSTEM							744		
4/84	SYSTEM							720		
5/84	SYSTEM							744		
6/84	SYSTEM							720		
7/84	SYSTEM							744		
8/84	SYSTEM							744		
9/84	SYSTEM							720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	MILL CREEK	
UNIT NUMBER	1	
CITY	LOUISVILLE	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1084	
GROSS UNIT GENERATING CAPACITY - MW	358	
NET UNIT GENERATING CAPACITY W/FGD - MW	334	
NET UNIT GENERATING CAPACITY WO/FGD - MW	339	
EQUIVALENT SCRUBBED CAPACITY - MW	358	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	660.66	(1400000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	151.7	(305 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.8	(19.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10800-12100
AVERAGE ASH CONTENT - %	14.50	
RANGE ASH CONTENT - %	10.0-18.0	
AVERAGE MOISTURE CONTENT - %	9.00	
RANGE MOISTURE CONTENT - %	8.0-10.0	
AVERAGE SULFUR CONTENT - %	3.75	
RANGE SULFUR CONTENT - %	3.5-4.5	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT %	.03-.06	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** FABRIC FILTER

NUMBER	0
TYPE	NONE

** ESP

NUMBER	2	
NUMBER OF SPARES	0	
TYPE	HOT SIDE	
SUPPLIER	WESTERN PRECIPITATOR	
INLET FLUE GAS CAPACITY - CU.M/S	330.3	(700000 ACFM)
INLET FLUE GAS TEMPERATURE - C	151.7	(305 F)
PRESSURE DROP - KPA	.1	(1. IN-H ₂ O)
PARTICLE REMOVAL EFFICIENCY - %	99.4	

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A

LOUISVILLE GAS & ELECTRIC: MILL CREEK 1 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	FLUOR - PIONEER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	1.4
CURRENT STATUS	1
COMMERCIAL START-UP	4/81
INITIAL START-UP	12/80
CONTRACT AWARDED	11/77

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT %	4.50	
DESIGN COAL HEAT CONTENT - J/G	23260.0	(10000 BTU/LB)
DESIGN COAL ASH CONTENT - %	18.00	
DESIGN MOISTURE CONTENT - %	10.00	
DESIGN CHLORIDE CONTENT - %	.06	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	120.0	

** QUENCHER/PRESATURATOR

NUMBER	0
TYPE	NONE

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
DIMENSIONS FT	26.0 X 31.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
NUMBER OF CONTACTING ZONES	4	
LIQUID RECIRCULATION RATE - LITER/S	3755.	(59600 GPM)
L/G RATIO - L/CU.M	11.9	(88.9 GAL/1000 ACF)
SUPERFICIAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
INLET GAS FLOW - CU. M/S	316.17	(670000 ACFM)
INLET GAS TEMPERATURE C	148.9	(300 F)
SO2 REMOVAL EFFICIENCY - %	86.6	

** REHEATER

NUMBER	2	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	STEAM	
TRADE NAME/COMMON TYPE	FIN TUBE	
LOCATION	DOWNSTREAM OF ABSORBER	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS TEMPERATURE C	54.4	(130 F)
OUTLET FLUE GAS TEMPERATURE - C	82.2	(180 F)
NUMBER OF HEAT EXCHANGER BANKS	2	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

LOUISVILLE GAS & ELECTRIC: MILL CREEK 1 (CONT.)

** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	AMERICAN STANDARD
FUNCTION	BOOSTER
APPLICATION	INDUCED DRAFT
SERVICE	DRY
FLUE GAS TEMPERATURE - C	82.2 (180 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	AMERICAN STANDARD
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	316.17 (670000 ACFM)
FLUE GAS TEMPERATURE - C	148.9 (300 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	COMBUSTION ENGINEERING
MODULATION	OPEN/ CLOSED
SEAL AIR FLOW - CU. M/S	.71 (1500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL (BLADES & FRAMES); STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	COMBUSTION ENGINEERING
MODULATION	OPEN/ CLOSED
SEAL AIR FLOW CU. M/S	.71 (1500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL (BLADES & FRAMES); STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	COMBUSTION ENGINEERING
MODULATION	OPEN/ CLOSED
SEAL AIR FLOW - CU. M/S	.71 (1500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL (BLADES & FRAMES); STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR

LOUISVILLE GAS & ELECTRIC: MILL CREEK 1 (CONT.)

** DUCTWORK	
LOCATION	ABSORBER OUTLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
 ** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
 ** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	TUBE MILL
NUMBER	1
NUMBER OF SPARES	0
PRODUCT QUALITY - % SOLIDS	25.0
 ** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	1
REAGENT FEED	1
 ** PUMPS	
SERVICE	NUMBER
-----	-----
ABSORBER RECIRCULATION	8
 ** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	140 DIA X 15.0
CAPACITY	1050000 GAL
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
BELT GENERIC MATERIAL TYPE	N/A
BELT SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	1120 GPM/10% SOLIDS
OUTLET STREAM CHARACTERISTICS	280 GPM/30% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	840 GPM
OUTLET STREAM DISPOSITION	VACUUM FILTER
 ** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	5
NUMBER OF SPARES	1
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
BELT GENERIC MATERIAL TYPE	NR
BELT SPECIFIC MATERIAL TYPE	NR
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	25% SOLIDS
OUTLET STREAM CHARACTERISTICS	45% SOLIDS
OUTLET STREAM DISPOSITION	PUG MILL

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 1 (CONT.)

*** SALEABLE BYPRODUCTS

NATURE

NONE

*** SLUDGE

** TREATMENT

METHOD

FIXATION

DEVICE

PUG MILL

PROPRIETARY PROCESS

CONVERSION SYSTEMS [POZ-O-TEC]

INLET QUALITY - %

45.0

** DISPOSAL

NATURE

FINAL

TYPE

LANDFILL

LOCATION

ON-SITE

SITE TRANSPORTATION METHOD

TRUCK

SITE TREATMENT

CLAY LINING

SITE SERVICE LIFE - YRS

10

** WATER BALANCE

WATER LOOP TYPE

OPEN/CLOSED

MAKEUP WATER ADDITION - LITERS/S

125.0

(1984 GPM)

** CHEMICALS AND CONSUMPTION

FUNCTION

ABSORBENT

NAME

CARBIDE LIME

PRINCIPAL CONSTITUENT

90% CAOH₂

SOURCE/SUPPLIER

AIRCO

POINT OF ADDITION

RECYCLE TANK

** FGD SPARE CAPACITY INDICES

ABSORBER - %

.0

MIST ELIMINATOR - %

.0

REHEATER - %

.0

FAN - %

.0

BALL MILL - %

.0

EFFLUENT HOLD TANK - %

.0

THICKENER - %

.0

VACUUM FILTER - %

.0

** FGD SPARE COMPONENT INDICES

ABSORBER

.0

MIST ELIMINATOR

.0

REHEATER

.0

FAN

.0

BALL MILL

.0

EFFLUENT HOLD TANK

.0

THICKENER

.0

VACUUM FILTER

.0

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO ₂	PER BOILER PART. HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
12/80	SYSTEM	45.2	98.5	98.5	44.5	90.00	744	336	331 60.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM IS PRESENTLY IN THE STARTUP PHASE. OPERATIONS BEGAN ON
DECEMBER 17, 1980 AND NO MAJOR PROBLEMS WERE REPORTED.

1/81	SYSTEM	51.0	46.0	46.0	42.0	94.80	744	675	312 45.0
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LOUISVILLE GAS & ELECTRIC: MILL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY A BROKEN BLEED PUMP DISCHARGE LINES CAUSE APPROXIMATELY 363 HOURS OF OUTAGE TIME.

2/81	SYSTEM	51.5	51.5	51.5	51.5	672	346	346	50.0
3/81	SYSTEM	39.0	36.0	36.0	35.0	744	712	258	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY AND MARCH PROBLEMS WERE ENCOUNTERED DUE TO THE THICKENER PLUGGING.

ADDITIONAL OUTAGE TIME DURING MARCH WAS DUE TO STRIKING WORKERS AT THE PLANT.

4/81	SYSTEM	39.9	25.2	25.2	7.9	720	226	57	25.0
5/81	SYSTEM	46.9	60.7	60.7	21.8	744	267	162	35.0
6/81	SYSTEM	56.1	33.9	33.9	26.5	720	563	191	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER 1981 THE UTILITY REPORTED HAVING PROBLEMS WITH THE GLYCOL HEAT EXCHANGER.

7/81	SYSTEM	76.3	75.3	75.3	72.2	744	713	537	65.0
8/81	SYSTEM	99.2	99.2	99.2	98.7	744	740	734	65.0
9/81	SYSTEM	85.7	95.5	95.5	79.6	720	600	573	60.0

** PROBLEMS/SOLUTIONS/COMMENTS

ALL FGD SYSTEM DOWNTIME DURING THE THIRD QUARTER 1981 WAS ATTRIBUTED TO PROBLEMS WITH THE GLYCOL HEAT EXCHANGER ON THE REHEAT SYSTEM.

10/81	SYSTEM	39.6	41.0	41.0	39.6	720	719	295	50.0
11/81	SYSTEM	37.4	39.8	39.8	37.4	720	675	269	50.0
12/81	SYSTEM	26.1	29.1	29.1	26.1	744	666	194	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FOURTH QUARTER PROBLEMS WERE ENCOUNTERED WITH THE GLYCOL HEAT EXCHANGER.

1/82	SYSTEM	4.7	6.2	6.2	4.7	744	570	36	50.0
2/82	SYSTEM	25.4	25.6	25.6	25.4	672	669	171	50.0
3/82	SYSTEM	41.3	54.9	54.9	41.3	744	560	307	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT FROZEN LINES DURING THE FIRST QUARTER 1982 HINDERED THE FGD SYSTEM OPERATION.

AN ADDITIONAL PROBLEM EXPERIENCED DURING THE PERIOD WAS HEAT EXCHANGER FAILURE.

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

4/82	SYSTEM	96.4	63.9	63.9	6.4			720	72	46 50.0
5/82	SYSTEM	43.1	35.2	35.2	30.9			744	653	230 50.0
6/82	SYSTEM	77.9	42.2	42.2	16.2			720	277	117 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER MAJOR PROBLEMS WERE EXPERIENCED WITH THE GLYCOL HEAT EXCHANGE.

7/82	SYSTEM	33.5	61.5	61.5	23.4			744	283	174 50.0
8/82	SYSTEM	64.5	69.7	69.7	64.5			744	689	480 50.0
9/82	SYSTEM	75.3	75.3	75.3	75.3			720	720	542 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT PROBLEMS WITH THE GYCOL REHEAT SYSTEM OCCURRED DURING THE MONTHS OF JULY, AUGUST AND SEPTEMBER, 1982.

10/82	SYSTEM	47.3	49.4	49.4	47.3			744	712	352 50.0
11/82	SYSTEM	83.8	83.8	83.8	83.8			720	720	603 50.0
12/82	SYSTEM	21.2	38.6	38.6	21.2			744	409	158 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT REHEATER TUBE FAILURES CAUSED SOME OUTAGE TIME DURING THE PERIOD OF JULY THROUGH DECEMBER 1982.

SPRAY PUMP PROBLEMS WERE ALSO REPORTED FOR THE PERIOD OF JULY THROUGH DECEMBER 1982.

1/83	SYSTEM	40.9	43.7	43.7	40.9			744	695	304 50.0
2/83	SYSTEM	47.2	47.1	47.1	47.0			672	671	316 50.0
3/83	SYSTEM	77.2	85.6	85.6	76.5			744	665	569 50.0
4/83	SYSTEM	43.9	82.1	82.1	43.9			720	385	316 50.0
5/83	SYSTEM	9.7	19.3	19.3	9.7			744	374	72 50.0
6/83	SYSTEM	55.0	62.8	62.8	55.0			720	631	396 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MIST ELIMINATOR REPAIRS ACCOUNTED FOR OUTAGE TIME DURING THE PERIOD OF JANUARY THROUGH JUNE 1983.

7/83	SYSTEM	56.2	57.4	57.4	55.5			744	719	413 50.0
8/83	SYSTEM	48.0	48.4	48.4	48.0			744	737	357 50.0
9/83	SYSTEM	44.7	35.0	35.0	24.6			720	505	177 50.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

STACK REHEAT FAILURES DURING THE PERIOD RESULTED IN A STACK PLUME REHEAT
 SYSTEM DESIGN.

10/83	SYSTEM	82.4	79.3	79.3	66.4	744	623	494
11/83	SYSTEM	73.3	68.4	68.4	56.8	720	598	409
12/83	SYSTEM	58.2	46.3	46.3	39.2	744	630	292

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM					744		
2/84	SYSTEM					696		
3/84	SYSTEM					744		
4/84	SYSTEM					720		
5/84	SYSTEM					744		
6/84	SYSTEM					720		
7/84	SYSTEM					744		
8/84	SYSTEM					744		
9/84	SYSTEM					720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	MILL CREEK	
UNIT NUMBER	2	
CITY	LOUISVILLE	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	*****	
GROSS UNIT GENERATING CAPACITY - MW	350	
NET UNIT GENERATING CAPACITY W/FGD - MW	325	
NET UNIT GENERATING CAPACITY WO/FGD - MW	330	
EQUIVALENT SCRUBBED CAPACITY - MW	350	
 ** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	660.66	(1400000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	151.7	(305 F)
STACK HEIGHT - M	183.	(600 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.8	(19.0 FT)
 ** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10800-12100
AVERAGE ASH CONTENT - %	14.50	
RANGE ASH CONTENT - %	10.0-18.0	
AVERAGE MOISTURE CONTENT - %	9.00	
RANGE MOISTURE CONTENT - %	8.0-10.0	
AVERAGE SULFUR CONTENT - %	3.75	
RANGE SULFUR CONTENT - %	3.5-4.5	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT %	.03-.06	
 *** PARTICLE CONTROL		
 ** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
 ** FABRIC FILTER		
NUMBER	0	
TYPE	NONE	
 ** ESP		
NUMBER	2	
NUMBER OF SPARES	0	
TYPE	HOT SIDE	
SUPPLIER	WESTERN PRECIPITATOR	
PRESSURE DROP - KPA	.1	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.4	
 ** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	

LOUISVILLE GAS & ELECTRIC: MILL CREEK 2 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	FLUOR - PIONEER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
ENERGY CONSUMPTION - %	1.4
CURRENT STATUS	1
COMMERCIAL START-UP	4/82
INITIAL START-UP	12/81
CONTRACT AWARDED	11/77

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFER CONTENT - %	4.50	
DESIGN COAL HEAT CONTENT - J/G	23260.0	(10000 BTU/LB)
DESIGN COAL ASH CONTENT - %	18.00	
DESIGN MOISTURE CONTENT - %	10.00	
DESIGN CHLORIDE CONTENT - %	.06	

** QUENCHER/PRESATURATOR

TYPE	NONE
------	------

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	COMBUSTION ENGINEERING	
DIMENSIONS - FT	26.0 X 31.0	
SHELL GENERIC MATERIAL	STAINLESS STEEL	
SHELL SPECIFIC MATERIAL	AUSTENITIC	
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
NUMBER OF CONTACTING ZONES	4	
LIQUID RECIRCULATION RATE - LITER/S	3755.	(59600 GPM)
L/G RATIO L/CU.M	11.9	(88.9 GAL/1000 ACF)
SUPERFICAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
INLET GAS FLOW - CU. M/S	316.17	(670000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
SO2 REMOVAL EFFICIENCY - %	86.6	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR ¹	
NUMBER PER SYSTEM	4	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	2	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	ATLANTIC BRIDGE	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	3	
PRESSURE DROP - KPA	.1	(.5 IN-H2O)
SUPERFICAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
WASH WATER SOURCE	FRESH	
WASH FREQUENCY	INTERMITTENT	
WASH RATE - L/S	18.9	(300 GAL/MIN)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 2 (CONT.)

** REHEATER	
NUMBER	2
NUMBER OF SPARES	0
NUMBER PER MODULE	1
GENERIC TYPE	IN-LINE
SPECIFIC TYPE	STEAM
TRADE NAME/COMMON TYPE	FIN TUBE
TEMPERATURE INCREASE - C	27.8 (50 F)
OUTLET FLUE GAS TEMPERATURE - C	82.2 (180 F)
NUMBER OF HEAT EXCHANGER BANKS	2
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	AMERICAN STANDARD
FUNCTION	BOOSTER
APPLICATION	INDUCED DRAFT
SERVICE	DRY
FLUE GAS TEMPERATURE - C	82.2 (180 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	AMERICAN STANDARD
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
CONSTRUCTION MATERIAL GENERIC TYPE	NR
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	COMBUSTION ENGINEERING
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.71 (1500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL [BLADES & FRAMES]; STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	COMBUSTION ENGINEERING
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.71 (1500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL [BLADES & FRAMES]; STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER
MANUFACTURER	COMBUSTION ENGINEERING
MODULATION	OPEN/CLOSED
SEAL AIR FLOW - CU. M/S	.71 (1500 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL [BLADES & FRAMES]; STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110; AUSTENITIC

LOUISVILLE GAS & ELECTRIC: MILL CREEK 2 (CONT.)

LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER INLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
LOCATION	ABSORBER OUTLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	NR
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	1
REAGENT FEED	1
** PUMPS	
SERVICE	NUMBER
-----	-----
NR	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	140 DIA X 15.0
CAPACITY	1050000 GAL
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
BELT GENERIC MATERIAL TYPE	N/A
BELT SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	1120 GPM/10% SOLIDS
OUTLET STREAM CHARACTERISTICS	280 GPM/30% SOLIDS
OVERFLOW STREAM CHARACTERISTICS	840 GPM
OUTLET STREAM DISPOSITION	VACUUM FILTER
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	1
NUMBER OF SPARES	0
SHELL GENERIC MATERIAL TYPE	NR
SHELL SPECIFIC MATERIAL TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
BELT GENERIC MATERIAL TYPE	NR
BELT SPECIFIC MATERIAL TYPE	NR

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 2 (CONT.)

OUTLET STREAM CHARACTERISTICS	45% SOLIDS
*** SALEABLE BYPRODUCTS	
NATURE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-O-TEC]
INLET QUALITY - %	45.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	CLAY LINING
SITE SERVICE LIFE - YRS	10
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
MAKEUP WATER ADDITION - LITERS/S	125.0 (1984 GPM)
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	.0
THICKENER - %	.0
VACUUM FILTER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
THICKENER	.0
VACUUM FILTER	.0

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/81	SYSTEM	100.0	57.3	75.0	100.0	95.00 99.00	744	262	150	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

MILL CREEK 2 COMMENCED OPERATIONS ON DECEMBER 18, 1981. THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME SINCE START-UP.

1/82	SYSTEM	24.1	25.3	25.3	24.1		744	707	179	50.0
2/82	SYSTEM	88.5	88.5	88.5	88.5		672	672	595	50.0
3/82	SYSTEM	73.8	73.8	73.8	73.8		744	744	549	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1982 THE UTILITY EXPERIENCED START-UP PROBLEMS WITH THE UNIT 2 FGD SYSTEM.

4/82	SYSTEM	85.6	84.1	100.0	75.7		720	648	545	50.0
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/82	SYSTEM	100.0	100.0	100.0	22.4		744	167	167	50.0
6/82	SYSTEM	81.7	81.1	81.1	78.7		720	699	567	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER FAILURE OF THE RECIRCULATION PUMP CAUSED SOME OUTAGE TIME.

7/82	SYSTEM	.0	.0	.0	.0		744	714	0	50.0
8/82	SYSTEM	.0	.0	.0	.0		744	713	0	50.0
9/82	SYSTEM	.0	.0	.0	.0		720	558	0	50.0
10/82	SYSTEM	.0	.0	.0	.0		744	739	0	50.0
11/82	SYSTEM	.0	.0	.0	.0		720	691	0	50.0
12/82	SYSTEM	55.8	70.1	70.1	50.4		744	535	375	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT A MAJOR BEARING FAILURE ON THE 2B BOOSTER FAN OCCURRED DURING THE PERIOD OF JULY THROUGH DECEMBER 1982.

1/83	SYSTEM	36.8	38.6	38.6	36.8		744	710	274	50.0
2/83	SYSTEM	56.3	59.3	59.3	52.4		672	594	352	50.0
3/83	SYSTEM	93.5	92.7	92.7	81.5		744	654	606	50.0
4/83	SYSTEM	86.8	87.2	87.2	67.2		720	555	484	50.0
5/83	SYSTEM	.0	.0	.0	.0		744	184	0	50.0
6/83	SYSTEM	.0	.0		.0		720	151	0	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THICKENER PROBLEMS DURING THE PERIOD OF JANUARY THROUGH JUNE 1983.

BLEED LINE PROBLEMS WERE ALSO EXPERIENCED DURING THE FIRST SIX MONTHS OF 1983.

PUMP FAILURES WERE REPORTED CAUSING OUTAGE TIME DURING THE PERIOD OF JANUARY THROUGH JUNE 1983.

7/83	SYSTEM	63.6	63.7	63.7	63.6		744	743	473	50.0
8/83	SYSTEM	81.0	89.3	89.3	77.6		744	646	577	50.0
9/83	SYSTEM	71.8	74.2	74.2	57.1		720	554	411	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

REPAIRS ON THE ABSORBER VENT SYSTEM WERE MADE DURING THE THIRD QUARTER OF 1983.

THE NEED TO ISOLATE THE SERVICE WATER SYSTEM RESULTED IN DOWN TIME DURING THE THIRD QUARTER.

10/83	SYSTEM	77.6	72.9	72.9	48.4		744	494	360	
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
11/83	SYSTEM	70.4	58.9	58.9	45.1		720	552	325
12/83	SYSTEM	58.3	47.7	47.7	39.1		744	610	291

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM						744		
2/84	SYSTEM						696		
3/84	SYSTEM						744		
4/84	SYSTEM						720		
5/84	SYSTEM						744		
6/84	SYSTEM						720		
7/84	SYSTEM						744		
8/84	SYSTEM						744		
9/84	SYSTEM						720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC
PLANT NAME	MILL CREEK
UNIT NUMBER	3
CITY	LOUISVILLE
STATE	KENTUCKY
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1084
GROSS UNIT GENERATING CAPACITY - MW	427
NET UNIT GENERATING CAPACITY W/FGD - MW	420
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	427
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	755.04 (1600000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9 (300 F)
STACK HEIGHT - M	183. (600 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	6.4 (21.0 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	26284. (11300 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	11000-12000
AVERAGE ASH CONTENT - %	15.00
RANGE ASH CONTENT - %	13.0-16.0
AVERAGE MOISTURE CONTENT - %	10.00
RANGE MOISTURE CONTENT - %	9.0-15.0
AVERAGE SULFUR CONTENT - %	3.87
RANGE SULFUR CONTENT - %	3.5-4.0
AVERAGE CHLORIDE CONTENT - %	.04
RANGE CHLORIDE CONTENT - %	.03-.06
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	2
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	AMERICAN AIR FILTER
INLET FLUE GAS CAPACITY - CU.M/S	377.5 (800000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9 (300 F)
PARTICLE REMOVAL EFFICIENCY - %	99.5
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	AMERICAN AIR FILTER
A-E FIRM	FLUOR POWER SERVICES
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.00
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
CURRENT STATUS	1
COMMERCIAL START-UP	3/79
INITIAL START-UP	8/78
CONTRACT AWARDED	11/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	27912.0	(12000 BTU/LB)
DESIGN COAL ASH CONTENT - %	16.00	
DESIGN MOISTURE CONTENT - %	15.00	
DESIGN CHLORIDE CONTENT - %	.06	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	120.0	

** QUENCHER/PRESATURATOR

NUMBER	4	
TYPE	VENTURI	
SUPPLIER	AMERICAN AIR FILTER	
INLET GAS FLOW - CU. M/S	188.76	(400000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP - KPA	.5	(2.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	126.	(2000 GPM)
L/G RATIO - L/CU. M	.7	(5.0 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	ENTRAINED PACKING	
TRADE NAME/COMMON TYPE	MOBILE BED CONTACTOR	
SUPPLIER	AMERICAN AIR FILTER	
DIMENSIONS - FT	16.0 X 20.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	INORGANIC	
LINER SPECIFIC MATERIAL	HYDRAULICALLY-BONDED MORTAR	
LINER MATERIAL TRADE NAME/COMMON TYPE	PRE-KRETE G-8	
GAS CONTACTING DEVICE TYPE	POLYURETHANE BALLS	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1285.	(20400 GPM)
L/G RATIO - L/CU.M	7.4	(55.0 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.5	(6.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	175.03	(370900 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
SO2 REMOVAL EFFICIENCY %	85.7	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	8
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	2
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
MANUFACTURER	ATLANTIC BRIDGE

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	3
FREEBOARD DISTANCE - M	2.13 (7.0 FT)
DISTANCE BETWEEN STAGES - CM	7.62 (3.0 IN)
DISTANCE BETWEEN VANES - CM	2.5 (1.00 IN)
PRESSURE DROP - KPA	.2 (1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	4.6 (15.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
WASH WATER SOURCE	FRESH
WASH FREQUENCY	10% OF THE AREA WASHED EACH 1/2 MINUTE
WASH RATE - L/S	2.5 (40 GAL/MIN)
** REHEATER	
NUMBER	4
NUMBER OF SPARES	0
NUMBER PER MODULE	1
GENERIC TYPE	IN-LINE
SPECIFIC TYPE	STEAM
TRADE NAME/COMMON TYPE	BARE TUBE
LOCATION	TOP OF ABSORBER
TEMPERATURE INCREASE - C	27.8 (50 F)
INLET FLUE GAS TEMPERATURE - C	54.4 (130 F)
OUTLET FLUE GAS TEMPERATURE - C	82.2 (180 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	AMERICAN STANDARD
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	377.52 (800000 ACFM)
FLUE GAS TEMPERATURE - C	148.9 (300 F)
PRESSURE DROP - KPA	12.9 (42.3 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	2
FUNCTION	SHUT-OFF
GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

** DUCTWORK	
LOCATION	ABSORBER INLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	ABSORBER OUTLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** DUCTWORK	
LOCATION	DOWNSTREAM OF REHEATER
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	FOAM GLASS BLOCKS
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	COMPARTMENTED
DEVICE TYPE	TUBE MILL
NUMBER	1
NUMBER OF SPARES	0
PRODUCT QUALITY - % SOLIDS	25.0
** TANKS	
SERVICE	NUMBER
-----	-----
CARBIDE LIME SLURRY	2
ADDITIVE SLURRY DAY	1
REACTION	4
THICKENER	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ADDITIVE SLURRY TRANSFER	7
RECYCLE	10
ABSORBER BLEED	6
THICKENER UNDERFLOW	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
DIMENSIONS - FT	125.0 X 10.0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	10% SOLIDS
OUTLET STREAM CHARACTERISTICS	20% SOLIDS
OUTLET STREAM DISPOSITION	VACUUM FILTER
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	5
NUMBER OF SPARES	1

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	20% SOLIDS
OUTLET STREAM CHARACTERISTICS	45% SOLIDS
OUTLET STREAM DISPOSITION	PUG MILL
*** SALEABLE BYPRODUCTS	
NATURE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-O-TEC]
INLET QUALITY - %	45.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	CLAY LINING
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	SLURRY RECYCLE
CHEMICAL PARAMETERS	PH
MONITOR TYPE	UNILOC
MONITOR LOCATION	IN REACTION TANK
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	OPEN/CLOSED
MAKEUP WATER ADDITION - LITERS/S	9.4 (150 GPM)
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	CARBIDE LIME
PRINCIPAL CONSTITUENT	90% CAOH ₂
SOURCE/SUPPLIER	AIRCO
POINT OF ADDITION	RECYCLE TANK
** FGD SPAPE CAPACITY INDICES	
ABSORBER %	.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN %	.0
BALL MILL - %	.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP %	25.0
THICKENER %	.0
VACUUM FILTER - %	.0
** FGD SPAPE COMPONENT INDICES	
ABSORBER	.0
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.0
BALL MILL	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	1.0
THICKENER	.0
VACUUM FILTER	.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/78	SYSTEM						744			
** PROBLEMS/SOLUTIONS/COMMENTS										
INITIAL FGD OPERATIONS BEGAN ON AUGUST 13, 1978. OPERATIONAL HOURS WERE NOT AVAILABLE FOR AUGUST.										
9/78	SYSTEM	81.0	80.7	80.0	80.0		720	714	576	52.0
** PROBLEMS/SOLUTIONS/COMMENTS										
FRP PIPING PROBLEMS WERE ENCOUNTERED.										
SOME BEARING AND SHAFT RELATED PUMP PROBLEMS WERE ALSO ENCOUNTERED DURING SEPTEMBER.										
10/78	SYSTEM	86.0	85.5	85.0	81.6		744	710	607	54.0
11/78	SYSTEM	93.0	85.2	85.0	41.5		720	351	299	40.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT WAS SHUT DOWN NOVEMBER 18, 1978 FOR SCHEDULED INSPECTION. RESTART IS PROJECTED FOR FEBRUARY 1, 1979.										
12/78	SYSTEM				.0		744	0	0	.0
1/79	SYSTEM				.0		744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT DID NOT OPERATE DURING DECEMBER OR JANUARY.										
2/79	SYSTEM	26.0	18.0	18.0	17.4		672	651	117	52.0
3/79	SYSTEM	62.0	53.1	53.0	52.4		744	735	390	51.0
** PROBLEMS/SOLUTIONS/COMMENTS										
COMPLIANCE TESTING WAS PERFORMED DURING MARCH AND THE UNIT WAS DECLARED COMMERCIAL.										
4/79	SYSTEM	75.0	63.6	63.0	44.4		720	503	320	40.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE ONLY PROBLEMS REPORTED WERE WITH DAMPERS AND PUMP FAILURES.										
5/79	SYSTEM	100.0	97.8	97.0	64.7		744	492	481	38.0
6/79	SYSTEM	56.0	51.9	51.0	47.9		720	665	345	48.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO UNUSUAL OPERATING PROBLEMS WERE ENCOUNTERED DURING MAY OR JUNE.										
7/79	SYSTEM	63.0	59.9	59.0	55.2		744	686	411	53.0
8/79	SYSTEM	76.0	68.0	68.0	50.3		744	550	374	47.0

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL · PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

IN JULY AND AUGUST REHEATER PROBLEMS WERE ENCOUNTERED. THE REHEATER WILL HAVE TO BE REPLACED DURING EITHER NOVEMBER OR DECEMBER OF THIS YEAR.

9/79	SYSTEM	91.0	90.6	91.0	83.9	720	667	604	50.0
10/79	SYSTEM	83.0	82.0	82.0	76.1	744	690	566	44.0

** PROBLEMS/SOLUTIONS/COMMENTS

AT THE END OF OCTOBER THE UNIT WENT DOWN FOR A TURBINE OVERHAUL AND IS SCHEDULED TO BE DOWN UNTIL LATE JANUARY OR EARLY FEBRUARY.

11/79	SYSTEM				.0	720	0	0	.0
12/79	SYSTEM				.0	744	0	0	.0
1/80	SYSTEM				.0	744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE OVERHAUL GENERAL SCRUBBER MAINTENANCE WAS DONE BUT NO MAJOR MODIFICATIONS WERE MADE.

2/80	SYSTEM	37.0	36.1	36.0	26.6	696	512	185	39.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT CAME BACK ON LINE ON FEBRUARY 10 AFTER THE TURBINE OVERHAUL WORK WAS COMPLETED.

3/80	SYSTEM	37.0	36.9	37.0	30.6	744	618	228	46.0
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** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS ENCOUNTERED DURING FEBRUARY AND MARCH WITH THE FGD SYSTEM OPERATION INCLUDED FROZEN WATER LINES AND WORN GASKETS BLOWING IN THE REHEATER FLANGES.

THE UTILITY IS IN THE PROCESS OF REPLACING THE REHEATER TUBES.

4/80	SYSTEM	42.9	42.5	42.5	42.2	720	715	304	53.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE REHEATER TUBE REPLACEMENT CONTINUED INTO APRIL.

THE OTHER OUTAGE TIME ENCOUNTERED DURING APRIL WAS CAUSED BY A BLOWN GASKET IN THE CONDENSATE PUMP.

5/80	SYSTEM	67.5	51.4	51.4	34.4	744	498	256	47.0
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE PLASTIC MIST ELIMINATOR COMPONENTS WERE REPLACED WITH STAINLESS STEEL. THIS KEPT THE SYSTEM OFF LINE FOR APPROXIMATELY 10 DAYS.

REHEATER TUBE LEAKS WERE ALSO ENCOUNTERED IN MAY.

6/80	SYSTEM	88.2	.0	.0	.0	720	85	0	14.0
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UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

IN LATE MAY THE TURBINE LOST TWO BLADES CAUSING THE SYSTEM TO SHUTDOWN UNTIL THE LATTER PART OF JUNE. DURING THE OUTAGE THE UTILITY DECIDED TO REPLACE THE LIME STORAGE TANK LINES WITH LARGER ONES TO SERVICE THE NEW UNITS. THE WORK WAS NOT COMPLETED WHEN THE BOILER WAS RETURNED TO SERVICE; THUS, THE FGD UNIT DID NOT OPERATE DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
7/80	SYSTEM	92.0	91.3	91.3	83.9		744	684	625	52.0	

** PROBLEMS/SOLUTIONS/COMMENTS

RECYCLE PUMP FAILURES CAUSED THE FGD SYSTEM TO SHUTDOWN FOR PART OF JULY.

8/80	SYSTEM	58.7	81.7	81.7	58.7		744	535	437	60.0	
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9/80	SYSTEM	57.2	60.4	60.4	57.2		720	682	412	60.0	
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE AUGUST THROUGH SEPTEMBER PERIOD THE PUMP HOUSE WAS FLOODED DUE TO THE FAILURE OF THE BLEED PUMP FRP PIPE LINE. BECAUSE OF THIS FAILURE, 23 PUMPS AND 23 PUMP MOTORS WERE DAMAGED.

10/80	SYSTEM	100.0	97.1	97.1	96.9		744	742	721	99.7	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF OCTOBER.

11/80	SYSTEM	57.1	49.4	49.4	41.9		720	611	302	60.0	
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING NOVEMBER OPERATION OF THE FGD SYSTEM WAS LOW DUE TO PUMP DAMAGES WHICH RESULTED FROM THE PUMP HOUSE FLOODING IN AUGUST.

12/80	SYSTEM	100.0	100.0	100.0	61.1		744	455	455	60.0	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF DECEMBER.

1/81	SYSTEM	.0	.0	.0	.0		744	521	0	40.0	
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2/81	SYSTEM	.0	.0	.0	.0		672	593	0	50.0	
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3/81	SYSTEM	1.0	1.0	1.0	1.0		744	675	8	50.0	
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** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1981 MAJOR CORROSION DAMAGE CAUSED FAILURE OF THE PRECRETE-G.

FROZEN LINES ENCOUNTERED DURING THE PERIOD ACCOUNTED FOR SOME OUTAGE TIME.

REPAIRS TO THE MIST ELIMINATOR SHELL CAUSED ADDITIONAL OUTAGE TIME.

DURING MARCH STRIKING WORKERS ADDED TO THE OUTAGE TIME OF THE SYSTEM.

4/81	SYSTEM	32.9	33.2	33.2	32.9		720	714	237	45.0	
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LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF APRIL THE UTILITY REPORTED HAVING PROBLEMS WITH FROZEN PIPELINE FAILURES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/81	SYSTEM	33.7	37.9	37.9	33.7		744	662	251	55.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF MAY THE UTILITY REPORTED HAVING PROBLEMS WITH THE THICKENER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/81	SYSTEM	34.6	34.6	34.6	34.6		720	719	249	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE MONTH OF JUNE THE UTILITY REPORTED HAVING MODULE CORROSION PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/81	SYSTEM	63.4	73.6	73.6	63.4		744	641	472	60.0
8/81	SYSTEM	89.2	91.8	91.8	88.3		744	716	657	65.0
9/81	SYSTEM	80.8	80.8	80.8	80.8		720	720	582	65.0

** PROBLEMS/SOLUTIONS/COMMENTS

MIST ELIMINATOR MODULE FAILURES WERE ENCOUNTERED DURING THE THIRD QUARTER 1981.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/81	SYSTEM	41.4	89.7	89.7	41.4		744	332	298	50.0
11/81	SYSTEM	32.4	37.4	37.4	32.4		720	623	233	50.0
12/81	SYSTEM	41.4	42.7	42.7	41.4		744	721	308	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FOURTH QUARTER PUMP FAILURES WERE ENCOUNTERED.

PROBLEMS DURING THE PERIOD WERE ALSO EXPERIENCED WITH THE THICKENER AND CORROSION.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/82	SYSTEM	.0	.0		.0		744	743	0	50.0
2/82	SYSTEM	.0	.0		.0		672	612	0	50.0
3/82	SYSTEM	.0	.0		.0		744	202	0	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1982 THE FGD SYSTEM WAS OFF-LINE TO REBUILD THE MODULES AND THE MIST ELIMINATORS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/82	SYSTEM	.0	.0	.0	.0		720	704	0	50.0
5/82	SYSTEM	.0	.0	.0	.0		744	665	0	50.0
6/82	SYSTEM	8.9	12.7	12.7	8.9		720	502	64	50.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE SECOND QUARTER, THE MIST ELIMINATOR SHELL ON ALL MODULES WAS RELINED.

7/82	SYSTEM	36.4	36.5	36.5	36.4	744	742	271	50.0
8/82	SYSTEM	60.5	59.8	59.8	58.3	744	726	434	50.0
9/82	SYSTEM	15.3	43.7	43.7	15.3	720	252	110	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THICKENER PROBLEMS WERE EXPERIENCED DURING THE MONTHS OF JULY, AUGUST AND SEPTEMBER, 1982.

10/82	SYSTEM	71.5	73.4	73.4	59.7	744	605	444	50.0
11/82	SYSTEM	74.0	60.6	60.6	30.1	720	358	217	50.0
12/82	SYSTEM	.0	.0	.0	.0	744	550	0	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT MIST ELIMINATORS WERE BEING REBUILT DURING THE PERIOD OF JULY THROUGH DECEMBER 1982.

REHEAT TUBES WERE ALSO REBUILT/REPLACED DURING THIS PERIOD.

1/83	SYSTEM	.0	.0	.0	.0		42	0	50.0
2/83	SYSTEM	9.4	71.6	71.6	9.4	672	88	63	50.0
3/83	SYSTEM	25.0	41.0	41.0	25.0	744	454	186	50.0
4/83	SYSTEM	.0	.0	.0	.0	720	416	0	50.0
5/83	SYSTEM	57.0	72.5		56.5	744	579	420	50.0
6/83	SYSTEM	30.0	43.1	43.1	30.0	720	501	216	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED PROBLEMS WITH PLUGGING IN THE REHEATER DURING THE PERIOD OF JANUARY THROUGH JUNE 1983.

FAILURE OF THE REHEAT TUBES OCCURRED DURING THE FIRST SIX MONTHS OF 1983 CAUSING FGD SYSTEM OUTAGE TIME.

7/83	SYSTEM	28.1	28.2	28.2	28.1	744	742	209	50.0
8/83	SYSTEM	2.7	2.7	2.7	2.7	744	737	20	50.0
9/83	SYSTEM	.0	.0	.0	.0	720	659	0	50.0

** PROBLEMS/SOLUTIONS/COMMENTS

LEAKS IN THE STACK REHEAT SYSTEM WERE REPAIRED DURING THE THIRD QUARTER OF 1983.

10/83	SYSTEM	13.8	14.7	14.7	13.6	744	685	101	
11/83	SYSTEM	56.7			.0	720	0	0	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER BOILER PART. HOURS	FGD HOURS	CAP. FACTOR

12/83	SYSTEM	25.9	8.6	8.6	6.7		744	583	25
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** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM						744		
2/84	SYSTEM						696		
3/84	SYSTEM						744		
4/84	SYSTEM						720		
5/84	SYSTEM						744		
6/84	SYSTEM						720		
7/84	SYSTEM						744		
8/84	SYSTEM						744		
9/84	SYSTEM						720		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC
PLANT NAME	MILL CREEK
UNIT NUMBER	4
CITY	LOUISVILLE
STATE	KENTUCKY
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	495
GROSS UNIT GENERATING CAPACITY - MW	495
NET UNIT GENERATING CAPACITY W/FGD - MW	495
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	495
 ** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	755.04 (1600000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9 (300 F)
STACK HEIGHT - M	183. (600 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	***** (***** FT)
 ** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT J/G	26749. (11500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	11000-12000
AVERAGE ASH CONTENT - %	15.00
RANGE ASH CONTENT - %	13.0-16.0
AVERAGE MOISTURE CONTENT - %	10.00
RANGE MOISTURE CONTENT - %	3.5-4.0
AVERAGE SULFUR CONTENT - %	3.75
RANGE SULFUR CONTENT - %	*****
AVERAGE CHLORIDE CONTENT - %	.08
RANGE CHLORIDE CONTENT - %	.03-.06
 *** PARTICLE CONTROL	
 ** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
 ** FABRIC FILTER	
NUMBER	0
TYPE	NONE
 ** ESP	
NUMBER	2
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	AMERICAN AIR FILTER
INLET FLUE GAS CAPACITY - CU.M/S	377.5 (800000 ACFM)
INLET FLUE GAS TEMPERATURE - C	148.9 (300 F)
PARTICLE REMOVAL EFFICIENCY - %	99.5
 ** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A

LOUISVILLE GAS & ELECTRIC: MILL CREEK 4 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	AMERICAN AIR FILTER
A-E FIRM	FLUOR POWER SERVICES
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	85.00
CURRENT STATUS	1
COMMERCIAL START-UP	10/82
INITIAL START-UP	7/82
CONTRACT AWARDED	2/76

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	27912.0	(12000 BTU/LB)
DESIGN COAL ASH CONTENT - %	16.00	
DESIGN MOISTURE CONTENT - %	15.00	
DESIGN CHLORIDE CONTENT - %	.06	

** QUENCHER/PRESATURATOR

NUMBER	4	
TYPE	VENTURI	
SUPPLIER	AMERICAN AIR FILTER	
INLET GAS FLOW - CU. M/S	188.76	(400000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
L/G RATIO - L/CU. M	.7	(5.0 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	ENTRAINED PACKING	
TRADE NAME/COMMON TYPE	MOBILE BED CONTACTOR	
SUPPLIER	AMERICAN AIR FILTER	
DIMENSIONS - FT	16.0 X 20.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	INORGANIC	
LINER SPECIFIC MATERIAL	HYDRAULICALLY-BONDED MORTAR	
LINER MATERIAL TRADE NAME/COMMON TYPE	PRE-KRETE G-8	
GAS CONTACTING DEVICE TYPE	POLYURETHANE BALLS	
LIQUID RECIRCULATION RATE - LITER/S	1285.	(20400 GPM)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
SO2 REMOVAL EFFICIENCY - %	85.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	8	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	2	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	ATLANTIC BRIDGE	
CONFIGURATION	HORIZONTAL	
NUMBER OF PASSES PER STAGE	3	
FREEBOARD DISTANCE M	2.13	(7.0 FT)
DISTANCE BETWEEN STAGES - CM	7.62	(3.0 IN)
DISTANCE BETWEEN VANES - CM	2.5	(1.0 IN)
PRESSURE DROP KPA	.2	(1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	4.6	(15.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 4 (CONT.)

WASH WATER SOURCE	FRESH	
WASH RATE - L/S	2.5	(40 GAL/MIN)
** REHEATER		
NUMBER	4	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	STEAM	
TRADE NAME/COMMON TYPE	BARE TUBE	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
** FANS		
NUMBER	2	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	AMERICAN STANDARD	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	377.52	(800000 ACFM)
FLUE GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP - KPA	12.9	(42.3 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	4	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	TOP-ENTRY GUILLOTINE	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	ABSORBER INLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	INORGANIC	
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR	
** DUCTWORK		
LOCATION	ABSORBER OUTLET	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	INORGANIC	
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR	
** DUCTWORK		
LOCATION	DOWNSTREAM OF REHEATER	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	HYDRAULICALLY-BONDED MORTAR	
** DUCTWORK		
LOCATION	BYPASS	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	WET BALL MILL	
DEVICE	COMPARTMENTED	
DEVICE TYPE	NR	
NUMBER	1	

LOUISVILLE GAS & ELECTRIC: MILL CREEK 4 (CONT.)

** TANKS	
SERVICE	NUMBER
-----	-----
CARBIDE LIME SLURRY	2
ADDITIVE SLURRY DAY	1
REACTION	4
THICKENER	1
 ** PUMPS	
SERVICE	NUMBER
-----	-----
ADDITIVE SLURRY TRANSFER	7
RECYCLE	10
SCRUBBER BLEED	6
THICKENER	2
NR	****
 ** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
DIMENSIONS - FT	125.0 X 10.0
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
FEED STREAM CHARACTERISTICS	10% SOLIDS
OUTLET STREAM CHARACTERISTICS	20% SOLIDS
 *** SALEABLE BYPRODUCTS	
NATURE	NONE
 *** SLUDGE	
 ** TREATMENT	
METHOD	FIXATION
DEVICE	PUG MILL
PROPRIETARY PROCESS	CONVERSION SYSTEMS [POZ-O-TEC]
 ** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	100 ACRES
 ** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	SLURRY RECYCLE
CHEMICAL PARAMETERS	PH
MONITOR TYPE	UNILOC
MONITOR LOCATION	IN REACTION TANK
 ** WATER BALANCE	
WATER LOOP TYPE	CLOSED
 ** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	CARBIDE LIME
PRINCIPAL CONSTITUENT	90% CAOH ₂
SOURCE/SUPPLIER	AIRCO

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 4 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

7/82	SYSTEM	5.4	21.8	21.8	4.6		744	156	34 50.0
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT START-UP FOR THE NEW BOILER WAS ON JULY 15, 1982.

8/82	SYSTEM	41.4	78.5	78.5	41.1		744	390	306 50.0
9/82	SYSTEM	39.4	52.4	52.9	38.5		720	529	277 50.0
10/82	SYSTEM	.0			.0		744	0	0 50.0
11/82	SYSTEM	.0	.0	.0	.0		720	347	0 50.0
12/82	SYSTEM	35.1	56.6	56.6	35.1		744	461	261 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT PROBLEMS ASSOCIATED WITH START-UP OF THE NEW BOILER WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH DECEMBER, 1982.

1/83	SYSTEM	18.1	24.2	24.2	18.1		744	558	135 50.0
2/83	SYSTEM	.0	.0	.0	.0		672	600	0 50.0
3/83	SYSTEM	25.3	64.4	64.4	24.1		744	278	179 50.0
4/83	SYSTEM	44.7	48.5	48.5	41.3		720	612	297 50.0
5/83	SYSTEM	65.2	95.3	95.3	59.4		744	464	442 50.0
6/83	SYSTEM	6.4	7.4	7.4	6.4		720	619	46 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

BYPASS DAMPER REPAIRS WERE MADE DURING THE PERIOD OF JANUARY THROUGH JUNE, 1983.

THE UTILITY REPORTED A THICKENER RAKE FAILURE DURING THE PERIOD OF JANUARY THROUGH JUNE, 1983.

THE UTILITY REPORTED REHEAT PROBLEMS DURING THE PERIOD OF JANUARY THROUGH JUNE, 1983.

7/83	SYSTEM	37.5	40.7	40.7	36.8		744	673	274 50.0
8/83	SYSTEM	36.6	39.1	39.1	36.6		744	695	272 50.0
9/83	SYSTEM	15.7	15.7	15.7	15.7		720	720	113 50.0

** PROBLEMS/SOLUTIONS/COMMENTS

A THICKENER RAKE STOPPED UP IN ACCUMULATED THICKENER SOLIDS DURING THE THIRD QUARTER RESULTING IN OUTAGE TIME.

THICKENER UNDERFLOW PUMP PROBLEMS CONTRIBUTED TO LOW AVAILABILITY DURING THE PERIOD.

THE UTILITY REPORTED PLUGGING IN THE ABSORBER MOBILE BALL BEDS DURING THE THIRD QUARTER.

10/83	SYSTEM	4.8	12.4	12.4	4.8		744	290	36
11/83	SYSTEM	43.6	32.5	32.5	31.7		720	701	228

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: MILL CREEK 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/83	SYSTEM	57.4	45.8	45.8	39.4		744	640	293	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM						744			
2/84	SYSTEM						696			
3/84	SYSTEM						744			
4/84	SYSTEM						720			
5/84	SYSTEM						744			
6/84	SYSTEM						720			
7/84	SYSTEM						744			
8/84	SYSTEM						744			
9/84	SYSTEM						720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	PADDY'S RUN	
UNIT NUMBER	6	
CITY	LOUISVILLE	
STATE	KENTUCKY	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	302	
GROSS UNIT GENERATING CAPACITY - MW	72	
NET UNIT GENERATING CAPACITY W/FGD - MW	67	
NET UNIT GENERATING CAPACITY WO/FGD - MW	69	
EQUIVALENT SCRUBBED CAPACITY - MW	72	

** UNIT DATA - BOILER AND STACK

BOILER SUPPLIER	FOSTER WHEELER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	PEAK	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	174.60	(370000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	168.3	(335 F)
STACK HEIGHT - M	76.	(250 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	4.3	(14.0 FT)

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26284.	(11300 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		10400-11900
AVERAGE ASH CONTENT - %	14.00	
RANGE ASH CONTENT - %	10.0-20.0	
AVERAGE MOISTURE CONTENT - %	9.00	
RANGE MOISTURE CONTENT - %	8.0-10.8	
AVERAGE SULFUR CONTENT - %	3.70	
RANGE SULFUR CONTENT - %	3.5-4.0	
AVERAGE CHLORIDE CONTENT - %	.04	
RANGE CHLORIDE CONTENT - %	.03-.06	

*** PARTICLE CONTROL

** MECHANICAL COLLECTOR

NUMBER	0
TYPE	NONE

** ESP

NUMBER	1
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	RESEARCH-COTTRELL
INLET FLUE GAS CAPACITY - CU.M/S	174.6 (370000 ACFM)
INLET FLUE GAS TEMPERATURE - C	168.3 (335 F)
PARTICLE REMOVAL EFFICIENCY - %	99.1

** PARTICLE SCRUBBER

NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A

*** FGD SYSTEM

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
A-E FIRM	FLUOR - PIONEER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	RETROFIT
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.10
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	2.8
CURRENT STATUS	1
COMMERCIAL START-UP	4/73
INITIAL START-UP	4/73
CONTRACT AWARDED	7/71

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.00	
DESIGN COAL HEAT CONTENT - J/G	24190.4	(10400 BTU/LB)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	192.0	

** QUENCHER/PRESATURATOR

NUMBER	0
--------	---

** ABSORBER

NUMBER	2	
NUMBER OF SPARES	0	
GENERIC TYPE	PACKED TOWER	
SPECIFIC TYPE	STATIC BED PACKING	
TRADE NAME/COMMON TYPE	MARBLE-BED SCRUBBER	
SUPPLIER	COMBUSTION ENGINEERING	
DIMENSIONS - FT	17.0 X 18.0 X 50.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER; MICA FLAKE-FILLED	
LINER MATERIAL TRADE NAME/COMMON TYPE	FLAKELINE 103; FLAKELINE 151	
GAS CONTACTING DEVICE TYPE	GLASS MARBLES	
NUMBER OF CONTACTING ZONES	2	
DISTANCE BETWEEN GAS CONTACTING ZONES - CM	7.6	(3.0IN)
LIQUID RECIRCULATION RATE LITER/S	510.	(8100 GPM)
L/G RATIO - L/CU.M	5.9	(43.8 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	2.7	(11.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW CU. M/S	87.30	(185000 ACFM)
INLET GAS TEMPERATURE - C	168.3	(335 F)
SO2 REMOVAL EFFICIENCY %	85.0	
PARTICLE REMOVAL EFFICIENCY - %	99.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR	
NUMBER PER SYSTEM	4	
NUMBER OF SPARES PER SYSTEM	0	
NUMBER PER MODULE	2	
GENERIC TYPE	IMPINGEMENT	
SPECIFIC TYPE	BAFFLE	
TRADE NAME/COMMON TYPE	CLOSED VANE	
MANUFACTURER	COMBUSTION ENGINEERING	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	2	
NUMBER OF PASSES PER STAGE	3	
FREEBOARD DISTANCE - M	1.52	(5.0 FT)
DISTANCE BETWEEN STAGES CM	121.92	(48.0 IN)
DISTANCE BETWEEN VANES - CM	4.3	(1.70 IN)
VANE ANGLES DEGREES	45	
PRESSURE DROP KPA	.4	(1.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.0	(10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPROPYLENE	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

WASH WATER SOURCE	FRESH	
WASH FREQUENCY	EVERY 8 HOURS	
WASH RATE - L/S	8.8	(140 GAL/MIN)
** REHEATER		
NUMBER	4	
NUMBER OF SPARES	0	
NUMBER PER MODULE	2	
GENERIC TYPE	DIRECT COMBUSTION	
SPECIFIC TYPE	IN-LINE BURNER	
TRADE NAME/COMMON TYPE	NATURAL GAS	
COMBUSTION FUEL SULFUR CONTENT - %	.0	
LOCATION	IN OUTLET DUCT	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	27.8	(50 F)
INLET FLUE GAS TEMPERATURE - C	52.2	(126 F)
OUTLET FLUE GAS TEMPERATURE - C	80.0	(176 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CAST IRON	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
NUMBER	1	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	WESTINGHOUSE	
FUNCTION	BOOSTER	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE CU.M/S	82.58	(175000 ACFM)
FLUE GAS TEMPERATURE - C	80.0	(176 F)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
** DAMPERS		
NUMBER	7	
FUNCTION	CONTROL/SHUT-OFF	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
MANUFACTURER	COMBUSTION ENGINEERING	
SEAL AIR FLOW - CU. M/S	.00	(0 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	INLET	
CONFIGURATION	RECTANGULAR	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	OUTLET	
CONFIGURATION	RECTANGULAR	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DUCTWORK		
LOCATION	BYPASS	
CONFIGURATION	RECTANGULAR	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	GRINDING OF SOLIDS FOUND IN BARGE DELIVERED CARB	
PRODUCT QUALITY - % SOLIDS	25.0	

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	****
REAGENT PREP PRODUCT	****
THICKENER OVERFLOW	****
** PUMPS	
SERVICE	NUMBER
-----	-----
RECYCLE	3
ABSORBER BLEED	****
THICKENER UNDERFLOW	2
CARBIDE LIME SLURRY	****
THICKENER OVERFLOW	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	1
CAPACITY	240 TONS/DAY
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
BELT GENERIC MATERIAL TYPE	ORGANIC
BELT SPECIFIC MATERIAL TYPE	POLYPROPYLENE
FEED STREAM SOURCE	THICKENER UNDERFLOW
FEED STREAM CHARACTERISTICS	23% SOLIDS
OUTLET STREAM CHARACTERISTICS	45-50% SOLIDS
OUTLET STREAM DISPOSITION	LANDFILL
OVERFLOW STREAM DISPOSITION	TO THICKENER
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
DIMENSIONS - FT	50 DIA X 17.0
CAPACITY	250000
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	10% SOLIDS
OUTLET STREAM CHARACTERISTICS	23% SOLIDS
OUTLET STREAM DISPOSITION	VACUUM FILTER
OVERFLOW STREAM DISPOSITION	TO REACTION TANK
*** SLUDGE	
% CASO3 - DRY	96.0
% CASO4 - DRY	4.0
% ASH - DRY	3.5
** TREATMENT	
METHOD	FIXATION
DEVICE	LANDFILL
PROPRIETARY PROCESS	NONE
INLET QUALITY - %	40.0
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	OFF-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	NONE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

** PROCESS CONTROL AND INSTRUMENTATION

PROCESS STREAM
CHEMICAL PARAMETERS
CONTROL LEVELS

INLET, OVERFLOW POT DRAINS, SUMP
PH
PH <6 UPPER BED, PH >4 LOWER BED, PH 8-10 AT INL

** WATER BALANCE

WATER LOOP TYPE
MAKEUP WATER ADDITION - LITERS/S

CLOSED
3.1 (50 GPM)

** CHEMICALS AND CONSUMPTION

FUNCTION
NAME
PRINCIPAL CONSTITUENT
SOURCE/SUPPLIER
CONSUMPTION
POINT OF ADDITION

ABSORBENT
CARBIDE LIME
CA(OH)₂
AIRCO
4800 LB/HR DRY CA(OH)₂
ADDITIVE SLURRY TANK

** FGD SPARE CAPACITY INDICES

ABSORBER - %	20.0
MIST ELIMINATOR - %	.0
REHEATER - %	.0
FAN - %	.0
EFFLUENT HOLD TANK - %	.0
RECIRCULATION PUMP - %	33.0
THICKENER - %	.0
VACUUM FILTER - %	.0

** FGD SPARE COMPONENT INDICES

ABSORBER	.0
MIST ELIMINATOR	.3
REHEATER	.0
FAN	.0
EFFLUENT HOLD TANK	.0
RECIRCULATION PUMP	1.0
THICKENER	.0
VACUUM FILTER	.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO₂ PART. HOURS HOURS HOURS FACTOR

4/73	6A	18.0	8.0			
	6B	56.0	24.9			
	SYSTEM	37.0	16.5	720	320	118

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATION OF THE FGD SYSTEM AT PADDY'S RUN BEGAN IN APRIL. THE MODULES WERE OPERATED ONE AT A TIME, WITH FREQUENT SHUTDOWNS FOR INSPECTION OF EQUIPMENT AND MINOR REPAIRS.

5/73	6A	11.0	3.9			
	6B	65.0	23.1			
	SYSTEM	38.0	13.5	744	265	101

** PROBLEMS/SOLUTIONS/COMMENTS

SINGLE-MODULE OPERATION CONTINUED THROUGH MAY 19, WHEN THE UNIT WAS SHUT DOWN FOR MODIFICATIONS.

EQUIPMENT WAS INSTALLED FOR INJECTION OF A FLOCCULATING AGENT INTO THE CLARIFIER TANK.

6/73	6A	.1	.0			
	6B	6.0	2.1			
	SYSTEM	3.1	1.1	720	255	8

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	BOILER HOURS	FGD CAP. HOURS FACTOR
7/73	6A	21.0			6.7				
	6B	21.0			6.7				
	SYSTEM	21.0			6.7		744	240	50
** PROBLEMS/SOLUTIONS/COMMENTS									
DURING A SCHEDULED OUTAGE FROM JULY 12 THROUGH AUGUST 1, SEVERAL REPAIRS WERE MADE TO THE LIME SLURRY MAKE-UP SYSTEM. A DISINTEGRATOR UNIT WAS INSTALLED TO REDUCE PLUGGING OF STRAINERS AND SLURRY CONTROL VALVES.									
OPERATION WAS INTERMITTENT FROM JUNE 19 TO JULY 11 BECAUSE OF MECHANICAL PROBLEMS WITH THE SLURRY PUMPS.									
8/73	6A	53.0			23.5				
	6B	64.0			28.4				
	SYSTEM	58.5			26.0		744	330	193
** PROBLEMS/SOLUTIONS/COMMENTS									
THE OPERATION WAS CONTINUOUS FROM AUGUST 2 TO AUGUST 18 EXCEPT FOR A BRIEF SHUTDOWN DUE TO A BOILER-RELATED PROBLEM.									
FROM AUGUST 19 TO SEPTEMBER 5, THE SYSTEM WAS SHUT DOWN TO REPLACE THE CLARIFIER UNDERFLOW LINE WITH ONE OF LARGER DIAMETER AND TO INSTALL ADDITIONAL PUMP CAPACITY IN THE CLARIFIER OVERFLOW SYSTEM.									
9/73	6A	85.0			46.1				
	6B	72.0			39.0				
	SYSTEM	78.5			42.6		720	390	306
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UNIT OPERATED CONTINUOUSLY BETWEEN SEPTEMBER 6 AND 20 EXCEPT FOR A 7-HOUR SHUTDOWN TO REPAIR A MARBLE BED SUPPORT PLATE.									
THE UNIT WAS SHUT DOWN FROM SEPTEMBER 20 TO THE END OF THE MONTH.									
10/73	6A	49.0			45.4				
	6B	94.0			87.2				
	SYSTEM	71.5			66.3		744	690	493
11/73	6A	35.0			35.0				
	6B	100.0			100.0				
	SYSTEM	67.5			67.5		720	720	486
12/73	6A	44.0			11.3				
	6B	78.0			19.9				
	SYSTEM	61.0			15.6		744	190	116
** PROBLEMS/SOLUTIONS/COMMENTS									
THE FGD SYSTEM WAS OPERATED UNTIL DECEMBER 20 AFTER WHICH THE BOILER AND THE SCRUBBER MODULES WERE SHUT DOWN BECAUSE OF A LACK OF DEMAND (THIS IS A PEAKING-LOAD BOILER).									
1/74	SYSTEM				.0		744	0	0 .0
** PROBLEMS/SOLUTIONS/COMMENTS									
THE BOILER WAS SHUT DOWN DUE TO A LACK OF DEMAND.									
2/74	SYSTEM				.0		672	0	0 .0
3/74	SYSTEM				.0		744	0	0 .0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/74	SYSTEM				.0		720	0	0	.0
5/74	SYSTEM				.0		744	0	0	.0
6/74	SYSTEM				.0		720	0	0	.0
7/74	6A		51.0		21.0					
	6B		81.0		33.3					
	SYSTEM		66.0		27.2		744	306	202	
8/74	6A		50.0		2.1					
	6B		77.0		3.2					
	SYSTEM		63.5		2.7		744	31	20	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT HAS BEEN ON AND OFF FREQUENTLY DUE TO FLUCTUATION IN POWER DEMAND.										
9/74	SYSTEM		.0		.0		720	43	0	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WAS SHUT DOWN BECAUSE OF A LACK OF DEMAND.										
10/74	6A		100.0		32.9					
	6B		100.0		32.9					
	SYSTEM		100.0		32.9		744	245	245	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WAS OPERATED TO PERFORM LIMESTONE TESTS ON THE FGD SYSTEM.										
11/74	SYSTEM		.0		.0		720	122	0	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER WAS SHUT DOWN BECAUSE OF A LACK OF DEMAND.										
12/74	SYSTEM				.0		744	0	0	.0
1/75	SYSTEM				.0		744	0	0	.0
2/75	SYSTEM				.0		672	0	0	.0
3/75	SYSTEM				.0		744	0	0	.0
4/75	SYSTEM				.0		720	0	0	.0
5/75	SYSTEM				.0		744	0	0	.0
6/75	SYSTEM				.0		720	0	0	.0
7/75	SYSTEM				.0		744	0	0	.0
8/75	SYSTEM				.0		744	0	0	.0
9/75	6A		100.0		100.0					
	6B		100.0		100.0					
	SYSTEM	100.0	100.0		100.0		720	720	720	
10/75	6A		100.0		100.0					

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	6B		100.0		100.0					
	SYSTEM	100.0	100.0		100.0		744	744	744	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER AND FGD SYSTEM WERE OPERATIONAL ALL OF SEPTEMBER AND THE FIRST TWO WEEKS IN OCTOBER. OPERABILITY FOR BOTH MODULES DURING THE OPERATIONAL PERIOD WAS 100% (BASED UPON LG&E'S PEAK LOAD DETERMINATION). SO2 REMOVAL WAS REPORTED TO BE OVER 98%.										
SYSTEM OUTAGE IN THE LAST TWO WEEKS OF OCTOBER WAS DUE PRIMARILY TO PROBLEMS WITH THE BREECHING IN THE BOILER SECTION.										
11/75	6A		100.0		100.0					
	6B		100.0		100.0					
	SYSTEM	100.0	100.0		100.0		720	720	720	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE BOILER AND SCRUBBER SYSTEM OPERATED MOST OF THE REPORT PERIOD ON A MONDAY-FRIDAY BASIS.										
12/75	6A		90.1		90.1					
	6B		90.1		90.1					
	SYSTEM		90.1		90.1		744	744	670	
** PROBLEMS/SOLUTIONS/COMMENTS										
TWO MINOR OUTAGES IN DECEMBER WERE DUE TO MALFUNCTION AND REPAIR OF THE DUAL STRAINER SWITCH SHAFT IN THE BOTTOM OF THE SCRUBBER MODULE.										
1/76	SYSTEM		53.5		18.7		744	260	139	
** PROBLEMS/SOLUTIONS/COMMENTS										
SO2 REMOVAL EFFICIENCY WAS REPORTED TO BE 99% DURING JANUARY.										
2/76	SYSTEM		66.7		9.8		696	102	68	
** PROBLEMS/SOLUTIONS/COMMENTS										
THE SYSTEM WAS SHUTDOWN IN EARLY FEBRUARY IN PREPARATION FOR AN EXTENSIVE SLUDGE STUDY TO MONITOR FIXATION, LEACHATES, AND SEASONAL VARIATIONS. THE STUDY IS SCHEDULED TO BEGIN IN JUNE OR JULY. THE SCRUBBER WILL NOT BE OPERATED UNTIL THE START OF THE PROGRAM UNLESS THE BOILER IS REQUIRED FOR PEAKING POWER DEMANDS. HIGHLIGHTS OF THE SCRUBBER/SLUDGE STUDY PROGRAM ARE AS FOLLOWS:										
-SIX MONTHS DURATION.										
-ONE SCHEDULED SHUTDOWN FOR TEST MODIFICATIONS.										
-DELIBERATE HIGH CHLORIDE CONCENTRATION OPERATION.										
-MGO INNOCULATION.										
3/76	SYSTEM				.0		744	0	0	.0
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UNIT REMAINED OFF LINE DURING MARCH IN PREPARATION FOR THE EPA SCRUBBER/SLUDGE STUDY. THE UTILITY IS NOW COMPLETING SYSTEM MODIFICATIONS NECESSARY FOR THE OPERATION OF THE TEST PROGRAM.										
4/76	SYSTEM		.0		.0		720	2	0	
5/76	SYSTEM		85.0		2.3		744	20	17	
6/76	SYSTEM		95.0		21.3		720	161	153	

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THIS PEAK LOAD UNIT WAS OPERATED PART OF THE TIME DURING THE REPORT PERIOD (APPROXIMATELY 2 WEEKS IN MAY AND TWO WEEKS IN JUNE). THE SCRUBBER WAS AVAILABLE TO THE BOILER 100% OF THE TIME AND SO2 REMOVAL EFFICIENCY WAS 98 TO 99% DURING THIS OPERATING SEGMENT.

7/76	SYSTEM	87.7	30.8	744	261	229
8/76	SYSTEM	92.8	8.6	744	69	64

** PROBLEMS/SOLUTIONS/COMMENTS

THIS UNIT WAS OPERATIONAL PART OF THE TIME DURING THE JULY-AUGUST PERIOD. THE SCRUBBING SYSTEM WAS AVAILABLE TO THE BOILER ON A 100% BASIS. NO MAJOR SCRUBBER-RELATED PROBLEMS WERE ENCOUNTERED.

9/76	SYSTEM		.0	720	0	0 .0
10/76	SYSTEM	94.6	21.2	744	167	158

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT DID NOT OPERATE THROUGHOUT SEPTEMBER AND THE FIRST THREE WEEKS IN OCTOBER. THE EPA-FUNDED SCRUBBER/SLUDGE STUDY PROGRAM COMMENCED OCTOBER 25. THE INITIAL PHASE OF THE PROGRAM CALLS FOR OPERATIONS TO PROCEED FOR A 20-30 DAY PERIOD WITH CARBIDE LIME SCRUBBING ABSORBENT. FOLLOWING COMPLETION OF THIS RUN, THE UNIT WILL BE SHUT DOWN AND MODIFICATIONS WILL BE INCORPORATED INTO THE SYSTEM FOR OPERATION WITH COMMERCIAL GRADE (HIGH CALCIUM) LIME.

11/76	SYSTEM	99.3	99.3	720	720	715
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS IN SERVICE DURING THE REPORT PERIOD. THE SCRUBBING SYSTEM OPERATED 99.5% OF THE TIME THAT THE BOILER WAS IN SERVICE. CARBIDE LIME WAS EMPLOYED AS THE SO2 ABSORBENT. THE HIGH CALCIUM (VIRGIN) LIME RUN, SCHEDULED AS PART OF THE SCRUBBER/SLUDGE STUDY, WILL COMMENCE ON MARCH 1, 1977.

12/76	SYSTEM	98.5	71.4	744	539	531
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS IN SERVICE DURING THE REPORT PERIOD. THE SCRUBBING SYSTEM OPERATED 99.5% OF THE TIME THAT THE BOILER WAS IN SERVICE. CARBIDE LIME WAS EMPLOYED AS THE SO2 ABSORBENT. THE HIGH CALCIUM (VIRGIN) LIME RUN, SCHEDULED AS PART OF THE SCRUBBER/SLUDGE STUDY, WILL COMMENCE ON MARCH 1, 1977.

1/77	SYSTEM	.0	.0	744	103	0
2/77	SYSTEM	.0	.0	672	62	0
3/77	SYSTEM	79.2	41.4	744	389	308

** PROBLEMS/SOLUTIONS/COMMENTS

BECAUSE OF SEVERE WEATHER CONDITIONS THERE WERE NO BOILER OPERATIONS AND NO SCRUBBER OPERATIONS (SINCE DECEMBER 31) UNTIL MARCH 15, 1977.

4/77	SYSTEM	93.6	42.6	720	328	307
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LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

5/77 SYSTEM 42.5 16.0 744 280 119

** PROBLEMS/SOLUTIONS/COMMENTS

IN MID MARCH LG&E BEGAN TESTS FOR EPA WITH REGULAR LIME SINCE ONE OF THE OBJECTIVES OF THE TEST WAS TO DETERMINE WHETHER THERE WERE APPRECIABLE DIFFERENCES BETWEEN REGULAR LIME AND CARBIDE LIME AT THIS FACILITY. DURING OPERATION WITH REGULAR LIME, SCALING PROBLEMS OCCURRED, INDICATING THAT THE SCALING RESULTED FROM INCREASED OXIDATION LEVELS. AVAILABLE OPTIONS FOR CONTROLLING SCALING WERE LIMITED BY THE FIXED DESIGN FEATURES OF THE SCRUBBER HARDWARE. THE OPTION SELECTED WAS ADDITION OF MGO TO THE SCRUBBING MEDIUM. WHEN MGO WAS ADDED, THE SCALING PROBLEM WAS ELIMINATED, ALLOWING COMPLETION OF THE TEST PROGRAM.

6/77 SYSTEM 93.4 43.3 720 334 312

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER/SLUDGE EVALUATION STUDY CONTINUED DURING THE PERIOD. THE SCRUBBER PLANT (ONE MODULE IS BEING UTILIZED FOR THIS EXPERIMENTAL PROGRAM) WAS IN SERVICE ON A VIRTUALLY CONTINUOUS BASIS FROM JUNE 18 TO AUGUST 8 OPERATING ON MAGNESIUM INNOCULATED COMMERCIAL LIME. SYSTEM OPERABILITY DURING THIS PERIOD WAS APPROXIMATELY 96%. SO2 REMOVAL EFFICIENCY WAS MEASURED IN EXCESS OF 99.5%. THE SYSTEM WAS SHUT DOWN AT THIS POINT TO PERFORM A NUMBER OF SCHEDULED MODIFICATIONS TO THE SYSTEM FOR TEST PURPOSES. SPECIFICALLY, MODIFICATIONS ARE BEING IMPLEMENTED TO THE SYSTEM IN ORDER TO BYPASS THE REACTION TANK SO A SHORT TERM RETENTION TIME TEST COULD BE CONDUCTED. THE TESTING WAS COMPLETED IN AUGUST 1977 AFTER THE MODIFICATIONS WERE MADE.

7/77 SYSTEM 96.9 95.8 744 736 713

8/77 SYSTEM 94.0 73.5 744 582 547

9/77 SYSTEM 25.9 5.8 720 162 42

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS CURRENTLY NOT OPERATING DUE TO THE LACK OF POWER REQUIREMENT.

10/77 SYSTEM 46.9 2.0 744 32 15

11/77 SYSTEM .0 720 0 0 .0

12/77 SYSTEM .0 744 0 0 .0

1/78 SYSTEM .0 744 0 0 .0

2/78 SYSTEM .0 672 0 0 .0

3/78 SYSTEM .0 744 0 0 .0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OUT OF SERVICE FROM NOVEMBER THROUGH MARCH IN PART BECAUSE OF LOW DEMAND AND IN PART AS A RESULT OF PROBLEMS RELATED TO COLD WEATHER.

4/78 SYSTEM .0 720 0 0 .0

5/78 SYSTEM .0 744 0 0 .0

6/78 SYSTEM 98.1 7.1 720 52 51

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

PADDY'S RUN WAS ON LINE ONLY A FEW HOURS DURING THIS PERIOD. NO OPERATIONAL PROBLEMS WERE REPORTED BY THE UTILITY.

7/78	SYSTEM	99.5		25.4		744	190	189	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT RAN INTERMITTENTLY FOR ABOUT EIGHT TO TEN DAYS OVER THIS PERIOD.

8/78	SYSTEM			.0		744	0	0	.0
9/78	SYSTEM	100.0		47.1		720	339	339	

** PROBLEMS/SOLUTIONS/COMMENTS

THIS UNIT WAS OPERATED FOR TWO WEEKS IN SEPTEMBER SO THAT TESTING OF A NEW FLOCCULANT COULD BE CARRIED OUT. THE RESULTS OF THESE TESTS WILL DETERMINE THE TYPE OF FLOCCULANT THAT WILL BE USED IN THE FUTURE AT THE OTHER LG&E UNITS.

10/78	SYSTEM			.0		744	0	0	.0
11/78	SYSTEM			.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS NOT OPERATED DURING OCTOBER OR NOVEMBER.

12/78	SYSTEM			.0		744	0	0	.0
1/79	SYSTEM			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS NOT OPERATED DURING DECEMBER OR JANUARY.

2/79	SYSTEM			.0		672	0	0	.0
3/79	SYSTEM			.0		744	0	0	.0
4/79	SYSTEM			.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS NOT OPERATED DURING THESE MONTHS BECAUSE OF LACK OF DEMAND.

5/79	SYSTEM			.0		744	0	0	.0
6/79	SYSTEM			.0		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT DID NOT OPERATE DURING MAY OR JUNE DUE TO INSUFFICIENT DEMAND.

7/79	SYSTEM	.0		.0		744	19	0	
8/79	SYSTEM	45.0		13.0		744	218	99	
9/79	SYSTEM	.0		.0		720	36	0	

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO PROBLEMS WERE REPORTED WITH RESPECT TO OPERATION AT THIS UNIT DURING THE
 THIRD QUARTER 1979.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM				.0	744	0	0	0	.0
11/79	SYSTEM				.0	720	0	0	0	.0
12/79	SYSTEM				.0	744	0	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT DID NOT OPERATE DURING THE FOURTH QUARTER OF 1979 BECAUSE OF THE
 LACK OF DEMAND.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM				.0	744	0	0	0	.0
2/80	SYSTEM				.0	696	0	0	0	.0
3/80	SYSTEM				.0	744	0	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THIS UNIT DID NOT OPERATE DURING THE FOURTH QUARTER OF 1979 OR THE FIRST
 QUARTER OF 1980 DUE TO A LACK OF DEMAND. THIS UNIT IS USED AS A PEAKING
 UNIT AND WILL BE RETIRED SOMETIME IN 1987.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0			.0	720	0	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME BUT WAS NOT
 OPERATED DUE TO A BOILER RELATED PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	86.6	86.6	7.8	744	67	58		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY, NINE HOURS OF OUTAGE TIME RESULTED FROM THE UNAVAILABILITY OF
 THE LIME SLURRY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	100.0	94.1	94.1	6.7	720	51	48		

** PROBLEMS/SOLUTIONS/COMMENTS

THE THREE HOURS THE SCRUBBERS DID NOT OPERATE IN JUNE WAS DUE TO THE FACT
 THAT THE BOILER WAS BROUGHT ON LINE BEFORE THE SCRUBBER OPERATORS WERE
 ON DUTY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	100.0			.0					
	B	100.0			.0					
	SYSTEM	100.0			.0	744	0	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM DID NOT OPERATE DURING THE MONTH OF JULY DUE TO
 A LACK OF DEMAND.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM	100.0			.0	744	0	0	0	.0
9/80	SYSTEM	100.0			.0	720	0	0	0	.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER DID NOT OPERATE DURING AUGUST AND SEPTEMBER. THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME.

10/80	SYSTEM	100.0	.0	744	0	0	.0
11/80	SYSTEM	100.0	.0	720	0	0	.0
12/80	SYSTEM	100.0	.0	744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS NOT OPERATED DURING THE FOURTH QUARTER 1980 DUE TO THE LACK OF DEMAND.

1/81	SYSTEM	100.0	.0	744	0	0	.0
2/81	SYSTEM	100.0	.0	672	0	0	.0
3/81	SYSTEM	100.0	.0	744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1981 THE UNIT WAS NOT OPERATED DUE TO THE LACK OF DEMAND.

4/81	SYSTEM	100.0	.0	720	0	0	.0
5/81	SYSTEM	100.0	.0	744	0	0	.0
6/81	SYSTEM	100.0	.0	720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THROUGHOUT THE SECOND QUARTER 1981 THE BOILER DID NOT OPERATE; HOWEVER, THE FGD SYSTEM WAS AVAILABLE 100%.

7/81	SYSTEM	100.0	.0	744	0	0	.0
8/81	SYSTEM	100.0	.0	744	0	0	.0
9/81	SYSTEM	100.0	.0	720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

PADDY'S RUN UNIT 6 REMAINED OFF LINE DURING THE THIRD QUARTER 1981.

10/81	SYSTEM	100.0	.0	744	0	0	
11/81	SYSTEM	100.0	.0	720	0	0	
12/81	SYSTEM	100.0	.0	744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THROUGHOUT THE FOURTH QUARTER THE FGD SYSTEM WAS AVAILABLE FOR OPERATION; HOWEVER, THE BOILER WAS NOT NEEDED.

1/82	SYSTEM	100.0	.0	744	744	0	
2/82	SYSTEM	100.0	.0	672	0	0	.0
3/82	SYSTEM	100.0	.0	744	0	0	.0

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1982 THE FGD SYSTEM WAS AVAILABLE FOR OPERATION;
 HOWEVER, THE SYSTEM WAS NOT NEEDED DUE TO A LACK OF POWER DEMAND.

4/82	SYSTEM	100.0	.0	720	0		.0
5/82	SYSTEM	100.0	.0	744	0	0	.0
6/82	SYSTEM	100.0	.0	720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DUE TO A LACK OF POWER DEMAND, THE UNIT DID NOT OPERATE DURING THE SECOND
 QUARTER 1982.

7/82	SYSTEM	100.0	.0	744	0	0	.0
8/82	SYSTEM	100.0	.0	744	0	0	.0
9/82	SYSTEM	100.0	.0	720	0	0	.0
10/82	SYSTEM	100.0	.0	744	0	0	.0
11/82	SYSTEM	100.0	.0	720	0	0	.0
12/82	SYSTEM	100.0	.0	744	0	0	.0
1/83	SYSTEM	100.0	.0	744	0	0	.0
2/83	SYSTEM	100.0	.0	672	0	0	.0
3/83	SYSTEM	100.0	.0	744	0	0	.0
4/83	SYSTEM	100.0	.0	720	0	0	.0
5/83	SYSTEM	100.0	.0	744	0	0	.0
6/83	SYSTEM	100.0	.0	720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT AND FGD SYSTEM DID NOT OPERATE DURING
 THE PERIOD OF JULY 1, 1982 THROUGH JUNE 30, 1983. THE FGD SYSTEM WAS
 REPORTED AVAILABLE 100% OF THE TIME.

7/83	SYSTEM	100.0	.0	744	0	0	.0
8/83	SYSTEM	100.0	.0	744	0	0	.0
9/83	SYSTEM	100.0	.0	720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT AND FGD SYSTEM DID NOT OPERATE DURING THE THIRD QUARTER OF 1983,
 HOWEVER, THE FGD SYSTEM WAS REPORTED TO BE 100% AVAILABLE.

10/83	SYSTEM	100.0	.0	744	0	0	.0
11/83	SYSTEM	100.0	.0	720	0	0	.0
12/83	SYSTEM	100.0	.0	744	0	0	.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT AND SCRUBBER DID NOT OPERATE DURING THE FOURTH QUARTER OF 1983.

1/84	SYSTEM									744
2/84	SYSTEM									696
3/84	SYSTEM									744
4/84	SYSTEM									720
5/84	SYSTEM									744
6/84	SYSTEM									720
7/84	SYSTEM									744
8/84	SYSTEM									744
9/84	SYSTEM									720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MARQUETTE BOARD OF LIGHT & PWR
PLANT NAME	SHIRAS
UNIT NUMBER	3
CITY	MARQUETTE
STATE	MICHIGAN
REGULATORY CLASSIFICATION	B
PARTICULATE EMISSION LIMITATION - NG/J	13. (.030 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	172. (.400 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	215. (.500 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	40
GROSS UNIT GENERATING CAPACITY - MW	44
NET UNIT GENERATING CAPACITY W/FGD - MW	495
NET UNIT GENERATING CAPACITY WO/FGD - MW	495
EQUIVALENT SCRUBBED CAPACITY - MW	44
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	92.63 (196292 ACFM)
BOILER FLUE GAS TEMPERATURE - C	68.3 (155 F)
STACK HEIGHT - M	107. (350 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	2.7 (9.0 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20129. (8654 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	*****
AVERAGE ASH CONTENT - %	10.25
RANGE ASH CONTENT - %	*****
AVERAGE MOISTURE CONTENT - %	23.42
RANGE MOISTURE CONTENT - %	*****
AVERAGE SULFUR CONTENT - %	.30
RANGE SULFUR CONTENT - %	*****
AVERAGE CHLORIDE CONTENT - %	*****
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** FABRIC FILTER	
NUMBER	1
SUPPLIER	GE ENVIRONMENTAL SERVICES
PRESSURE DROP - KPA	1.7 (6.8 IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.8
TYPICAL GAS/CLOTH RATIO - M/MIN	.6 (2.0 FT/MIN)
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
*** FGD SYSTEM	
** GENERAL DATA	
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	SPRAY DRYING
PROCESS TYPE	LIME/SPRAY DRYING
SYSTEM SUPPLIER	GE ENVIRONMENTAL SERVICES
A-E FIRM	LUTZ, DALY, & BRAIN
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MARQUETTE BOARD OF LIGHT & PWR: SHIRAS 3 (CONT.)

UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.80	
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	80.00	
CURRENT STATUS	1	
COMMERCIAL START-UP	4/83	
INITIAL START-UP	3/83	
CONTRACT AWARDED	10/80	
** DESIGN AND OPERATING PARAMETERS		
DESIGN COAL SULFUR CONTENT - %	.60	
** QUENCHER/PRESATURATOR		
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** ABSORBER		
GENERIC TYPE	SPRAY DRYER	
SPECIFIC TYPE	NR	
TRADE NAME/COMMON TYPE	ROTARY ATOMIZER	
DIMENSIONS - FT	35'6" DIAMETER	
SHELL GENERIC MATERIAL	NR	
SHELL SPECIFIC MATERIAL	NR	
SHELL MATERIAL TRADE NAME/COMMON TYPE	NR	
LINER GENERIC MATERIAL	NONE	
LINER SPECIFIC MATERIAL	N/A	
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A	
INLET GAS TEMPERATURE - C	129.4	(265 F)
SO2 REMOVAL EFFICIENCY - %	80.0	
PARTICLE REMOVAL EFFICIENCY - %	99.9	
** MIST ELIMINATOR		
PRE-MIST ELIMINATOR/MIST ELIMINATOR	NONE	
GENERIC TYPE	N/A	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON TYPE	N/A	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** REHEATER		
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	3.0	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
** FANS		
DESIGN	NR	
FUNCTION	NR	
APPLICATION	NR	
SERVICE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
** DAMPERS		
FUNCTION	NR	
GENERIC TYPE	NR	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
SHELL GENERIC MATERIAL TYPE	NR	
SHELL SPECIFIC MATERIAL TYPE	NR	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** REAGENT PREPARATION EQUIPMENT		
FUNCTION	SLAKER	
DEVICE	NR	
DEVICE TYPE	NR	

MARQUETTE BOARD OF LIGHT & PWR: SHIRAS 3 (CONT.)

** PUMPS	
SERVICE	NUMBER
-----	-----
NR	****
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	N/A
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	OFF-SITE
SITE TREATMENT	NR

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
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3/83	SYSTEM									744
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** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL START-UP FOR THE FGD SYSTEM OCCURRED DURING MARCH, 1983.

4/83	SYSTEM									720
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5/83	SYSTEM									744
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6/83	SYSTEM									720
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** PROBLEMS/SOLUTIONS/COMMENTS

COMMERCIAL OPERATIONS COMMENCED ON APRIL 1, 1983. THE FGD SYSTEM IS PRESENTLY IN THE DEBUGGING PHASE OF OPERATION. NO PERFORMANCE OR WARRANTY TESTS HAVE BEEN RUN.

THE UTILITY REPORTED EXPERIENCING PROBLEMS WITH MATERIAL BUILD UP ON THE SPRAY DRYER WALLS AND PLUGGING ON THE SWIRL VANES OF THE ATOMIZER DUE TO IMPROPER PARTICLE SIZING. ADDITIONAL PROBLEMS HAVE BEEN ENCOUNTERED WITH SOLIDS REMOVAL FROM THE BOTTOM OF THE SPRAY DRYER. THE SYSTEM WAS DESIGNED PRIMARILY TO REMOVE A FLY-ASH TYPE MATERIAL. THE UTILITY PLANS TO INSTALL A GRANULATOR IN THE BOTTOM OF THE SPRAY DRYER TO AID BYPRODUCT REMOVAL.

7/83	SYSTEM									744
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8/83	SYSTEM									744
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9/83	SYSTEM									720
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT BOTH PERFORMANCE AND CONTRACT AGREEMENT TESTING WAS PERFORMED IN MID-SEPTEMBER. NO CONCLUSIONS ARE YET AVAILABLE FOR RELEASE, BUT INITIAL RESULTS LOOK FAVORABLE.

INSTALLATION OF THE GRANULATOR FOR WASTE REMOVAL IS REPORTED NEAR COMPLETION. THE UTILITY NOW AWAITS THE DELIVERY OF THE REMAINING EQUIPMENT AND

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MARQUETTE BOARD OF LIGHT & PWR: SHIRAS 3 (CONT.)

-----PERFORMANCE DATA-----
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
SO2 PART. HOURS HOURS HOURS HOURS FACTOR

MATERIALS TO COMPLETE THE JOB. ISOLATION OF THE DRYER HAS ENABLED THE UTILITY TO KEEP THE UNIT ON LINE DURING THE ENTIRE INSTALLATION PERIOD.

PROBLEMS WITH SCRUBBER MATERIAL BUILDUP ON THE SPRAY DRYER WALLS AND ATOMIZER SWIRL VANES WAS DETERMINED TO BE A RESULT OF OPERATING THE SYSTEM NEAR OR BELOW THE DEW POINT TEMPERATURE. THE PROBLEM HAS BEEN RESOLVED BY ADDING INSTRUMENTATION WHICH ALLOWS THE OPERATORS TO MONITOR MORE CLOSELY THE INLET AND OUTLET TEMPERATURE OF THE SPRAY DRYER.

10/83	SYSTEM	744
11/83	SYSTEM	720
12/83	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING THE FOURTH QUARTER OF 1983.

FINAL INSTALLATION AND TESTING OF THE NEW GRANULATOR WASTE REMOVAL SYSTEM IS SCHEDULED FOR FEBRUARY 1984.

GE ENVIRONMENTAL SERVICES, IN COOPERATION WITH THE UTILITY, WILL DESIGN AND TEST A NEW VARIABLE SPEED TYPE ATOMIZER AT THE SHIRAS 3 FACILITY. ATOMIZER SPEEDS WILL BE CONTROLLED VIA A DC MOTOR IN COMPARISON TO CONVENTIONAL DRIVE SYSTEMS, WHICH REQUIRE MANUALLY CHANGING THE DRIVE SHAFT PULLEY. PRESENTLY, A FULL DAY IS REQUIRED TO CHANGE A DRIVE SHAFT PULLEY.

1/84	SYSTEM	744
2/84	SYSTEM	696
3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MICHIGAN SO CENTRAL PWR AGENCY
PLANT NAME	PROJECT
UNIT NUMBER	1
CITY	LITCHFIELD
STATE	MICHIGAN
REGULATORY CLASSIFICATION	B
PARTICULATE EMISSION LIMITATION - NG/J	13. (.030 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	365. (.850 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	***** (***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	55
GROSS UNIT GENERATING CAPACITY MW	55
NET UNIT GENERATING CAPACITY W/FGD - MW	50
NET UNIT GENERATING CAPACITY WO/FGD - MW	51
EQUIVALENT SCRUBBED CAPACITY - MW	55
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	BABCOCK & WILCOX
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	103.83 (220015 ACFM)
BOILER FLUE GAS TEMPERATURE - C	156.7 (314 F)
STACK HEIGHT - M	76. (250 FT)
STACK SHELL	CARBON STEEL
STACK TOP DIAMETER - M	2.9 (9.5 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	28377. (12200 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	11000-13000
AVERAGE ASH CONTENT - %	10.00
RANGE ASH CONTENT - %	6.0-15.0
AVERAGE MOISTURE CONTENT - %	6.00
RANGE MOISTURE CONTENT - %	4.0-8.0
AVERAGE SULFUR CONTENT - %	2.25
RANGE SULFUR CONTENT - %	0.0-4.3
AVERAGE CHLORIDE CONTENT - %	*****
RANGE CHLORIDE CONTENT %	*****
*** PARTICLE CONTROL	
** ESP	
NUMBER	1
TYPE	HOT SIDE
SUPPLIER	BELCO
INLET FLUE GAS CAPACITY - CU.M/S	126.2 (267510 ACFM)
INLET FLUE GAS TEMPERATURE - C	156.7 (314 F)
PRESSURE DROP - KPA	.1 (1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.8
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A
GAS CONTACTING DEVICE TYPE	N/A
*** FGD SYSTEM	
** GENERAL DATA	
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
PROCESS ADDITIVES	MAG
SYSTEM SUPPLIER	BABCOCK & WILCOX

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MICHIGAN SO CENTRAL PWR AGENCY: PROJECT 1 (CONT.)

A-E FIRM	CAMPBELL DEBOE & ASSOCIATES
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	1.8
CURRENT STATUS	1
COMMERCIAL START-UP	5/83
INITIAL START-UP	5/83
CONTRACT AWARDED	6/79

** DESIGN AND OPERATING PARAMETERS

** QUENCHER/PRESATURATOR	
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR

** ABSORBER	
NUMBER	1
NUMBER OF SPARES	0
GENERIC TYPE	SPRAY TOWER
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY
TRADE NAME/COMMON TYPE	N/A
SUPPLIER	BABCOCK & WILCOX
DIMENSIONS - FT	22.5 X 92.5
SHELL GENERIC MATERIAL	STAINLESS STEEL
SHELL SPECIFIC MATERIAL	AUSTENITIC
SHELL MATERIAL TRADE NAME/COMMON TYPE	TYPE 316L
LINER GENERIC MATERIAL	NONE
LINER SPECIFIC MATERIAL	N/A
LINER MATERIAL TRADE NAME/COMMON TYPE	N/A
GAS CONTACTING DEVICE TYPE	NONE
L/G RATIO - L/CU.M	1.3 (10.0 GAL/1000 ACF)
SUPERFICIAL GAS VELOCITY - M/SEC	2.4 (7.9 FT/S)
INLET GAS FLOW - CU. M/S	87.84 (186147 ACFM)
INLET GAS TEMPERATURE - C	160.0 (320 F)
SO2 REMOVAL EFFICIENCY - %	90.0

** MIST ELIMINATOR	
PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	1
GENERIC TYPE	NR
SPECIFIC TYPE	NR
TRADE NAME/COMMON TYPE	NR
CONFIGURATION	VERTICAL
NUMBER OF STAGES	2
NUMBER OF PASSES PER STAGE	1
DISTANCE BETWEEN STAGES - CM	25.91 (10.2 IN)
DISTANCE BETWEEN VANES - CM	6.9 (2.70 IN)
VANE ANGLES - DEGREES	107
PRESSURE DROP KPA	.1 (.3 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	2.7 (8.8 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	BLENDED
WASH RATE - L/S	5.4 (85 GAL/MIN)

** REHEATER	
NUMBER	1
GENERIC TYPE	IN-LINE
SPECIFIC TYPE	STEAM
TRADE NAME/COMMON TYPE	NR
TEMPERATURE INCREASE - C	27.8 (50 F)
INLET FLUE GAS FLOW RATE - CU. M/S	88.35 (187219 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC

** FANS	
DESIGN	NR
FUNCTION	NR
APPLICATION	NR
SERVICE	NR

MICHIGAN SO CENTRAL PWR AGENCY: PROJECT 1 (CONT.)

CONSTRUCTION MATERIAL GENERIC TYPE	NR
** DAMPERS	
FUNCTION	NR
GENERIC TYPE	NR
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
LOCATION	HORIZONTAL IN-VERTICAL OUT
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NR
LINER SPECIFIC MATERIAL TYPE	NR
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	WET BALL MILL
DEVICE	NR
DEVICE TYPE	NR
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	1
THICKENER OVERFLOW	2
SPARGER/OXIDIZER	1
REAGENT PREP PRODUCT	2
THICKENER UNDERFLOW	1
** PUMPS	
SERVICE	NUMBER
-----	-----
LIME PRODUCT	2
SLURRY TRANSFER	2
THICKENER UNDERFLOW	2
ABSORBER RECIRCULATION	3
SAND	2
CYCLONE	2
VACUUM FILTER FEED	2
FILTRATE	2
VACUUM	2
CLARIFIED RECYCLE	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	1
NUMBER OF SPARES	0
CONFIGURATION	CYLINDRICAL
DIMENSIONS - FT	70.0 DIA
FEED STREAM CHARACTERISTICS	17% SOLIDS
OUTLET STREAM CHARACTERISTICS	29% SOLIDS
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	1
SHELL SPECIFIC MATERIAL TYPE	FIBER-REINFORCED POLYESTER
FEED STREAM CHARACTERISTICS	29% SOLIDS
OUTLET STREAM CHARACTERISTICS	60% SOLIDS
*** SLUDGE	
** TREATMENT	
METHOD	FORCED OXIDATION
DEVICE	NR
PROPRIETARY PROCESS	NR

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MICHIGAN SO CENTRAL PWR AGENCY: PROJECT 1 (CONT.)

** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	OFF-SITE
SITE TRANSPORTATION METHOD	TRUCK/RAIL
SITE TREATMENT	NONE
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH-SOLIDS-ADDITIVES
MONITOR LOCATION	RECYCLE SLURRY LINE
PROCESS CONTROL MANNER	AUTOMATIC
PROCESS CHEMISTRY MODE	FEEDBACK/FEED FORWARD
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	4.0 (64 GPM)
SLUDGE HYDRATION WATER LOSS - LITER/S	1.1 (17 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
RECEIVING WATER STREAM	105
MAKEUP WATER ADDITION - LITERS/S	5.4 (85 GPM)

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS	FACTOR
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5/83	SYSTEM						744			
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6/83	SYSTEM						720			
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** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL FGD OPERATIONS COMMENCED IN MAY 1983.

THE UTILITY REPORTED EXPERIENCING SOME MINOR PUMP BEARING AND VACUUM FILTER PROBLEMS DURING STARTUP.

7/83	SYSTEM						744			
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8/83	SYSTEM						744			
------	--------	--	--	--	--	--	-----	--	--	--

9/83	SYSTEM						720			
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED MINOR PROBLEMS ASSOCIATED WITH START-UP DURING THE THIRD QUARTER, HOWEVER, NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

10/83	SYSTEM						744			
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11/83	SYSTEM						720			
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12/83	SYSTEM						744			
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM						744			
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2/84	SYSTEM						696			
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD RELATED OUTAGES WERE ENCOUNTERED DURING THE PERIOD OF OCTOBER 1983 THROUGH FEBRUARY 1984. SO2 REMOVAL DURING THIS PERIOD WAS ESTIMATED AT 95%.

MICHIGAN SO CENTRAL PWR AGENCY: PROJECT 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THE LIMESTONE CRUSHER WAS REPLACED DURING THE PERIOD OF OCTOBER 1983 TO
 FEBRUARY 1984 DUE TO INADEQUATE SIZING.

THE UTILITY REPORTED PROBLEMS WITH THE VACUUM FILTRATION SYSTEM DURING THE
 PERIOD OF OCTOBER 1983 TO FEBRUARY 1984. THE PROBLEMS WERE SUBSEQUENTLY
 WORKED OUT AND REPAIRS WERE MADE.

3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

A GENERATOR FAILURE OCCURRED IN LATE FEBRUARY 1984, FORCING A SHUT DOWN OF
 THE TOTAL FACILITY FOR THE REMAINDER OF THE FIRST THREE QUARTERS OF 1984.

THE UTILITY IS CURRENTLY DISCUSSING MODIFICATIONS OF THE DEWATERING SYSTEM
 TO PROVIDE EASIER AND MORE ECONOMICAL DEWATERING. A SIX MONTH TEST PROGRAM
 BEGINNING IN JANUARY 1985 WILL DETERMINE WHETHER OR NOT THE MODIFICATIONS
 SHOULD BE MADE PERMANENT.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MINNESOTA POWER & LIGHT
PLANT NAME	CLAY BOSWELL
UNIT NUMBER	4
CITY	COHASSET
STATE	MINNESOTA
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO ₂ EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NO _x EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1000
GROSS UNIT GENERATING CAPACITY - MW	554
NET UNIT GENERATING CAPACITY W/FGD - MW	504
NET UNIT GENERATING CAPACITY WO/FGD - MW	511
EQUIVALENT SCRUBBED CAPACITY - MW	475
 ** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1086.40 (2302181 ACFM)
BOILER FLUE GAS TEMPERATURE - C	148.9 (300 F)
STACK HEIGHT - M	183. (600 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	11.3 (37.0 FT)
 ** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	19276. (8287 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	7509-9923
AVERAGE ASH CONTENT - %	9.40
RANGE ASH CONTENT - %	*****
AVERAGE MOISTURE CONTENT - %	24.50
RANGE MOISTURE CONTENT - %	20.3-28.3
AVERAGE SULFUR CONTENT - %	.94
RANGE SULFUR CONTENT - %	0.4-2.8 [PACKMAKERS]
AVERAGE CHLORIDE CONTENT - %	.01
RANGE CHLORIDE CONTENT - %	*****
 *** PARTICLE CONTROL	
 ** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
 ** ESP	
NUMBER	1
NUMBER OF SPARES	0
TYPE	HOT SIDE
SUPPLIER	WESTERN PREC. DIVISION, JOY
INLET FLUE GAS CAPACITY - CU.M/S	94.4 (200000 ACFM)
INLET FLUE GAS TEMPERATURE - C	398.9 (750 F)
PRESSURE DROP - KPA	.6 (3. IN-H ₂ O)
PARTICLE REMOVAL EFFICIENCY - %	99.7
 ** PARTICLE SCRUBBER	
NUMBER	4
NUMBER OF SPARES	1
GENERIC TYPE	VENTURI TOWER
SPECIFIC TYPE	VARIABLE-THROAT/ADJUSTABLE DRUM
TRADE NAME/COMMON NAME	RADIAL FLOW VENTURI
SUPPLIER	PEABODY PROCESS SYSTEMS
DIMENSIONS - FT	30.0 DIA X 40.0
SHELL GENERIC MATERIAL	STAINLESS STEEL
SHELL SPECIFIC MATERIAL	AUSTENITIC
LINER GENERIC MATERIAL	ORGANIC
LINER SPECIFIC MATERIAL	NATURAL RUBBER
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	1

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

LIQUID RECIRCULATION RATE - LITER/S	841.7	(13360 GPM)
L/G RATIO - LITER/CU.M	2.1	(16.0 GAL/1000ACF)
PH CONTROL ADDITIVE	ABSORBER SLURRY	
PRESSURE DROP KPA	3.0	(12.0 IN-H2O)
INLET GAS FLOW RATE - CU.M/S	394.4	(835840 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
PARTICLE REMOVAL EFFICIENCY - %	99.7	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS
A-E FIRM	EBASCO
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.73
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	89.00
ENERGY CONSUMPTION - %	1.3
CURRENT STATUS	1
COMMERCIAL START-UP	4/80
INITIAL START-UP	2/80

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	2.80	
DESIGN COAL HEAT CONTENT J/G	19980.3	(8590 BTU/LB)
DESIGN COAL ASH CONTENT - %	9.40	
DESIGN MOISTURE CONTENT - %	25.00	
DESIGN CHLORIDE CONTENT - %	.01	
SPACE REQUIREMENTS - SQ M	14864.0	(160000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	100.0	

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	SPRAY TOWER	
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	PEABODY PROCESS SYSTEMS	
DIMENSIONS - FT	35.0 DIA X 60.0	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	NATURAL RUBBER	
LINER MATERIAL TRADE NAME/COMMON TYPE	BLACK NATURAL RUBBER	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	2104.	(33400 GPM)
L/G RATIO - L/CU.M	7.0	(52.2 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	5.0	(20.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
INLET GAS FLOW - CU. M/S	302.08	(640130 ACFM)
INLET GAS TEMPERATURE - C	53.3	(128 F)
SO2 REMOVAL EFFICIENCY - %	89.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRECOLLECTOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	BULK SEPARATION
SPECIFIC TYPE	PERFORATED TRAYS
TRADE NAME/COMMON TYPE	SIEVE TRAY
CONFIGURATION	HORIZONTAL

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

NUMBER OF STAGES	1	
NUMBER OF PASSES PER STAGE	1	
PRESSURE DROP - KPA	.2	(1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	3.4	(11.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
WASH WATER SOURCE	MAKEUP OVERSPRAY AND MAKEUP/SUPERNATANT MIXTURE	
WASH RATE - L/S	29.9	(474 GAL/MIN)
** REHEATER		
NUMBER	1	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	HOT SIDE	
TRADE NAME/COMMON TYPE	N/A	
PERCENT GAS BYPASSED - AVG	5.0	
TEMPERATURE INCREASE - C	14.4	(26 F)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-MOLYBDENUM	
** FANS		
NUMBER	4	
NUMBER OF SPARES	1	
DESIGN	CENTRIFUGAL	
SUPPLIER	GREEN FAN	
FUNCTION	UNIT	
APPLICATION	INDUCED DRAFT	
SERVICE	WET	
FLUE GAS FLOW RATE - CU.M/S	320.33	(678800 ACFM)
FLUE GAS TEMPERATURE - C	62.2	(144 F)
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
** DAMPERS		
NUMBER	4	
FUNCTION	NR	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DAMPERS		
NUMBER	4	
FUNCTION	NR	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DAMPERS		
NUMBER	4	
FUNCTION	NR	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	NR	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NR	
LINER SPECIFIC MATERIAL TYPE	NR	
** DUCTWORK		
LOCATION	ABSORBER TO REHEATER	
DIMENSIONS	12.0 DIA	
SHELL GENERIC MATERIAL TYPE	CARBON STEEL	
SHELL SPECIFIC MATERIAL TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	ORGANIC	
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER	

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

** DUCTWORK	
LOCATION	REHEAT SECTION
DIMENSIONS	NR
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	NR
DEVICE TYPE	NR
MANUFACTURER	PEABODY PROCESS SYSTEMS
NUMBER	5
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	18.2 (20 TPH)
PRODUCT QUALITY - % SOLIDS	20.0
** TANKS	
SERVICE	NUMBER
-----	-----
ABSORBER RECYCLE	4
REAGENT PREP PRODUCT	1
MIST ELIMINATOR WASH	1
FLYASH	1
** PUMPS	
SERVICE	NUMBER
-----	-----
ALKALI FEED	2
FLY ASH SLURRY FEED	2
SCRUBBER RECIRCULATION	8
ABSORBER RECIRCULATION	12
WASH WATER	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	19.7 (21.7 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	45.0
% CASO3 - DRY	5.0
% CASO4 DRY	3.0
% CAOH2 DRY	.0
% CACO3 - DRY	1.0
% ASH - DRY	91.0
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	OFF-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE DIMENSIONS	276 ACRES
SITE CAPACITY - CU.M	9556522 (7814.0 ACRE-FT)
SITE SERVICE LIFE - YRS	35
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH AND SO2
PHYSICAL VARIABLES	DENSITY IN RECYCLE TANK
CONTROL LEVELS	PH 3-6; 7-9% SOLIDS
MONITOR TYPE	DUPONT AND LEAR SIEGLER FOR SO2
MONITOR LOCATION	RECYCLE TANK
PROCESS CONTROL MANNER	AUTOMATIC

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

PROCESS CHEMISTRY MODE

FEEDBACK

** WATER BALANCE

WATER LOOP TYPE

CLOSED

EVAPORATION WATER LOSS - LITER/S

27.6

(438 GPM)

SLUDGE HYDRATION WATER LOSS - LITER/S

.1

(1 GPM)

SLUDGE INTERSTITIAL WATER LOSS - LITERS/S

4.3

(69 GPM)

MAKEUP WATER ADDITION - LITERS/S

32.0

(508 GPM)

SOURCE OF MAKEUP WATER

RIVER WATER

** CHEMICALS AND CONSUMPTION

FUNCTION

ABSORBENT

NAME

LIME

PRINCIPAL CONSTITUENT

CAO

CONSUMPTION

NONE [ALKALINITY PROVIDED BY FLY ASH]

POINT OF ADDITION

SLAKER

** FGD SPARE CAPACITY INDICES

SCRUBBER - %

33.0

ABSORBER - %

33.0

** FGD SPARE COMPONENT INDICES

SCRUBBER

1.0

ABSORBER

1.0

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

4/80 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER BEGAN OPERATIONS ON FEBRUARY 26, 1980 AND FIRED OIL THROUGH THE MONTH OF MARCH. INITIAL FGD SYSTEM OPERATIONS BEGAN IN EARLY APRIL WITH THE BOILER FIRING COAL FOR TESTING PURPOSES. THE UNIT WAS SHUTDOWN IN MID-APRIL TO RECTIFY MINOR SHAKEDOWN PROBLEMS. A TRIAL RUN OF THE FGD SYSTEM IN AN INTEGRATED MODE OCCURRED IN LATE APRIL.

5/80 SYSTEM

744

6/80 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

SHAKEDOWN OPERATIONS CONTINUED THROUGH THE SECOND QUARTER OF 1980. THE FGD SYSTEM WILL BE FINE TUNED TO MEET DESIGN CRITERIA THROUGH JULY. TO DATE THE UTILITY REPORTED THAT, ALTHOUGH MANY TYPICAL STARTUP PROBLEMS ATTRIBUTABLE TO OPERATOR ERROR AS WELL AS MECHANICAL MALFUNCTIONS HAVE OCCURRED, NO UNUSUAL PROBLEMS HAVE OCCURRED. THE COMPLIANCE TEST IS SCHEDULED FOR EARLY SEPTEMBER.

7/80	1	87.8	100.0	86.8				
	2	97.8	100.0	96.7				
	3	100.0	100.0	100.0				
	4	.0		.0				
	SYSTEM	96.1	100.0	95.0	720	712	684	79.0
8/80	1	71.8	100.0	62.9				
	2	75.5	100.0	66.1				
	3	29.4	100.0	25.8				
	4	49.7	100.0	43.5				
	SYSTEM	75.5	100.0	66.1	744	652	492	61.7
9/80	1	71.6	100.0	71.0				
	2	89.6	100.0	88.7				
	3	14.7	100.0	14.5				

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	4		65.1	100.0	64.5					
	SYSTEM		80.3	100.0	79.6		744	737	592	73.7
** PROBLEMS/SOLUTIONS/COMMENTS										
THE FGD SYSTEM IS STILL IN THE DEBUGGING PHASE OF OPERATION. MUCH OF THE EQUIPMENT IS STILL BEING WORKED ON AND TESTED.										
10/80	1		31.6	100.0	22.6					
	2		38.4	100.0	27.4					
	3		.0		.0					
	4		83.6	100.0	59.7					
	SYSTEM		51.2	100.0	36.6		744	531	272	59.1
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT THE AVAILABLE HOURS AND UNAVAILABLE HOURS DURING OCTOBER WERE NOT RECORDED.										
THE UNIT OUTAGE TIME WAS DUE TO MISCELLANEOUS MAINTENANCE AND AN INSPECTION.										
11/80	1	94.4	67.2	100.0	60.7					
	2	85.6	55.5	100.0	50.1					
	3	98.1	59.1	100.0	53.3					
	4	55.4	26.0	100.0	23.4					
	SYSTEM	100.0	69.2	100.0	62.5		720	650	450	60.8
** PROBLEMS/SOLUTIONS/COMMENTS										
MODULE 4 OUTAGE TIME DURING NOVEMBER WAS DUE TO NECESSARY CLEANING AND GENERAL REPAIRS.										
12/80	1	100.0	100.0	100.0	100.0					
	2	93.4	62.0	100.0	61.3					
	3	19.4	2.4	100.0	2.4					
	4	96.5	87.6	100.0	86.6					
	SYSTEM	100.0	87.6	100.0	83.5		744	735	621	89.7
** PROBLEMS/SOLUTIONS/COMMENTS										
DURING DECEMBER MODULE 3 OUTAGE TIME WAS DUE TO GENERAL MAINTENANCE AND REPAIRS TO THE VENTURI LINER.										
1/81	1	100.0	100.0	100.0	100.0					
	2	69.4	48.1	100.0	48.1					
	3	100.0	98.4	100.0	98.4					
	4	73.1	38.7	100.0	38.7					
	SYSTEM	100.0	95.0	100.0	95.0		744	744	707	93.0
2/81	1	100.0	92.2	100.0	91.5					
	2	82.1	36.4	100.0	36.2					
	3	75.7	48.9	100.0	48.5					
	4	100.0	67.8	100.0	67.3					
	SYSTEM	100.0	81.7	100.0	81.1		672	667	545	86.0
3/81	1	79.8	55.6	100.0	53.2					
	2	40.2	29.5	100.0	28.2					
	3	100.0	94.8	100.0	90.7					
	4	100.0	95.8	100.0	91.7					
	SYSTEM	100.0	91.8	100.0	87.9		744	712	654	88.9

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER 1981 THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

4/81	1	54.3	28.2	100.0	26.3				
	2	88.1	70.5	100.0	65.7				
	3	94.0	56.7	100.0	52.8				
	4	100.0	88.1	100.0	82.1				
	SYSTEM	100.0	81.1	100.0	75.6	720	671	545	83.5
5/81	1	95.2	51.2	100.0	46.8				
	2	95.3	75.2	100.0	67.7				
	3	98.0	66.0	100.0	59.5				
	4	.0	.0		.0				
	SYSTEM	96.1	64.3	100.0	58.0	744	671	432	63.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY MODULE 4 WAS DOWN FOR AN INSPECTION, MAINTENANCE AND VENTURI MODIFICATIONS.

6/81	1	100.0	71.6	100.0	71.6				
	2	96.1	74.9	100.0	74.9				
	3	94.0	78.3	100.0	78.3				
	4	33.5	31.7	100.0	31.7				
	SYSTEM	100.0	85.5	100.0	85.5	720	720	616	89.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF JUNE.

7/81	1	66.5	56.2	100.0	49.2				
	2	100.0	93.9	100.0	82.1				
	3	100.0	78.8	100.0	69.0				
	4	79.0	29.5	100.0	25.8				
	SYSTEM	100.0	86.1	100.0	75.4	744	651	561	78.0
8/81	1	27.3	9.3	100.0	8.3				
	2	100.0	100.0	100.0	91.5				
	3	78.5	31.3	100.0	28.0				
	4	100.0	100.0	100.0	91.5				
	SYSTEM	100.0	80.2	100.0	73.1	744	665	544	73.8
9/81	1	100.0	60.0	100.0	56.8				
	2	100.0	100.0	100.0	95.4				
	3	58.2	41.8	100.0	39.6				
	4	66.7	65.0	100.0	61.5				
	SYSTEM	100.0	88.9	100.0	84.4	720	682	608	87.8

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO MAJOR FGD-RELATED PROBLEMS REPORTED FOR THE THIRD QUARTER 1981.

10/81	1	100.0	90.8	100.0	90.8				
	2	56.4	56.4	100.0	56.4				
	3	87.6	78.5	100.0	78.5				
	4	60.7	58.7	100.0	58.7				
	SYSTEM	100.0	94.8	100.0	94.8	744	744	705	88.0
11/81	1	87.5	67.6	100.0	51.2				

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

12/81	2	35.0	38.8	100.0	29.4					
	3	100.0	100.0	100.0	76.4					
	4	64.4	80.6	100.0	61.1					
	SYSTEM	93.8	95.9	100.0	72.8		720	546	524	66.5
	1	100.0	77.4	100.0	77.4					
	2	100.0	98.0	100.0	98.0					
	3	25.0	20.2	100.0	20.2					
	4	75.8	75.1	100.0	75.1					
	SYSTEM	100.0	90.2	100.0	90.2		744	744	671	79.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER.

1/82	1	78.0	48.0	100.0	48.0					
	2	100.0	100.0	100.0	100.0					
	3	75.1	75.1	100.0	75.1					
	4	90.4	82.5	100.0	82.5					
	SYSTEM	100.0	100.0	100.0	100.0		744	744	744	98.0
2/82	1	.0	.0		.0					
	2	100.0	100.0	100.0	97.8					
	3	100.0	89.6	100.0	81.8					
	4	100.0	100.0	100.0	94.0					
	SYSTEM	100.0	99.8	100.0	91.2		672	614	613	86.0
3/82	1	68.4	59.5	100.0	59.0					
	2	100.0	92.3	100.0	91.5					
	3	100.0	94.6	100.0	53.5					
	4	47.8	43.8	100.0	43.4					
	SYSTEM	100.0	96.7	100.0	96.0		744	738	714	92.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1982.

4/82	SYSTEM						720			
5/82	SYSTEM						744			
6/82	1	64.9	65.4	100.0	50.4					
	2	100.0	86.7	100.0	66.8					
	3	83.9	62.2	100.0	47.9					
	4	82.4	82.2	100.0	63.3					
	SYSTEM	100.0	98.8	100.0	76.2		720	555	549	62.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

7/82	SYSTEM						744			
8/82	SYSTEM						744			
9/82	SYSTEM						720			
10/82	SYSTEM						744			
11/82	SYSTEM						720			

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
12/82	SYSTEM							744	
1/83	SYSTEM							744	
2/83	SYSTEM							672	
3/83	SYSTEM							744	

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF JULY 1982 THROUGH MARCH 1983.

4/83	1	96.9	80.3	100.0	80.2				
	2	76.0	50.6	100.0	50.6				
	3	65.3	66.1	100.0	66.0				
	4	34.9	33.5	100.0	33.5				
	SYSTEM	91.0	76.8	100.0	76.7		720	719	553 82.0
5/83	1	78.2	59.4	100.0	59.4				
	2	88.6	65.2	100.0	65.2				
	3	79.2	15.2	100.0	15.2				
	4	96.6	93.5	100.0	93.5				
	SYSTEM	100.0	77.8	100.0	77.8		744	744	579 68.9
6/83	1	89.7	56.8	100.0	35.3				
	2	71.0	1.8	100.0	1.1				
	3	99.6	53.9	100.0	33.5				
	4								
	SYSTEM	86.8	37.5	100.0	23.3		720	448	168 34.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF APRIL THROUGH JUNE 1983.

7/83	1	96.8	78.1	100.0	69.6				
	2	100.0	19.8	100.0	17.6				
	3	100.0	72.5	100.0	64.7				
	4	100.0	83.7	100.0	74.6				
	SYSTEM	100.0	84.7	100.0	75.5		744	663	562 78.0
8/83	1	100.0	33.5	100.0	33.5				
	2	98.3	85.9	100.0	85.9				
	3	100.0	80.4	100.0	80.4				
	4	86.0	67.9	100.0	67.9				
	SYSTEM	100.0	89.2	100.0	89.2		744	744	664 78.5
9/83	1	100.0	55.9	100.0	44.8				
	2	100.0	79.0	100.0	63.3				
	3	100.0	72.5	100.0	58.1				
	4	92.2	50.5	100.0	40.4				
	SYSTEM	100.0	86.0	100.0	68.8		720	577	496 61.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER 1983.

10/83	1	98.1	9.0	100.0	4.5				
	2	100.1	100.0	100.0	53.1				
	3	100.1	59.6	100.0	29.7				
	4	100.1	96.2	100.0	47.9				
	SYSTEM	100.0	88.3	100.0	45.1		744	371	335 34.2

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

11/83	1	60.0	.0		.0					
	2	100.0	51.0	100.0	51.0					
	3	100.0	63.8	100.0	63.8					
	4	100.0	79.9	100.0	79.9					
	SYSTEM	100.0	64.9	100.0	64.9		720	720	467	62.8
12/83	1	89.8	9.9	100.0	9.9					
	2	100.0	30.4	100.0	30.4					
	3	100.0	52.4	100.0	52.4					
	4	100.0	45.6	100.0	45.6					
	SYSTEM	100.0	46.1	100.0	46.1		744	744	343	88.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED
DURING THE FOURTH QUARTER OF 1983.

1/84	1	40.2	25.9	100.0	22.2					
	2	100.0	100.0	100.0	93.8					
	3	68.8	71.0	100.0	61.0					
	4	100.0	100.0	100.0	89.4					
	SYSTEM	100.0	99.0	100.0	88.8		744	639	661	80.0
2/84	1	100.0	86.5	100.0	86.4					
	2	54.0	46.6	100.0	46.6					
	3	83.0	66.8	100.0	66.7					
	4	100.0	97.1	100.0	96.9					
	SYSTEM	100.0	99.0	100.0	98.9		696	695	688	85.0
3/84	1	61.0	48.2	100.0	47.8					
	2	99.6	98.0	100.0	97.3					
	3	100.0	99.4	100.0	98.7					
	4	77.2	47.1	100.0	46.8					
	SYSTEM	100.0	97.5	100.0	96.9		744	739	721	97.0
4/84	1	100.0	80.9	100.0	80.7					
	2	100.0	84.2	100.0	84.0					
	3	100.0	38.2	100.0	38.1					
	4	95.8	85.5	100.0	85.3					
	SYSTEM	100.0	96.3	100.0	96.0		720	718	691	94.4
5/84	1	43.1	36.4	100.0	36.1					
	2	100.0	100.0	100.0	99.4					
	3	90.3	69.8	100.0	69.2					
	4	100.0	98.4	100.0	97.6					
	SYSTEM	100.0	100.0	100.0	100.0		744	738	744	97.0
6/84	1	100.0	92.3	100.0	92.3					
	2	34.5	30.5	100.0	30.5					
	3	100.0	92.1	100.0	92.1					
	4	76.7	56.9	100.0	56.9					
	SYSTEM	100.0	90.6	100.0	90.6		720	720	652	90.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING THE
FIRST TWO QUARTERS OF 1984.

7/84	SYSTEM						744			
8/84	SYSTEM						744			
9/84	SYSTEM						720			

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART. HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MINNKOTA POWER	
PLANT NAME	MILTON R. YOUNG	
UNIT NUMBER	2	
CITY	CENTER	
STATE	NORTH DAKOTA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	*****	(***** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	690	
GROSS UNIT GENERATING CAPACITY - MW	440	
NET UNIT GENERATING CAPACITY W/FGD - MW	402	
NET UNIT GENERATING CAPACITY WO/FGD - MW	409	
EQUIVALENT SCRUBBED CAPACITY - MW	374	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	BABCOCK & WILCOX	
BOILER TYPE	CYCLONE	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	958.33	(2030800 ACFM)
BOILER FLUE GAS TEMPERATURE - C	176.7	(350 F)
STACK HEIGHT - M	168.	(550 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	7.6	(25.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	15119.	(6500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		6000-6800
AVERAGE ASH CONTENT - %	8.90	
RANGE ASH CONTENT - %	7.2-14.3	
AVERAGE MOISTURE CONTENT - %	38.00	
RANGE MOISTURE CONTENT - %	30-45	
AVERAGE SULFUR CONTENT - %	.60	
RANGE SULFUR CONTENT - %	.4-.8	
AVERAGE CHLORIDE CONTENT - %	*****	
RANGE CHLORIDE CONTENT - %	*****	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** FABRIC FILTER		
NUMBER	2	
** ESP		
NUMBER	2	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	WHEELABRATOR-FRYE	
INLET FLUE GAS CAPACITY - CU.M/S	479.2	(1015400 ACFM)
INLET FLUE GAS TEMPERATURE - C	176.7	(350 F)
PRESSURE DROP - KPA	.3	(1. IN-H2O)
PARTICLE REMOVAL EFFICIENCY - %	99.8	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	
GAS CONTACTING DEVICE TYPE	N/A	

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	THYSSEN/CEA
A-E FIRM	SANDERSON & PORTER
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.60
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	78.00
ENERGY CONSUMPTION - %	1.6
CURRENT STATUS	1
COMMERCIAL START-UP	6/78
INITIAL START-UP	9/77
CONTRACT AWARDED	4/75

** DESIGN AND OPERATING PARAMETERS

OPER. & MAINT. REQUIREMENT - MANHR/DAY	92.0
--	------

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	2
NUMBER OF SPARES	1
GENERIC TYPE	SPRAY TOWER
SPECIFIC TYPE	OPEN COUNTERCURRENT SPRAY
TRADE NAME/COMMON TYPE	N/A
SUPPLIER	THYSSEN/CEA
DIMENSIONS - FT	40.0 DIA X 120.0
SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A
LINER GENERIC MATERIAL	ORGANIC
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER
LINER MATERIAL TRADE NAME/COMMON TYPE	FLAKELINE 500
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	1
LIQUID RECIRCULATION RATE - LITER/S	3456. (54850 GPM)
L/G RATIO - L/CU.M	8.7 (64.8 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	.2 (1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.8 (9.1 FT/S)
INLET GAS FLOW - CU. M/S	399.70 (847000 ACFM)
INLET GAS TEMPERATURE - C	168.3 (335 F)
SO2 REMOVAL EFFICIENCY - %	85.0
PARTICLE REMOVAL EFFICIENCY - %	70.0

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	2
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	5
FREEBOARD DISTANCE - M	2.44 (8.0 FT)
VANE ANGLES - DEGREES	120
PRESSURE DROP - KPA	.2 (1.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	2.8 (9.1 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE
WASH WATER SOURCE	BLENDED
WASH FREQUENCY	CONTINUOUS
WASH RATE - L/S	50.5 (800 GAL/MIN)

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

** REHEATER

NUMBER	1	
NUMBER OF SPARES	0	
GENERIC TYPE	BYPASS	
SPECIFIC TYPE	COLD SIDE	
TRADE NAME/COMMON TYPE	N/A	
LOCATION	OUTLET DUCT	
PERCENT GAS BYPASSED - AVG	12.0	
TEMPERATURE INCREASE - C	22.2	(40 F)
INLET FLUE GAS TEMPERATURE - C	54.4	(130 F)
OUTLET FLUE GAS TEMPERATURE - C	76.7	(170 F)
NUMBER OF TUBES PER BUNDLE	0	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** FANS

NUMBER	2	
NUMBER OF SPARES	1	
DESIGN	AXIAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	UNIT	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	519.09	(1100000 ACFM)
FLUE GAS TEMPERATURE - C	176.7	(350 F)
PRESSURE DROP - KPA	3.2	(10.6 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	

** FANS

NUMBER	2	
NUMBER OF SPARES	1	
DESIGN	AXIAL	
SUPPLIER	TLT-BABCOCK	
FUNCTION	BOOSTER	
APPLICATION	FORCED DRAFT	
SERVICE	DRY	
PRESSURE DROP - KPA	8.8	(28.8 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	

** DAMPERS

GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

** DAMPERS

GENERIC TYPE	GUILLOTINE
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

** DAMPERS

GENERIC TYPE	LOUVER
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

** DAMPERS

GENERIC TYPE	BUTTERFLY
SPECIFIC TYPE	NR
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

** DUCTWORK		
LOCATION		INLET
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE		AISI 1110
LINER GENERIC MATERIAL TYPE		NONE
LINER SPECIFIC MATERIAL TYPE		N/A
** DUCTWORK		
LOCATION		OUTLET
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE		AISI 1110
LINER GENERIC MATERIAL TYPE		ORGANIC
LINER SPECIFIC MATERIAL TYPE		GLASS FLAKE-FILLED POLYESTER
** DUCTWORK		
LOCATION		BYPASS
SHELL GENERIC MATERIAL TYPE		CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE		AISI 1110
LINER GENERIC MATERIAL TYPE		NONE
LINER SPECIFIC MATERIAL TYPE		N/A
** REAGENT PREPARATION EQUIPMENT		
FUNCTION		SLAKER
DEVICE		NR
DEVICE TYPE		NR
MANUFACTURER		WALLACE & TIERNAN
NUMBER		1
NUMBER OF SPARES		0
FULL LOAD DRY FEED CAPACITY - M.TONS/HR	3.6	(4 TPH)
PRODUCT QUALITY - % SOLIDS	13.0	
** TANKS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECYCLE	2	
THICKENER UNDERFLOW	1	
FLY ASH SLURRY FEED	1	
LIME SLAKER TRANSFER	1	
THICKENER OVERFLOW	1	
CLARIFIER OVERFLOW/WE WASH	1	
TRAY RECYCLE	2	
LIME SLURRY FEED	1	
** PUMPS		
SERVICE	NUMBER	
-----	-----	
ABSORBER RECIRCULATION	8	
TRAY RECIRCULATION	4	
TRAY SPRAY/CLARIFIER OVERFLOW	2	
THICKENER UNDERFLOW	2	
THICKENER OVERFLOW	2	
LIME SLAKER TRANSFER	2	
LIME SLURRY FEED	2	
FLYASH SLURRY FEED	2	
MIST ELIMINATOR SPRAY	2	
CLARIFIER UNDERFLOW	2	
FILTER BELT WASH	2	
BLOW DOWN SUMP	2	
FILTRATE	2	
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE		CENTRIFUGE
NUMBER		2
** SOLIDS CONCENTRATING/DEWATERING		
DEVICE		THICKENER
NUMBER		2
DIMENSIONS - FT		130 DIA X 15 HIGH
CAPACITY		3000000
SHELL GENERIC MATERIAL TYPE		INORGANIC

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

SHELL SPECIFIC MATERIAL TYPE	CONCRETE
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	FIBER-REINFORCED POLYESTER
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	12% SOLIDS
OUTLET STREAM CHARACTERISTICS	40% SOLIDS
OUTLET STREAM DISPOSITION	TO VACUUM FILTER
OVERFLOW STREAM DISPOSITION	TO FLYASH SLURRY, VACUUM FILTER WASH, & ME WASH
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	VACUUM FILTER
NUMBER	2
NUMBER OF SPARES	0
CAPACITY	750 TON/DAY
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	NATURAL RUBBER
BELT GENERIC MATERIAL TYPE	ORGANIC
BELT SPECIFIC MATERIAL TYPE	POLYPROPYLENE
FEED STREAM SOURCE	THICKENER & CLARIFIER UNDERFLOW
FEED STREAM CHARACTERISTICS	30% SOLIDS
OUTLET STREAM CHARACTERISTICS	60% SOLIDS
OUTLET STREAM DISPOSITION	TO LANDFILL
OVERFLOW STREAM DISPOSITION	TO THICKENER
*** SLUDGE	
FULL LOAD SLUDGE QUANTITY - M.TONS/HR (DRY)	19.1 (21.0 TPH)
MOISTURE CONTENT - % TOTAL FREE WATER	40.0
% CASO3 - DRY	.0
** TREATMENT	
METHOD	DEWATERED
DEVICE	N/A
PROPRIETARY PROCESS	N/A
** DISPOSAL	
NATURE	FINAL
TYPE	LANDFILL
LOCATION	OFF-SITE
SITE TRANSPORTATION METHOD	TRUCK
SITE TREATMENT	CLAY LINING
** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING
SITE SERVICE LIFE - YRS	1
** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE DIMENSIONS	11.92 ACRES X 15 FT DEEP [SEMI-CIRCLE]
SITE CAPACITY - CU.M	218672 (178.8 ACRE-FT)
** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE DIMENSIONS	11.92 ACRES X 15 FT DEEP [SEMI-CIRCLE]
SITE CAPACITY - CU.M	218672 (178.8 ACRE-FT)
** PROCESS CONTROL AND INSTRUMENTATION	
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	PERCENT SOLIDS
CONTROL LEVELS	SOLIDS 5.5-12%; PH 4.0-5.5

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

PROCESS CONTROL MANNER

MANUAL

** WATER BALANCE

WATER LOOP TYPE

EVAPORATION WATER LOSS - LITER/S

MAKEUP WATER ADDITION - LITERS/S

CLOSED

34.6

(550 GPM)

44.1

(700 GPM)

** CHEMICALS AND CONSUMPTION

FUNCTION

NAME

PRINCIPAL CONSTITUENT

CONSUMPTION

UTILIZATION - %

POINT OF ADDITION

ABSORBENT

FLY ASH

20-25% CAO, 5-9% MGO

16 TPH

83.0

SLURRY FEED TANK

** FGD SPARE CAPACITY INDICES

ABSORBER - %

100.0

** FGD SPARE COMPONENT INDICES

ABSORBER

1.0

-----PERFORMANCE DATA-----

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
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0/77 SYSTEM

** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH THE MILTON R YOUNG 2 SCRUBBING SYSTEM ORIGINAL DESIGN DID NOT INCLUDE SPARE FGD CAPACITY, THE SYSTEM DOES, IN ACTUALITY, GENERALLY HAVE A SPARE MODULE AS A CONSEQUENCE OF THE VARIABILITY IN LIGNITE SULFUR CONTENT. THE LIGNITE BLEND AT M.R.YOUNG 2 VARIES IN SULFUR CONTENT FROM 0.35 TO 1.3%. WHEN THE SULFUR CONTENT RISES TO 1.3% BOTH SCRUBBING TOWERS ARE REQUIRED (WITH 5 TO 15% OF THE FLUE GAS BYPASSED FOR REHEAT). WHEN THE SULFUR CONTENT DROPS TO 0.7% OR BELOW ONLY ONE TOWER IS REQUIRED. 0.7% SULFUR IS TYPICAL FOR THE M.R.YOUNG 2 LIGNITE BLEND. BECAUSE OF THE EFFECTIVE SPARE MODULE THE SYSTEM DEPENDABILITY FIGURES THAT APPEAR IN THIS SECTION WILL GENERALLY NOT BE EQUIVALENT TO THE AVERAGE OF THE MODULAR DEPENDABILITIES (E.G. WITH 0.7% SULFUR LIGNITE THERE IS 100% SPARE CAPACITY. IF A-MODULE OPERATES THE FIRST HALF OF THE MONTH (50%) AND B-MODULE THE SECOND HALF OF THE MONTH (50%) THE TOTAL SYSTEM UTILIZATION WILL BE 100%).

9/77 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL SCRUBBING OPERATIONS BEGAN IN SEPTEMBER. THE FGD SYSTEM IS EXPECTED TO BE OPERATING IN AN INTEGRATED MODE IN LATE OCTOBER, HOWEVER, A SCRUBBER LINING FAILURE MAY RESULT IN SOME DELAYS. THE UTILITY EXPECTS THE SYSTEM OPERATIONS TO STABILIZE BY MID-NOVEMBER.

10/77 SYSTEM

744

11/77 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED INTERMITTENT FGD SYSTEM OPERATIONS SINCE START-UP.

MAJOR OPERATIONAL PROBLEMS HAVE OCCURRED AS A RESULT OF SEVERE WINTER WEATHER CONDITIONS, PARTICULARLY NUMEROUS INSTANCES OF FROZEN AND RUPTURED LINES. THE SYSTEM WAS SHUT DOWN DURING THE FIRST PART OF THE MONTH OF DECEMBER TO INSTALL HEAT TRACING IN THE LIQUID CIRCUIT.

SOME MINOR PROBLEMS HAVE OCCURRED WITH THE FLOW METERS (ROTAMETERS).

THE UTILITY ENCOUNTERED PROBLEMS WITH GUILLOTINE GAS DAMPER GUIDES DURING

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

OCTOBER AND NOVEMBER.

12/77 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WAS AN EMERGENCY SHUTDOWN ON DECEMBER 5 AS A RESULT OF TURBINE BEARING DAMAGE. THE SHUTDOWN CONTINUED SO THAT A COMPLETE TURBINE INSPECTION COULD BE MADE.

WORK CONTINUED ON INSTALLATION OF ELECTRICAL HEAT TRACING ON SLURRY LINES AND WATER PIPING.

1/78 SYSTEM

744

** PROBLEMS/SOLUTIONS/COMMENTS

BECAUSE OF THE TURBINE BEARING PROBLEMS THE COMPLIANCE TEST ORIGINALLY SCHEDULED FOR THE DECEMBER-JANUARY PERIOD WAS TENTATIVELY RESCHEDULED WITH THE EPA FOR THE END OF MARCH. THE UTILITY EXPECTS THE FGD SYSTEM TO ACHIEVE EQUILIBRIUM (WATER BALANCE) WHEN THE UNIT COMES BACK ON LINE IN FEBRUARY.

2/78 SYSTEM

672

** PROBLEMS/SOLUTIONS/COMMENTS

BOTH THE BOILER AND FGD SYSTEM CAME BACK ON LINE FEBRUARY 21 AFTER COMPLETION OF THE TURBINE REPAIRS. THE COMPLIANCE TEST HAS AGAIN BEEN RESCHEDULED WITH EPA FOR THE END OF MAY.

ONE FORCED-DRAFT FAN (UPSTREAM OF THE FGD SYSTEM) HAD AN OIL LEAK AND A SHAFT ALIGNMENT PROBLEM. THE FAN WAS TAKEN OFF LINE AND SHIPPED TO BUFFALO FORGE FOR REPAIRS.

THE VACUUM FILTER MALFUNCTIONED, ALLOWING LARGER SIZE PARTICLES TO ESCAPE THE FILTER. THIS CAUSED THE RUBBER LINING DOWN STREAM TO PEEL WHICH, IN TURN, CREATED A PLUGGING PROBLEM. EIMCO ENGINEERS ARE PRESENTLY STUDYING THE PROBLEM AND HOPE TO INCORPORATE MODIFICATIONS TO IMPROVE THE PERFORMANCE OF THE FILTERS.

3/78 SYSTEM

744

4/78 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

THE DAMAGED FD FAN WAS REINSTALLED DURING APRIL. THE AFFECTED MODULE WAS DOWN FROM FEBRUARY 23 THROUGH APRIL 10.

5/78 SYSTEM

744

6/78 SYSTEM

720

** PROBLEMS/SOLUTIONS/COMMENTS

COMPLIANCE TESTING TOOK PLACE DURING THE WEEK OF JUNE 5. THE REPORT SHOULD BE AVAILABLE TO THE UTILITY BY THE END OF JUNE.

THE UNIT WAS DOWN WITH DAMPER PROBLEMS (DOWN ON THE 24TH OF JUNE). APPARENTLY THE CHAINS THAT PULL THE GUILLotine DAMPERS WERE UNDERDESIGNED AND PRONE TO FAILURE. THE CHAINS ARE CURRENTLY BEING REPLACED.

7/78 SYSTEM

744

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

8/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

OFFICIAL RESULTS OF THE COMPLIANCE TEST PERFORMED ON JUNE 6 ARE STILL NOT AVAILABLE. BECAUSE OF INTERMITTENT OPERATION, FGD SYSTEM PERFORMANCE FIGURES ARE NOT YET AVAILABLE.

9/78 SYSTEM 720

10/78 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

THE THICKENER HAS BEEN A MAJOR PROBLEM AREA. THE POLYETHYLENE LINER WAS ACCIDENTLY PIERCED WHILE REPAIRS WERE BEING MADE TO SOME OTHER COMPONENTS. THE LINER IS CURRENTLY BEING PATCHED.

THE UTILITY REPORTED THAT OPERATION OF THE BOILER AND FGD SYSTEM CONTINUED ON AN INTERMITTENT BASIS THROUGHOUT THE PERIOD.

11/78 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THICKENER PROBLEMS ARE CONTINUING. THE RUBBER LINER HAS BEEN DETACHING FROM THE THICKENER CONE. THE THICKENER MUST BE DRAINED TO MAKE THE REPAIRS.

FAN PROBLEMS OCCURRED DURING THE PERIOD. THERE IS NO DAMPER BETWEEN THE MODULE AND FAN. UNDER SOME OPERATING CONDITIONS WET GAS CAN BACK INTO THE FAN AREA RESULTING IN CORROSION AND OTHER MOISTURE RELATED PROBLEMS.

12/78	A	4.6	5.1		4.6				
	B	37.7	28.4		25.7				
	SYSTEM	42.3	33.5	33.8	30.3	744	673	225	54.0

** PROBLEMS/SOLUTIONS/COMMENTS

MINNKOTA POWER COOP REPORTED THE FOLLOWING STATISTICS FOR THE YEAR OF 1978:

TOTAL PERIOD HOURS: 8760
 TOTAL BOILER HOURS: 6926
 TOTAL A-MODULE HOURS: 1790
 TOTAL B-MODULE HOURS: 2110
 ANNUAL BOILER CAPACITY FACTOR: 66.7%

FGD SYSTEM PERFORMANCE:

	A-MODULE	B-MODULE	SYSTEM
AVAILABILITY	92.3	28.5	46.1
OPERABILITY	28.0	25.9	52.7
RELIABILITY			53.9
UTILIZATION	22.2	20.4	41.7

THE B-TOWER WAS OUT OF SERVICE DURING DECEMBER DUE TO PLUGGING OF THE THICKENER UNDERFLOW BY RUBBER LINING. THE THICKENER WAS PUMPED OUT AND REPAIRED.

1/79	A	4.6	5.1		4.6				
	B	37.7	28.4		25.7				
	SYSTEM	42.3	33.5	33.8	30.3	744	673	225	54.0

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

SOME WEATHER-RELATED PROBLEMS OCCURRED WITH FGD SYSTEM PIPING FREEZE-UPS.

THE UTILITY REPORTED THAT THE A-TOWER WAS OUT OF SERVICE FOR A PERIOD IN JANUARY DUE TO BROKEN INLET ISOLATION DAMPER CHAINS.

THE A-TOWER WAS OUT OF SERVICE TO REPAIR A BOOSTER FAN SERVO MECHANISM THROUGH JANUARY 28.

THE B-TOWER WAS OUT OF SERVICE FROM DECEMBER 27 THROUGH JANUARY 31 DUE TO A FAN MOTOR FAILURE.

THE UTILITY REPORTED THAT EROSION PROBLEMS IN THE SCRUBBER TOWERS ARE SEVERE ENOUGH THAT HOLES HAVE BEEN DISCOVERED IN TOWER WALLS.

2/79	A	19.4	26.5		19.4				
	B	32.1	44.0		32.1				
	SYSTEM	51.5	70.5	70.5	51.5	672	491	346	58.1
3/79	A	19.4	26.5		19.4				
	B	32.1	44.0		32.1				
	SYSTEM	51.5	70.5	70.5	51.5	744	543	383	58.1

** PROBLEMS/SOLUTIONS/COMMENTS

TWO DAYS OF DOWN TIME WERE REQUIRED TO REMOVE LOOSE RUBBER FROM THE THICKENER PIPING DURING THE FEBRUARY-MARCH PERIOD.

A BOOSTER FAN MOTOR FIRE OCCURRED IN THE A-MODULE.

HOLES IN THE B-SIDE ABSORBER TOWER WERE REPAIRED DURING THE PERIOD.

COLD WEATHER INHIBITED SCRUBBER STARTUPS AFTER REPAIRS WERE MADE DURING THE PERIOD.

4/79	A	3.0	3.2		3.0				
	B	57.1	61.6		57.1				
	SYSTEM	60.1	64.8	65.4	60.1	720	668	432	69.4
5/79	A	3.0	3.2		3.0				
	B	57.1	61.6		57.1				
	SYSTEM	60.1	64.8	65.4	60.1	744	690	448	88.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE A-MODULE IS STILL EXPERIENCING FAN PROBLEMS. DURING APRIL AND MAY THE FAN HAD ALIGNMENT PROBLEMS POSSIBLY RELATED TO THE FAN FOUNDATION.

DURING APRIL AND MAY HOLES WERE REPAIRED IN THE ABSORBER WALLS, VALVE REPAIRS WERE MADE, AND REPAIRS WERE MADE ON A THICKENER DRIVE GEAR.

6/79	A	17.2	17.2		17.2				
	B	36.3	36.3		36.3				
	SYSTEM	52.8	52.8	52.8	52.8	720	720	380	88.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE A-TOWER WAS DOWN FOR REPAIR TO THE FLAKE LINING.

THE FGD SYSTEM WAS DOWN FOR PART OF THE MONTH FOR REPAIRS AFTER EXCESS SOLIDS ENTERING THE TRAY RECYCLE LOOP OVERLOADED THE CLARIFIER.

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

AN A-TOWER TRAY RECYCLE DISTRIBUTION HEADER WAS CLEANED DURING JUNE.

THE SYSTEM WAS FORCED OUT OF SERVICE WHEN BOILER PROBLEMS CAUSED AN EXCESSIVE AMOUNT OF HEAVY PARTICLES (SLAG CARRYOVER) TO ENTER THE FGD SYSTEM RESULTING IN THE PLUGGING OF SEVERAL LINES AND STOPPING THE THICKENER RAKE. SLUDGE HAD TO BE DREDGED AND HAULED OUT FROM THE TOP OF THE THICKENER.

THE A-TOWER WAS OUT OF SERVICE DUE TO PROBLEMS WITH THE WATER BALANCE AND THE VACUUM FILTERS AS WELL AS TO UNPLUG THE ABSORBER BLEED LINE. LIME WAS USED FOR SEVERAL DAYS AS MAKE UP CHEMICAL (AS OPPOSED TO PRIMARILY ALKALINE FLYASH) TO EASE THE HIGH SOLIDS PROBLEM.

A-TOWER AGITATOR GEARS WHICH FAILED AS A RESULT OF A CLARIFIER OVERLOAD WERE REPLACED DURING THE PERIOD.

7/79	A	44.5	44.5		44.5				
	B	.0	.0		.0				
	SYSTEM	44.0	44.0	44.0	44.0	744	744	331	86.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS REPORTED THAT A TRAY RECYCLE CONTROL VALVE AND AN ABSORBER TRAIN VALVE FAILED DURING JULY.

THE UTILITY REPORTED PROBLEMS WITH PLUGGING IN THE MIST ELIMINATORS, THE THICKENER AND IN THE ABSORBER FEED LINE.

THE UNIT EXPERIENCED A BOOSTER FAN TRIP IN JULY.

PROBLEMS WITH THE VACUUM FILTERS AND THE SEAL WATER PUMP WERE ENCOUNTERED.

THE ABSORBER AGITATOR WAS REPLACED DURING JULY.

8/79	A	28.7	28.7		28.7				
	B	10.6	10.6		10.6				
	SYSTEM	39.0	39.0	39.0	39.0	744	744	293	92.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST EXCESSIVE VIBRATION AND HIGH BEARING TEMPERATURE IN THE A-SIDE BOOSTER FAN WERE ENCOUNTERED CAUSING SOME DOWN TIME.

THE INABILITY TO ADD ALKALI (FLYASH OR LIME) TO THE SYSTEM CAUSED SOME OPERATIONAL PROBLEMS ON THE A-SIDE SCRUBBER.

DURING AUGUST THE B-SIDE THICKENER RAKE WAS BURIED IN THE SLUDGE. THE SLUDGE HAD TO BE REMOVED BY MINING IT FROM THE TOP.

PLUGGING OF THE FLYASH TANK AND THE LIME SLURRY FEED LINE CAUSED SOME B-SIDE OUTAGE TIME DURING AUGUST.

DUE TO A LACK OF LIME (THE UTILITY SUPPLY WAS EXHAUSTED) THE FGD SYSTEM HAD TO SHUT DOWN.

THE HOLES IN THE SIDES OF THE B-SIDE ABSORBER TOWER HAD TO BE REPAIRED CAUSING SOME OUTAGE TIME IN AUGUST.

9/79	A	21.4	21.5		21.4				
	B	1.2	1.2		1.2				
	SYSTEM	23.0	23.0	23.0	23.0	720	717	163	96.6

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER THE A-SIDE WAS DOWN DUE TO HEAVY SOLIDS IN THE THICKENER AND CLARIFIER. HIGH VIBRATIONS WERE EXPERIENCED WITH THE BOOSTER FAN.

THE B-SIDE REMAINED OUT OF SERVICE DUE TO PROBLEMS WITH THE THICKENER AND CLARIFIER.

10/79	A	.0	.0	.0				
	B	31.3	31.4	31.3				
	SYSTEM	31.3	31.4	31.4	31.3	744	743	233 89.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY IS IN THE PROCESS OF CLEANING THE CLARIFIER.

THE CLARIFIER AGITATOR DRIVE GEAR FAILED CAUSING DOWN TIME FOR REPAIR IN OCTOBER.

THE BLEED LINE TO THE THICKENER PLUGGED AND NEEDED MAINTENANCE.

THE GEAR HOUSING FAILED ON THE THICKENER LIFT MECHANISM CAUSING OUTAGE TIME FOR REPAIR.

11/79	A	.6	.7	.6				
	B	15.4	16.7	15.4				
	SYSTEM	16.0	17.4	17.4	16.0	720	661	115 80.0

** PROBLEMS/SOLUTIONS/COMMENTS

AN EXCESS OF SOLIDS CAUSED PLUGGING IN THE THICKENER AND THE CLARIFIER DURING NOVEMBER.

12/79	A	26.6	31.5	26.6				
	B	9.7	11.5	9.7				
	SYSTEM	36.3	43.0	43.0	36.3	744	628	270 67.2

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING OF THE SEAL WATER SYSTEM RESULTED IN SOME OUTAGE TIME DURING DECEMBER.

BOOSTER FAN PROBLEMS RELATED TO EXCESSIVE VIBRATION WERE ENCOUNTERED ON MODULE B IN DECEMBER.

A HOLE IN A BLOCKING VALVE RESULTED IN SOME DOWNTIME.

THE GEAR HOUSING FAILED ON THE THICKENER LIFT MECHANISM.

1/80	A	7.1	10.5	7.1				
	B	.0	.0	.0				
	SYSTEM	7.1	10.5	10.5	7.1	744	504	53 58.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY, COLD WEATHER CAUSED SOME PIPE LINES AND A BOOSTER FAN TO ICE UP.

A HIGH PERCENTAGE OF COARSE SOLIDS IN THE THICKENER CAUSED SOME OUTAGE TIME. THE WORM GEAR ON THE THICKENER FAILED ADDING TO THE OUTAGE TIME.

CLEANING AND REPAIR OF THE THICKENER WAS COMPLICATED BY SUB-ZERO AMBIENT TEMPERATURES.

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR
2/80	SYSTEM	.0	.0		.0			696	696	0 97.1

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS RELATED TO THE COLD WEATHER CONTINUED THROUGH FEBRUARY. ICE ON THE BOOSTER FAN HAD TO BE MELTED BEFORE IT COULD BE OPERATED.

SHAFT SLEEVES ON SEVERAL SPRAY RECYCLE PUMPS WERE REPLACED DURING FEBRUARY.

THE GEAR REDUCER FAILED ON THE B-SIDE ABSORBER AGITATOR PREVENTING SCRUB-
BER OPERATION.

THE ISOLATION DAMPER CHAINS BROKE DURING THE MONTH.

3/80	A	22.6	22.6		22.6					
	B	6.2	6.2		6.2					
	SYSTEM	28.9	28.8	28.8	28.8			744	743	214 89.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH COLD WEATHER CONTINUED TO BE A PROBLEM.

THE TORQUE SWITCHES ON THE ISOLATION DAMPERS WERE REPLACED. THE DAMPER PROBLEMS CAUSED THE BOOSTER FAN TO TRIP. THE OUTAGE TIME WAS EXTENDED BECAUSE THE UTILITY HAD TO WAIT FOR THE SWITCHES TO BE DELIVERED.

AN EXCESSIVE AMOUNT OF COARSE PARTICLES IN THE THICKENER CONTINUED TO BE A PROBLEM. PLUGGED BLEED LINES FROM THE ABSORBER TO THE THICKENER WERE ALSO ENCOUNTERED.

THE A-SIDE ABSORBER AGITATOR ANCHOR BOLTS SHEARED DURING MARCH CAUSING MODULE DOWN TIME.

THE SHAFT SLEEVES ON THE SPRAY RECYCLE PUMPS WOULD NOT HOLD THE PUMP GLAND PACKING. THE SHAFT SLEEVES ARE CURRENTLY BEING REPLACED.

4/80	A	100.0	.0		.0					
	B	.0	.0	.0	.0					
	SYSTEM	100.0	.0	.0	.0			720	154	0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FOR APPROXIMATELY 3 WEEKS FOR THE ANNUAL UNIT OUTAGE DURING APRIL.

PLUGGED BLEED LINES AND THE REPLACEMENT OF THE SHAFT SLEEVES ON THE RECYCLE PUMPS CAUSED THE FGD SYSTEM TO REMAIN OFF LINE DURING THE TIME THE BOILER OPERATED.

5/80	A	.0	.0		.0					
	B	47.2	48.4	50.6	45.6					
	SYSTEM	47.2	48.4	50.6	45.6			744	700	339

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS OPERATED DURING MAY WHILE REPAIR WORK WAS BEING DONE ON MODULE A.

THE REPAIRS ON MODULE A INCLUDED WORK ON THE SPRAY RECYCLE NOZZLE PIPING, AND THE RECYCLE HEADER.

THE VALVES ON BOTH THE SPRAY RECYCLE PUMP AND THE DISCHARGE SPRAY CYCLE

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

PUMP WERE REPAIRED.

THE ABSORBER LINING HAS STARTED TO WEAR AND IS NOW BEING REPAIRED.

HIGH SOLIDS RESULTED IN THICKNER LINE PLUGGING. HIGH SOLIDS ALSO CAUSED PROBLEMS WITH THE RAKE AND CONE. BOTH THE THICKNER AND THE CLARIFIER HAD TO BE DRAINED AND CLEANED.

THE ABSORBER AGITATOR TUNNEL WAS ALSO CLEANED DURING THE MONTH.

6/80	A	.0	.0		.0				
	B	41.8	40.4	41.4	39.3				
	SYSTEM	41.8	40.4	41.4	39.3	720	701	283	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B CONTINUED TO OPERATE THROUGH JUNE.

PROBLEMS WITH THE THICKNER CONTINUED THROUGH THE MONTH. HIGH SOLIDS CAUSED PROBLEMS WITH THE RAKE MECHANISM AND THE LIMIT SWITCH.

TROUBLE WAS ENCOUNTERED DURING JUNE WITH THE VACUUM FILTER.

THE REPAIR WORK CONTINUED ON THE ABSORBER FLAKE LININGS.

MODULE A REPAIR WORK CONTINUED DURING JUNE.

7/80	A	.0	.0		.0				
	B	65.3	64.5	65.8	52.0				
	SYSTEM	65.3	64.5	65.8	52.0	744	600	387	60.0

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH THE RAKE MECHANISM AND UNDERFLOW PUMPS IN THE THICKENER CONTINUED IN JULY. HIGH SOLIDS IN THE THICKENER ARE CAUSED WHEN FLY ASH IS ADDED TO THE LIME IN THE ABSORBER TOWER. THE ABSORBER REAGENT IS CHANGED TO STRAIGHT LIME WHEN THIS OCCURS.

PROBLEMS WERE ENCOUNTERED WITH THE TWO VACUUM FILTER PUMPS. ONE WAS BEING REBUILT WHILE THE OTHER FUNCTIONED POORLY.

REPAIRS WERE MADE TO THE LEAK IN THE ABSORBER TOWER.

PROBLEMS WERE REPORTED WITH THE MOTOR AND DISCHARGE VALVE ON THE TRAY RECYCLE PUMPS.

THE FGD SYSTEM WAS NOT PLACED IN SERVICE WHEN THE BOILER WAS RUN AT REDUCED LOAD DURING THE MONTH.

8/80	A	90.7	54.3	98.8	53.9				
	B	56.9	44.2	99.4	44.0				
	SYSTEM	99.2	98.6	99.2	98.0	744	739	729	92.8

** PROBLEMS/SOLUTIONS/COMMENTS

BOTH MODULES WERE OPERATED DURING AUGUST.

DURING THE MONTH, MAINTENANCE WORK WAS DONE ON THE SPRAY RECYCLE PUMPS (TEFLON PACKING), THE VACUUM FILTER DRUM, SPRAY NOZZLES, THE ABSORBER AGITATOR, THE CLARIFIER CONE, AND THE THICKNER RAKE MECHANISM.

9/80	A	70.1	72.6	100.0	66.9				
	B	66.7	25.1	100.0	23.2				
	SYSTEM	100.0	97.9	100.0	90.3	720	664	650	78.5

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE DURING ALL OF SEPTEMBER.

BOTH MODULES WERE OPERATED DURING THE MONTH.

10/80	A	90.4	85.4	87.1	76.2				
	B	17.7	.0		.0				
	SYSTEM	100.0	85.4	87.1	76.2	744	664	744	75.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER AVAILABILITY FOR MODULE B WAS LOW DUE TO LEAKS IN THE TOWER.

11/80	A	42.2	40.4	100.0	38.7				
	B	98.6	54.0	96.4	50.1				
	SYSTEM	100.0	94.5	99.1	90.6	720	690	720	88.6

** PROBLEMS/SOLUTIONS/COMMENTS

AVAILABILITY WAS LOW FOR MODULE A DUE TO LEAKS IN THE TOWER DURING THE MONTH OF NOVEMBER.

12/80	A	41.5	33.2	54.5	40.0				
	B	30.0	29.5	88.6	28.4				
	SYSTEM	71.5	62.8	66.7	60.5	744	716	450	92.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING DECEMBER AVAILABILITY WAS LOW DUE TO DOWN TIME NECESSARY TO CONVERT FROM A THICKENER TO SLUDGE PONDS AND PROBLEMS WITH THE OVERFLOW LEVEL CONTROL OF THE ABSORBER.

ISOLATION DAMPER PROBLEMS DURING THE MONTH DELAYED THE STARTUP OF THE FGD SYSTEM.

1/81	A	83.8	94.4	100.0	83.9				
	B	.0	.0		.0				
	SYSTEM	83.9	94.4	100.0	83.9	744	661	624	83.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE SYSTEM WAS SHUT DOWN FOR PART OF THE MONTH TO REPACK THE ABSORBER TOWER AGITATOR.

ADDITIONAL OUTAGE TIME WAS DUE TO ISOLATION DAMPER PROBLEMS.

2/81	A	33.9	11.8	100.0	11.8				
	B	83.3	87.4	100.0	83.3				
	SYSTEM	95.0	99.8	100.0	95.0	672	641	639	88.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.

3/81	A	58.3	66.3	100.0	58.3				
	B	29.6	28.4	100.0	25.0				
	SYSTEM	87.8	94.6	100.0	83.8	744	655	620	78.7

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH SOME OUTAGE TIME WAS DUE TO ISOLATION DAMPER PROBLEMS.

BOOSTER FAN PROBLEMS CAUSED ADDITIONAL DOWN TIME.

4/81	A	.0	.0	.0	.0				
	B	2.7	5.4	5.6	2.7				
	SYSTEM	2.7	5.4	5.6	2.7	720	360	20	78.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE MIST ELIMINATOR PLUGGED CAUSING SYSTEM DOWN TIME.

PROBLEMS WERE ENCOUNTERED WITH THE BOOSTER FAN.

5/81	A	65.4	73.3	75.0	65.4				
	B	.0	.0	.0	.0				
	SYSTEM	65.4	73.3	75.0	65.4	744	661	487	80.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY MODULE A EXPERIENCED BOOSTER FAN PROBLEMS.

6/81	A	72.3	66.3	68.2	52.6				
	B	.0	.0	.0	.0				
	SYSTEM	72.3	66.3	68.2	52.6	720	571	379	77.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE MODULE B WAS OUT OF SERVICE FOR MAINTENANCE. MAINTENANCE WAS PERFORMED ON THE SPRAY NOZZLES, MIST ELIMINATOR, TRAY UNDERSPRAY STRAINER, ISOLATION DAMPER, AND THE FLAKE LINING.

MODULE B SPRAY RECYCLE NOZZLES WERE CLEANED AND THE WASH TRAY HEADER WAS CHECKED FOR PLUGGING.

THE RECYCLE TANK TRAY ON MODULE A WAS CLEANED DURING JUNE.

7/81	A	28.8	32.1	33.3	28.8				
	B	.0	.0	.0	.0				
	SYSTEM	28.8	32.1	33.3	28.8	744	666	214	82.9

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A WAS REMOVED FROM SERVICE ON JULY 10 WHEN THE THICKENER RAKE DRIVE BROKE. THIS CAUSED THE MODULE TO REMAIN OUT OF SERVICE THE REST OF THE MONTH.

DURING THE MONTH, THE FLAKE LINING WAS BEING REPAIRED ON MODULE B.

NEW MIST ELIMINATORS WERE INSTALLED IN MODULE B DURING JULY.

8/81	A	.0	.0	.0	.0				
	B	58.1	48.6	49.5	44.2				
	SYSTEM	58.1	48.6	49.5	44.2	744	677	329	79.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AUGUST, MODULE A WAS OFF LINE AWAITING FAN BLADES AND REPAIRS TO THE ABSORBER TOWER.

MODULE B WAS DOWN FOR PART OF THE MONTH AS REPAIRS CONTINUED TO THE

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

THICKENER RAKE DRIVE.

9/81	A	.0	.0	.0	.0				
	B	100.0	97.2	100.0	85.8				
	SYSTEM	100.0	97.2	100.0	85.8	720	636	618	83.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN TWICE DURING THE MONTH AS A RESULT OF BOILER TUBE LEAKS.

THE A MODULE REMAINED DOWN DURING THE MONTH FOR REPAIRS.

10/81	A	78.7	49.7	53.2	30.8				
	B	35.5	56.9	60.9	35.3				
	SYSTEM	100.0	100.0	100.0	66.1	744	461	492	83.0

11/81	A	100.0	98.0	98.9	88.9				
	B	.0	.0		.0				
	SYSTEM	100.0	98.0	98.9	88.9	720	653	640	87.4

12/81	A	22.6	21.7	21.5	21.5				
	B	78.6	78.6	79.2	78.6				
	SYSTEM	100.0	100.0	100.0	100.0	744	744	744	90.1

** PROBLEMS/SOLUTIONS/COMMENTS

THE MAJOR PROBLEM ENCOUNTERED DURING THE FOURTH QUARTER WAS FAILURE OF THE FLAKEGLASS LINERS.

SPRAY NOZZLE PLUGGING WAS ALSO ENCOUNTERED DURING THE THREE MONTH PERIOD.

1/82	A	17.0	19.1	19.2	17.0				
	B	68.5	77.0	77.7	68.5				
	SYSTEM	85.5	85.5	97.0	85.5	744	662	636	81.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN PART OF JANUARY TO DESLAG THE BOILER.

DURING THE MONTH THE FLAKE LINING IN MODULE A WAS REPAIRED.

MODULE B WAS TAKEN OUT OF SERVICE WHEN THE REAR BEARING TEMPERATURE ON THE BOOSTER FAN BEGAN TRENDING UP.

THE ISOLATION DAMPERS WOULD NOT OPERATE DURING THE FRIGID WEATHER.

2/82	A	65.9	65.9	65.9	65.9				
	B	31.1	31.1	31.1	31.1				
	SYSTEM	96.9	96.9	96.9	96.9	672	672	651	81.1

3/82	A	.0	.0		.0				
	B	55.9	96.2	100.0	55.9				
	SYSTEM	55.9	96.2	100.0	55.9	744	432	415	72.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE UNIT WENT DOWN FOR A SCHEDULED ANNUAL OUTAGE.

4/82	A	.0			.0				
	B	.0			.0				
	SYSTEM	.0			.0	720	0	0	.0

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS OFF-LINE DURING APRIL FOR AN ANNUAL OUTAGE. THE FGD SYSTEM WAS ALSO DOWN FOR THE ENTIRE MONTH.

5/82	A	78.0	88.9	94.9	72.5				
	B	.0	.0		.0				
	SYSTEM	78.0	88.9	94.9	72.5	744	607	539	76.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS DOWN THE MONTH OF MAY BECAUSE OF REPAIRS BEING PERFORMED ON THE FLAKE LINING AND THE SPRAY RECYCLE NOZZLES.

MODULE A WAS DOWN AT THE BEGINNING OF MAY BECAUSE OF THE ANNUAL OUTAGE. LATER IN THE MONTH THE MODULE WAS TAKEN OFF-LINE DUE TO ID FAN PROBLEMS.

6/82	A	86.2	91.9	93.8	76.4				
	B	.0	.0		.0				
	SYSTEM	86.2	91.9	93.8	76.5	720	599	550	73.5

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS OUT OF SERVICE DURING JUNE BECAUSE WORK WAS BEING PERFORMED ON THE FLAKE LINING AND THE SPRAY RECYCLE NOZZLES.

MODULE A WAS OFF-LINE AT THE BEGINNING OF JUNE DUE TO SCHEDULED MAINTENANCE ON THE TURBINE. THE MODULE WAS ALSO DOWN DURING MID-MONTH WHEN THE BOILER WAS OFF-LINE DUE TO A TUBE LEAK AND TO SET THE LIMIT SWITCHES.

7/82	A-11	97.6	97.6	100.0	97.6				
	A-21	.0	.0		.0				
	SYSTEM	97.6	97.6	100.0	97.6	744	744	726	80.2
8/82	A-11	7.4	7.4	7.4	7.4				
	A-21	96.8	92.0	92.0	92.0				
	SYSTEM	100.0	99.4	99.4	99.4	744	744	740	80.2
9/82	A-11	.0	.0	.0	.0				
	A-21	98.9	98.9	98.9	98.9				
	SYSTEM	98.9	98.9	98.9	98.9	720	720	712	81.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE PERIOD OF JULY THROUGH SEPTEMBER 1982.

10/82	A-11	50.5	62.6	63.2	50.5				
	A-21	49.5	35.0	35.3	28.3				
	SYSTEM	100.0	97.5	98.5	78.8	744	601	586	75.9

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED BY THE UTILITY. DURING OCTOBER.

11/82	A-11	79.5	77.1	77.8	71.9				
	A-21	.0	.0		.0				
	SYSTEM	79.5	77.1	77.8	71.9	720	672	518	62.3

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A-11 WAS DOWN FROM NOVEMBER 16 TO NOVEMBER 22 FOR REPAIR OF LEAKS.

MODULE A-21 WAS OUT OF SERVICE FOR THE ENTIRE MONTH TO ALLOW FOR THE PERFORMANCE OF MAINTENANCE WORK.

12/82	A-11	42.1	48.0	48.9	42.1				
	A-21	.0	.0	.0	.0				
	SYSTEM	42.1	48.0	48.9	42.1	744	653	313	65.7

** PROBLEMS/SOLUTIONS/COMMENTS

HIGH VIBRATIONS FROM AN ID FAN FORCED THE REMOVAL OF A SET OF FANS ON THE UNIT AND CONSEQUENTLY, AN FGD SYSTEM OUTAGE.

REPAIRS CONTINUED DURING DECEMBER ON THE LEAKS THAT DEVELOPED IN MODULE A-11.

MAINTENANCE WORK CONTINUED DURING THE MONTH ON MODULE A-21.

A DAMAGED COLD REHEAT LINE PRODUCING A LOW VACUUM RESULTED IN A UNIT TRIP ON DECEMBER 10. THE UNIT WAS BROUGHT DOWN ON DECEMBER 13 TO REPAIR THE COLD REHEAT LINE.

1/83	A-11	100.0	97.7	92.3	90.8				
	A-21	3.0	1.2	1.1	1.1				
	SYSTEM	100.0	98.9	93.4	91.9	744	692	684	82.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JANUARY.

2/83	A-11	100.0	94.8	86.0	83.7				
	A-21	.0	.0	.0	.0				
	SYSTEM	100.0	94.8	86.0	83.7	672	594	562	82.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING FEBRUARY.

3/83	A-11	80.6	95.6	94.8	75.7				
	A-21	.0	.0	.0	.0				
	SYSTEM	80.6	95.6	94.8	75.7	744	589	563	77.0

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A-21 HAD BEEN OUT OF SERVICE SINCE OCTOBER AND REMAINED OUT OF SERVICE DURING MARCH FOR REPAIRS TO THE ABSORBER LINING.

THE UNIT WAS TAKEN OUT OF SERVICE ON MARCH 25 FOR A SCHEDULED OUTAGE.

4/83	A-11	33.3	88.1	87.6	29.7				
	A-21	.0	.0	.0	.0				
	SYSTEM	33.3	88.1	86.0	29.7	720	243	214	69.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE ANNUAL OUTAGE WHICH BEGAN ON MARCH 25 ENDED ON APRIL 20.

WHEN ATTEMPTING TO START A BOOSTER FAN, THE FAN HOUSING FLOODED AND CAUSED

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR
A FAN HOUSING EXPANSION JOINT TO RUPTURE.										
5/83	A-11	98.2	95.4	86.9	84.8					
	A-21	.0	.0	.0	.0					
	SYSTEM	98.2	95.4	86.9	84.8		744	661	631	83.8
6/83	A-11	99.3	98.4	98.4	94.9					
	A-21	.0	.0	.0	.0					
	SYSTEM	99.3	98.4	98.4	94.9		720	695	683	83.5
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MAY AND JUNE.										
7/83	A-11	99.6	98.2	95.3	76.6					
	A-21	.0	.0	.0	.0					
	SYSTEM	99.6	98.2	95.3	76.6		744	580	570	81.5
** PROBLEMS/SOLUTIONS/COMMENTS										
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY.										
8/83	A-11	89.4	97.3	97.3	89.4					
	A-21	.0	.0	.0	.0					
	SYSTEM	89.4	97.3	97.3	89.4		744	684	665	89.5
** PROBLEMS/SOLUTIONS/COMMENTS										
WORK CONTINUED DURING AUGUST ON RELINING THE A-21 MODULE ABSORBER TOWER.										
MODULE A-11 EXPERIENCED EXPANSION JOINT PROBLEMS DURING AUGUST.										
MODULE A-11 ALSO EXPERIENCED FLYASH SLURRY LINE PROBLEMS DURING THE MONTH.										
9/83	A-11	76.3	89.3	91.2	70.1					
	A-21	.0	.0	.0	.0					
	SYSTEM	76.3	89.3	91.2	70.1		720	566	505	80.2
** PROBLEMS/SOLUTIONS/COMMENTS										
WORK CONTINUED DURING SEPTEMBER ON RELINING THE A-21 MODULE ABSORBER TOWER.										
FLYASH SLURRY LINE PROBLEMS CONTINUED DURING SEPTEMBER AT THE A-11 MODULE.										
MODULE A-11 ALSO EXPERIENCED PROBLEMS WITH THE SPRAY RECYCLE PUMP STRAINERS DURING THE MONTH.										
10/83	A-11	16.1	14.4	100.0	13.0					
	A-21	90.3	83.9	87.3	75.9					
	SYSTEM	100.0	98.3	100.0	88.9		744	673	662	89.8
11/83	A-11	.0	.0		.0					
	A-21	100.0	100.0	100.0	100.0					
	SYSTEM	100.0	100.0	100.0	100.0		720	720	720	87.4
** PROBLEMS/SOLUTIONS/COMMENTS										
NO MAJOR FGD-RELATED OUTAGES WERE ENCOUNTERED DURING OCTOBER AND NOVEMBER 1983.										
12/83	A-11	.0	.0	.0	.0					

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	A-21	70.1	78.1	54.3	54.3					
	SYSTEM	70.1	78.1	54.3	54.3		744	518	404	75.6

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A-11 WAS BEING RELINED DURING DECEMBER.

MAINTENANCE WORK WAS PERFORMED ON THE MODULE A-21 ABSORBER SLURRY RECYCLE SYSTEM DURING DECEMBER ACCOUNTING FOR LOW FGD SYSTEM AVAILABILITY.

THREE UNIT OUTAGES OCCURRED DURING DECEMBER DUE TO BOILER TUBE LEAK AND HYDROGEN LEAK REPAIRS.

1/84	A-11	.0	.0	.0	.0					
	A-21	84.5	84.5	100.0	84.5					
	SYSTEM	84.5	84.5	100.0	84.5		744	744	629	87.8

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE A-11 WAS NOT AVAILABLE FOR SERVICE DUE TO MODULE RELINING.

THE UTILITY REPORTED THAT THE ABSORBER WAS SHUT DOWN TO MAKE REPAIRS ON MODULE A21 SPRAY RECYCLE SYSTEM.

2/84	A-11	3.4	.0	.0	.0					
	A-21	100.0	100.0	100.0	100.0					
	SYSTEM	100.0	100.0	100.0	100.0		696	696	696	78.4
3/84	A-11	100.0	.0	.0	.0					
	A-21	100.0	100.0	100.0	100.0					
	SYSTEM	100.0	100.0	100.0	100.0		744		744	76.8
4/84	A-11	100.0	.0	.0	.0					
	A-21	100.0	99.1	99.8	88.3					
	SYSTEM	100.0	99.1	99.8	88.3		720	641	636	74.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING THE PERIOD OF FEBRUARY THROUGH APRIL 1984.

5/84	A-11	100.0			.0					
	A-21	100.0			.0					
	SYSTEM	100.0			.0		744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS SHUT DOWN THROUGHOUT MAY FOR ITS ANNUAL OUTAGE.

6/84	A-11	.0	.0	.0	.0					
	A-21	100.0	89.8	105.5	45.6					
	SYSTEM	100.0	89.8	100.0	45.6		720	366	328	79.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS AROSE DURING JUNE.

7/84	SYSTEM						744			
8/84	SYSTEM						744			
9/84	SYSTEM						720			

MINNKOTA POWER: MILTON R. YOUNG 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MONONGAHELA POWER
PLANT NAME	PLEASANTS
UNIT NUMBER	1
CITY	WILLOW ISLAND
STATE	WEST VIRGINIA
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	21. (.050 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1160
GROSS UNIT GENERATING CAPACITY - MW	626
NET UNIT GENERATING CAPACITY W/FGD - MW	580
NET UNIT GENERATING CAPACITY WO/FGD - MW	595
EQUIVALENT SCRUBBED CAPACITY - MW	626
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	FOSTER WHEELER
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1132.56 (2400000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	132.2 (270 F)
STACK HEIGHT - M	305. (1000 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	6.1 (20.0 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	29075. (12500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	11000-13300
AVERAGE ASH CONTENT - %	*****
RANGE ASH CONTENT - %	14.7-16.0
AVERAGE MOISTURE CONTENT - %	4.50
RANGE MOISTURE CONTENT - %	3.0-5.0
AVERAGE SULFUR CONTENT - %	3.00
RANGE SULFUR CONTENT - %	2.5-3.5
AVERAGE CHLORIDE CONTENT - %	.05
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	2
NUMBER OF SPARES	0
TYPE	COLD SIDE
SUPPLIER	AIR CORRECTION DIVISION, UOP
INLET FLUE GAS CAPACITY - CU.M/S	566.3 (1200000 ACFM)
INLET FLUE GAS TEMPERATURE - C	132.2 (270 F)
PARTICLE REMOVAL EFFICIENCY - %	99.5
** PARTICLE SCRUBBER	
NUMBER	0
GENERIC TYPE	NONE
SPECIFIC TYPE	N/A
TRADE NAME/COMMON NAME	N/A
SHELL GENERIC MATERIAL	N/A
SHELL SPECIFIC MATERIAL	N/A
LINER GENERIC MATERIAL	N/A
LINER SPECIFIC MATERIAL	N/A

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	UNITED ENGINEERS & CONSTRUCTORS
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.55
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	2.4
CURRENT STATUS	1
COMMERCIAL START-UP	12/80
INITIAL START-UP	12/78
CONTRACT AWARDED	9/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.50	
DESIGN COAL HEAT CONTENT - J/G	28842.4	(12400 BTU/LB)
DESIGN COAL ASH CONTENT - %	16.00	
DESIGN MOISTURE CONTENT - %	5.00	
DESIGN CHLORIDE CONTENT - %	.05	
SPACE REQUIREMENTS - SQ M	20252.2	(218000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	208.0	

** QUENCHER/PRESATURATOR

NUMBER	4	
TYPE	VENTURI	
SUPPLIER	BABCOCK & WILCOX	
INLET GAS FLOW - CU. M/S	283.14	(600000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP - KPA	1.0	(4.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	504.	(8000 GPM)
L/G RATIO - L/CU. M	1.8	(13.3 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	TRAY TOWER	
SPECIFIC TYPE	SIEVE TRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	BABCOCK & WILCOX	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	SYNTHETIC RUBBER	
LINER MATERIAL TRADE NAME/COMMON TYPE	CHLOROBUTYL	
GAS CONTACTING DEVICE TYPE	PERFORATED TRAYS	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1008.	(16000 GPM)
L/G RATIO - L/CU.M	4.0	(30.2 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.2	(5.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	250.11	(530000 ACFM)
INLET GAS TEMPERATURE - C	51.7	(125 F)
SO2 REMOVAL EFFICIENCY %	90.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

TRADE NAME/COMMON TYPE	CLOSED VANE
MANUFACTURER	BABCOCK & WILCOX
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	2
NUMBER OF PASSES PER STAGE	3
DISTANCE BETWEEN STAGES - CM	213.36 (84.0 IN)
SUPERFICIAL GAS VELOCITY - M/S	3.0 (10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	THICKENER OVERFLOW/MAKEUP
WASH FREQUENCY	CONTINUOUSLY; ONCE EVERY 2 HOURS
WASH RATE - L/S	15.1 (240 GAL/MIN)
** REHEATER	
NUMBER	1
NUMBER OF SPARES	0
GENERIC TYPE	BYPASS
SPECIFIC TYPE	COLD SIDE
TRADE NAME/COMMON TYPE	N/A
LOCATION	AHEAD OF STACK
PERCENT GAS BYPASSED - AVG	15.0
TEMPERATURE INCREASE - C	13.9 (25 F)
INLET FLUE GAS TEMPERATURE - C	51.7 (125 F)
OUTLET FLUE GAS TEMPERATURE - C	65.6 (150 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
NUMBER	4
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	AMERICAN STANDARD
FUNCTION	BOOSTER
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	267.10 (566000 ACFM)
FLUE GAS TEMPERATURE - C	132.2 (270 F)
PRESSURE DROP - KPA	7.9 (26.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	NR
SUPPLIER	AMERICAN STANDARD
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	493.14 (1045000 ACFM)
FLUE GAS TEMPERATURE - C	132.2 (270 F)
PRESSURE DROP - KPA	7.6 (25.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL/OPPOSED BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
SERVICE CONDITIONS	270
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL/OPPOSED BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

SERVICE CONDITIONS	125
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC; INORGANIC
LINER SPECIFIC MATERIAL TYPE	ASPHALT-URETHANE; BOROSILICATE GLASS
** DUCTWORK	
LOCATION	OUTLET AFTER BYPASS JUNCTION
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	DETENTION
DEVICE TYPE	N/A
MANUFACTURER	DORR-OLIVER
NUMBER	3
NUMBER OF SPARES	1
PRODUCT QUALITY - % SOLIDS	15.0
** TANKS	
SERVICE	NUMBER
-----	-----
RECIRCULATION	4
ME WASH	****
SLURRY TRANSFER	1
SLURRY FEED	1
THICKENER OVERFLOW	2
SLUDGE STABILIZATION	2
** PUMPS	
SERVICE	NUMBER
-----	-----
QUENCHER RECIRCULATION	8
ABSORBER RECIRCULATION	16
THICKENER UNDERFLOW	****
LIME SLURRY TRANSFER	2
LIME SLURRY FEED	****
SLUDGE TRANSFER	4
RETURN WATER	3
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	2
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS FT	175.0 DIA X 10.0
CAPACITY	2190000

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	COAL TAR EPOXY
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	6% SOLIDS
OUTLET STREAM CHARACTERISTICS	30% SOLIDS (27-32%), PH 8.0
OUTLET STREAM DISPOSITION	TO SLUDGE TREATMENT
OVERFLOW STREAM DISPOSITION	RECIRCULATION TANK
*** SALEABLE BYPRODUCTS	
NATURE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	FIXATION
DEVICE	MIX TANK
PROPRIETARY PROCESS	DRAVO (CALCILOX)
INLET QUALITY - %	30.0
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	OFF-SITE (1.5 MILES)
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	200 ACRES X 200 FT
SITE SERVICE LIFE - YRS	31
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	OUTLET FROM ABSORBER
CHEMICAL PARAMETERS	PH, SO2
PHYSICAL VARIABLES	DENSITY, FLOW
CONTROL LEVELS	PH 5.9-6.0, 6% SOLIDS IN SLURRY
MONITOR TYPE	UNILOC (PH), LEAR SIEGLER (SO2), TEXAS NUCLEAR I
MONITOR LOCATION	ABSORBER DOWNCOMER FOR PH
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
RECEIVING WATER STREAM	OHIO RIVER
SOURCE OF MAKEUP WATER	RIVER WATER AND COOLING TOWER BLOWDOWN
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	THIOSORBIC LIME
PRINCIPAL CONSTITUENT	>90% CAO, 4-7% MGO
SOURCE/SUPPLIER	DRAVO
CONSUMPTION	11.1 TPH
UTILIZATION - %	94.0
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
ABSORBER %	33.3
FAN - %	.0
SLAKER %	1.0
THICKENER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	1.0
FAN	.0
SLAKER	1.0
THICKENER	.0

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 ----- SO2 PART. HOURS HOURS HOURS FACTOR -----

3/79 SYSTEM 744

4/79 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT STARTED ON MARCH 7, 1979. NO HOURS ARE YET AVAILABLE BECAUSE OF THE RECENT OPERATING STATUS.

THE A-MODULE HAS BEEN REMOVED FROM SERVICE DUE TO A WELD FAILURE ON THE ABSORBER DOWNCOMER SECTION.

5/79 SYSTEM 744

6/79 SYSTEM 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE UNIT WAS TAKEN OUT OF SERVICE ON JUNE 19 DUE TO SEVERE STACK LINER FAILURE. THE UNIT IS PROJECTED TO BE OUT OF SERVICE UNTIL THE MIDDLE OF AUGUST.

7/79 SYSTEM .0 .0 744 0 0 .0

8/79 SYSTEM .0 .0 744 0 0 .0

9/79 SYSTEM .0 .0 720 0 0 .0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT RESTARTED IN LATE SEPTEMBER AFTER COMPLETION OF THE STACK RELINING.

10/79 SYSTEM 744

11/79 SYSTEM 720

12/79 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THIS REPORT PERIOD.

1/80 SYSTEM 744

2/80 SYSTEM 690

3/80 SYSTEM 744

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE ON THE OPERATIONS AT PLEASANTS 1 FOR THE FIRST QUARTER OF 1980.

4/80 SYSTEM 720

5/80 SYSTEM 744

6/80 SYSTEM 720

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE SECOND QUARTER 1980 REPORT PERIOD.

7/80	SYSTEM				744				
8/80	A	96.3		27.9					
	B	98.1		28.5					
	C	.0		.0					
	D	98.1		28.5					
	SYSTEM	73.1		21.2	744	216	158	23.2	
9/80	SYSTEM	.0		.0	720	0	0	.0	

** PROBLEMS/SOLUTIONS/COMMENTS

AN EIGHT WEEK BOILER AND FGD SYSTEM SCHEDULED OUTAGE BEGAN DURING THE WEEK OF AUGUST 11. THE FGD SYSTEM WAS EXPECTED TO BE OUT OF SERVICE FOR 8-12 WEEKS. DURING THE OUTAGE THE FOLLOWING REPAIRS WERE TO BE PERFORMED:

1. REPLACE FABRIC EXPANSION JOINTS WITH ELASTOMER JOINTS
2. REPLACE GUNITE LININGS ON OUTLET DUCTWORK
3. BEGIN RE-LINING SO2 MODULES RUBBER LINING DUE TO SEVERE BLISTERING
4. COAT THICKENER OVERFLOW TANK WITH COAL TAR EPOXY
5. MISCELLANEOUS PUMP AND VALVE MAINTENANCE
6. UPGRADE THE ISOLATION DAMPERS

10/80	SYSTEM	.0		.0	744	0	0	.0	
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** PROBLEMS/SOLUTIONS/COMMENTS

THE PLEASANTS 1 FGD SYSTEM REMAINED OFF LINE THROUGH THE MONTH OF OCTOBER.

11/80	SYSTEM				720				
12/80	SYSTEM				744				

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE MONTHS OF NOVEMBER AND DECEMBER WAS NOT AVAILABLE.

1/81	SYSTEM				744			86.2	
2/81	SYSTEM				672			81.0	
3/81	SYSTEM				744			33.2	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING AN FGD SYSTEM OUTAGE IN MARCH IT WAS DISCOVERED THAT THE PLASITE LINING IN THE OUTLET DUCTWORK FOR MODULES B AND D WAS FAILING. THE B MODULE DUCTWORK WAS PATCHED AND THE MODULE RETURNED TO SERVICE. THE D MODULE WAS KEPT OFF LINE AND THE OUTLET DUCTWORK FOR THIS MODULE WILL BE RELINED WITH CHLOROBUTYL RUBBER.

4/81	SYSTEM				720				
5/81	SYSTEM				744				
6/81	SYSTEM				720				
10/81	SYSTEM				744				
11/81	SYSTEM				720				

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/81	SYSTEM						744			
1/82	SYSTEM						744			
2/82	SYSTEM						672			
3/82	SYSTEM						744			
4/82	SYSTEM						720			
5/82	SYSTEM						744			
6/82	SYSTEM						720			
7/82	SYSTEM						744			
8/82	SYSTEM						744			
9/82	SYSTEM						720			
10/82	SYSTEM						744			
11/82	SYSTEM						720			
12/82	SYSTEM						744			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF APRIL 1981 TO DECEMBER 1982.

1/83	1A	38.7		38.4						
	1B	90.8		90.2						
	1C	68.2		67.7						
	1D	46.8		46.5						
	SYSTEM	81.5		81.0			744	739	602	74.0
2/83	1A	.0		.0						
	1B	99.1		99.1						
	1C	100.0		100.0						
	1D	70.7		70.7						
	SYSTEM	89.9		89.9			672	672	604	67.0
3/83	1A	39.5		29.4						
	1B	64.0		47.7						
	1C	90.8		67.7						
	1D	53.3		39.8						
	SYSTEM	82.5		61.6			744	555	458	51.0

** PROBLEMS/SOLUTIONS/COMMENTS

EXPANSION JOINTS WERE REPLACED ON MODULES 1A AND 1B DURING MARCH.

4/83	1A	42.8		33.3						
	1B	76.8		59.9						
	1C	39.0		30.4						
	1D	92.7		72.2						
	SYSTEM	83.8		65.3			720	561	470	48.0
5/83	1A	83.7		67.7						
	1B	57.1		46.2						
	1C	57.6		46.6						
	1D	82.4		66.7						
	SYSTEM	93.6		75.8			744	602	564	54.0

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING APRIL AND MAY, 1983.

6/83	1A	99.6	33.3				
	1B	99.2	33.2				
	1C	100.0	34.4				
	1D	.0	.0				
	SYSTEM	99.6	33.7	720	241	242	24.0

** PROBLEMS/SOLUTIONS/COMMENTS

UNIT 1 WAS OUT OF SERVICE DURING PART OF JUNE FOR AN ANNUAL OUTAGE.

LIME SLURRY TANKS WERE LINED WITH EPOXY COATING DURING THE ANNUAL OUTAGE IN JUNE.

OUTLET DUCTS WERE RELINED DURING THE OUTAGE IN JUNE.

THE MODULE 1D MIST ELIMINATOR SECTION WAS RELINED WITH CHLOROBUTYL RUBBER DURING THE ANNUAL OUTAGE IN JUNE.

7/83	SYSTEM	744
8/83	SYSTEM	744
9/83	SYSTEM	720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.

10/83	SYSTEM	744
11/83	SYSTEM	720
12/83	SYSTEM	744

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM	744
2/84	SYSTEM	696
3/84	SYSTEM	744
4/84	SYSTEM	720
5/84	SYSTEM	744
6/84	SYSTEM	720
7/84	SYSTEM	744
8/84	SYSTEM	744
9/84	SYSTEM	720

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MONONGAHELA POWER	
PLANT NAME	PLEASANTS	
UNIT NUMBER	2	
CITY	WILLOW ISLAND	
STATE	WEST VIRGINIA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	21.	(.050 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1160	
GROSS UNIT GENERATING CAPACITY - MW	626	
NET UNIT GENERATING CAPACITY W/FGD - MW	580	
NET UNIT GENERATING CAPACITY WO/FGD - MW	595	
EQUIVALENT SCRUBBED CAPACITY - MW	626	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	FOSTER WHEELER	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	1132.56	(2400000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	132.2	(270 F)
STACK HEIGHT - M	305.	(1000 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	6.1	(20.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	29075.	(12500 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	11000-13300	
AVERAGE ASH CONTENT - %	*****	
RANGE ASH CONTENT - %	14.7-16.0	
AVERAGE MOISTURE CONTENT - %	4.50	
RANGE MOISTURE CONTENT - %	3.0-5.0	
AVERAGE SULFUR CONTENT - %	3.00	
RANGE SULFUR CONTENT - %	2.5-3.5	
AVERAGE CHLORIDE CONTENT - %	.05	
RANGE CHLORIDE CONTENT - %	*****	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** FABRIC FILTER		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	2	
NUMBER OF SPARES	0	
TYPE	COLD SIDE	
SUPPLIER	AIR CORRECTION DIVISION, UOP	
INLET FLUE GAS CAPACITY - CU.M/S	566.3	(1200000 ACFM)
INLET FLUE GAS TEMPERATURE - C	132.2	(270 F)
PARTICLE REMOVAL EFFICIENCY - %	99.5	
** PARTICLE SCRUBBER		
NUMBER	0	
GENERIC TYPE	NONE	
SPECIFIC TYPE	N/A	
TRADE NAME/COMMON NAME	N/A	
SHELL GENERIC MATERIAL	N/A	
SHELL SPECIFIC MATERIAL	N/A	
LINER GENERIC MATERIAL	N/A	
LINER SPECIFIC MATERIAL	N/A	

MONONGAHELA POWER: PLEASANTS 2 (CONT.)

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	BABCOCK & WILCOX
A-E FIRM	UNITED ENGINEERS & CONSTRUCTORS
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.55
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	90.00
ENERGY CONSUMPTION - %	2.4
CURRENT STATUS	1
COMMERCIAL START-UP	12/80
INITIAL START-UP	10/80
CONTRACT AWARDED	9/75

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	4.50	
DESIGN COAL HEAT CONTENT - J/G	28842.4	(12400 BTU/LB)
DESIGN COAL ASH CONTENT - %	16.00	
DESIGN MOISTURE CONTENT - %	5.00	
DESIGN CHLORIDE CONTENT - %	.05	
SPACE REQUIREMENTS - SQ M	20252.2	(218000 SQ FT)
OPER. & MAINT. REQUIREMENT - MANHR/DAY	208.0	

** QUENCHER/PRESATURATOR

NUMBER	4	
TYPE	VENTURI	
SUPPLIER	BABCOCK & WILCOX	
INLET GAS FLOW - CU. M/S	283.14	(600000 ACFM)
INLET GAS TEMPERATURE - C	148.9	(300 F)
PRESSURE DROP KPA	1.0	(4.0 IN-H2O)
LIQUID RECIRCULATION RATE - LITERS/S	504.	(8000 GPM)
L/G RATIO L/CU. M	1.8	(13.3 GAL/1000 ACFM)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	

** ABSORBER

NUMBER	4	
NUMBER OF SPARES	1	
GENERIC TYPE	TRAY TOWER	
SPECIFIC TYPE	SIEVE TRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	BABCOCK & WILCOX	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	NATURAL RUBBER	
LINER MATERIAL TRADE NAME/COMMON TYPE	BLACK NATURAL RUBBER	
GAS CONTACTING DEVICE TYPE	PERFORATED TRAYS	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	1008.	(16000 GPM)
L/G RATIO L/CU.M	4.0	(30.2 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	1.2	(5.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	3.0	(10.0 FT/S)
INLET GAS FLOW - CU. M/S	250.11	(530000 ACFM)
INLET GAS TEMPERATURE - C	51.7	(125 F)
SO2 REMOVAL EFFICIENCY - %	90.0	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	4
NUMBER OF SPARES PER SYSTEM	1
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONONGAHELA POWER: PLEASANTS 2 (CONT.)

TRADE NAME/COMMON TYPE	CLOSED VANE
MANUFACTURER	BABCOCK & WILCOX
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	2
NUMBER OF PASSES PER STAGE	3
DISTANCE BETWEEN STAGES - CM	213.36 (84.0 IN)
SUPERFICIAL GAS VELOCITY - M/S	3.0 (10.0 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC
CONSTRUCTION MATERIAL SPECIFIC TYPE	FIBER-REINFORCED POLYESTER
WASH WATER SOURCE	THICKENER OVERFLOW/MAKEUP
WASH FREQUENCY	CONTINUOUSLY; ONCE EVERY 2 HOURS
WASH RATE - L/S	15.1 (240 GAL/MIN)
** REHEATER	
NUMBER	1
NUMBER OF SPARES	0
GENERIC TYPE	BYPASS
SPECIFIC TYPE	COLD SIDE
TRADE NAME/COMMON TYPE	N/A
LOCATION	AHEAD OF STACK
PERCENT GAS BYPASSED - AVG	15.0
TEMPERATURE INCREASE - C	13.9 (25 F)
INLET FLUE GAS TEMPERATURE - C	51.7 (125 F)
OUTLET FLUE GAS TEMPERATURE - C	65.6 (150 F)
CONSTRUCTION MATERIAL GENERIC TYPE	NR
CONSTRUCTION MATERIAL SPECIFIC TYPE	NR
** FANS	
NUMBER	4
NUMBER OF SPARES	0
DESIGN	CENTRIFUGAL
SUPPLIER	AMERICAN STANDARD
FUNCTION	BOOSTER
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	267.10 (566000 ACFM)
FLUE GAS TEMPERATURE - C	132.2 (270 F)
PRESSURE DROP - KPA	7.9 (26.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** FANS	
NUMBER	2
NUMBER OF SPARES	0
DESIGN	NR
SUPPLIER	AMERICAN STANDARD
FUNCTION	UNIT
APPLICATION	FORCED DRAFT
SERVICE	DRY
FLUE GAS FLOW RATE - CU.M/S	493.14 (1045000 ACFM)
FLUE GAS TEMPERATURE - C	132.2 (270 F)
PRESSURE DROP KPA	7.6 (25.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL/OPPOSED BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING
SERVICE CONDITIONS	270
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	HIGH STRENGTH LOW ALLOY [HSLA]
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DAMPERS	
NUMBER	4
FUNCTION	SHUT-OFF
GENERIC TYPE	LOUVER
SPECIFIC TYPE	PARALLEL/OPPOSED BLADE MULTILOUVER
MANUFACTURER	FORNEY ENGINEERING

MONONGAHELA POWER: PLEASANTS 2 (CONT.)

SERVICE CONDITIONS	125
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC; INORGANIC
LINER SPECIFIC MATERIAL TYPE	ASPHALT-URETHANE; BOROSILICATE GLASS
** DUCTWORK	
LOCATION	OUTLET AFTER BYPASS JUNCTION
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	INORGANIC
LINER SPECIFIC MATERIAL TYPE	NR
** DUCTWORK	
LOCATION	BYPASS
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	DETENTION
DEVICE TYPE	N/A
MANUFACTURER	DORR-OLIVER
NUMBER	3
NUMBER OF SPARES	1
PRODUCT QUALITY - % SOLIDS	15.0
** TANKS	
SERVICE	NUMBER
-----	-----
RECIRCULATION	****
ME WASH	****
SLURRY TRANSFER	1
SLURRY FEED	1
THICKENER OVERFLOW	2
SLUDGE STABILIZATION	2
** PUMPS	
SERVICE	NUMBER
-----	-----
QUENCHER RECIRCULATION	8
ABSORBER RECIRCULATION	16
THICKENER UNDERFLOW	****
LIME SLURRY TRANSFER	2
LIME SLURRY FEED	****
SLUDGE TRANSFER	4
RETURN WATER	3
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	THICKENER
NUMBER	2
NUMBER OF SPARES	0
CONFIGURATION	CIRCULAR
DIMENSIONS - FT	175.0 DIA X 10.0
CAPACITY	2190000

MONONGAHELA POWER: PLEASANTS 2 (CONT.)

SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	COAL TAR EPOXY
FEED STREAM SOURCE	ABSORBER BLEED
FEED STREAM CHARACTERISTICS	6% SOLIDS
OUTLET STREAM CHARACTERISTICS	30% SOLIDS [27-32%]; PH 8.0
OUTLET STREAM DISPOSITION	TO SLUDGE TREATMENT
OVERFLOW STREAM DISPOSITION	RECIRCULATION TANK
*** SALEABLE BYPRODUCTS	
NATURE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	FIXATION
DEVICE	MIX TANK
PROPRIETARY PROCESS	DRAVO [CALCILOX]
INLET QUALITY - %	30.0
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	OFF-SITE [1.5 MILES]
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	NONE
SITE DIMENSIONS	200 ACRES X 200 FT
SITE SERVICE LIFE - YRS	31
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	OUTLET FROM ABSORBER
CHEMICAL PARAMETERS	PH, SO2
PHYSICAL VARIABLES	DENSITY, FLOW
CONTROL LEVELS	PH 5.9-6.0; 6% SOLIDS IN SLURRY
MONITOR TYPE	UNILOC [PH], LEAR SIEGLER [SO2], TEXAS NUCLEAR [
MONITOR LOCATION	ABSORBER DOWNCOMER FOR PH
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
RECEIVING WATER STREAM	OHIO RIVER
SOURCE OF MAKEUP WATER	RIVER WATER AND COOLING TOWER BLOWDOWN
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	THIOSORBIC LIME
PRINCIPAL CONSTITUENT	>90% CAO, 4-7% MGO
SOURCE/SUPPLIER	DRAVO
CONSUMPTION	11.1 TPH
UTILIZATION - %	94.0
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
ABSORBER - %	33.3
FAN - %	.0
SLAKER - %	1.0
THICKENER - %	.0
** FGD SPARE COMPONENT INDICES	
ABSORBER	1.0
FAN	.0
SLAKER	1.0
THICKENER	.0

MONONGAHELA POWER: PLEASANTS 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
10/80	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
INITIAL OPERATION OF THE FGD SYSTEM COMMENCED IN LATE OCTOBER 1980.									
11/80	SYSTEM						720		
12/80	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO MAJOR FGD PROBLEMS HAVE BEEN ENCOUNTERED.									
1/81	SYSTEM						744		60.4
** PROBLEMS/SOLUTIONS/COMMENTS									
DURING JANUARY IT WAS NECESSARY TO CLEAN THE SOLIDS OUT OF THE THICKENER OVERFLOW TANK AS A RESULT OF PROBLEMS WITH THE DENSITY CONTROL.									
2/81	SYSTEM						672		50.0
** PROBLEMS/SOLUTIONS/COMMENTS									
A NINE-FOOT SECTION OF PIPE HAD TO BE RELINED DURING THE MONTH ON MODULE B AS A RESULT OF FAILURE OF THE RUBBER LINER.									
3/81	SYSTEM						744		72.0
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MARCH.									
4/81	SYSTEM						720		
5/81	SYSTEM						744		
6/81	SYSTEM						720		
7/81	SYSTEM						744		
8/81	SYSTEM						744		
9/81	SYSTEM						720		
10/81	SYSTEM						744		
11/81	SYSTEM						720		
12/81	SYSTEM						744		
1/82	SYSTEM						744		
2/82	SYSTEM						672		
3/82	SYSTEM						744		
4/82	SYSTEM						744		
5/82	SYSTEM						744		
6/82	SYSTEM						744		

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONONGAHELA POWER: PLEASANTS 2 (CONT.)

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PER PART.	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/82	SYSTEM							744		
8/82	SYSTEM							744		
9/82	SYSTEM							720		
10/82	SYSTEM							744		
11/82	SYSTEM							720		
12/82	SYSTEM							744		

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE PERIOD OF APRIL 1981 TO DECEMBER 1982.

1/83	2A	76.2			62.0					
	2B	94.9			77.2					
	2C	16.4			13.3					
	2D	100.0			81.7					
	SYSTEM	95.8			78.0		744	605	581	58.0
2/83	2A	.0			.0					
	2B	72.3			72.3					
	2C	99.3			99.3					
	2D	99.6			99.6					
	SYSTEM	90.4			90.4		672	672	607	70.0
3/83	2A	27.7			27.7					
	2B	90.3			90.3					
	2C	30.6			30.6					
	2D	72.6			72.6					
	SYSTEM	73.7			73.7		744	744	549	70.0
4/83	2A	98.1			63.5					
	2B	100.0			68.1					
	2C	.0			.0					
	2D	.0			.0					
	SYSTEM	67.7			43.8		720	466	474	35.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT 2 STACK BRICK LINING WAS REPAIRED DURING APRIL. A CROSS-OVER DUCT TO UNIT 1 WAS USED DURING THE REPAIR WORK TO KEEP UNIT 2 IN SERVICE.

5/83	2A	100.0			99.7					
	2B	65.0			64.7					
	2C	.0			.0					
	2D	99.2			98.7					
	SYSTEM	88.1			87.7		744	740	652	69.0
6/83	2A	97.9			97.9					
	2B	100.0			100.0					
	2C	63.2			63.2					
	2D	37.2			37.2					
	SYSTEM	99.4			99.4		720	720	716	70.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING MAY AND JUNE, 1983.

7/83	SYSTEM						744			
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MONONGAHELA POWER: PLEASANTS 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
8/83	SYSTEM							744	
9/83	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE THIRD QUARTER OF 1983.									
10/83	SYSTEM							744	
11/83	SYSTEM							720	
12/83	SYSTEM							744	
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.									
1/84	SYSTEM							744	
2/84	SYSTEM							696	
3/84	SYSTEM							744	
4/84	SYSTEM							720	
5/84	SYSTEM							744	
6/84	SYSTEM							720	
7/84	SYSTEM							744	
8/84	SYSTEM							744	
9/84	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE FIRST THREE QUARTERS OF 1984.									

SECTION 13
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MONTANA POWER
PLANT NAME	COLSTRIP
UNIT NUMBER	1
CITY	COLSTRIP
STATE	MONTANA
REGULATORY CLASSIFICATION	D
PARTICULATE EMISSION LIMITATION - NG/J	43. (.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516. (1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301. (.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	664
GROSS UNIT GENERATING CAPACITY - MW	360
NET UNIT GENERATING CAPACITY W/FGD - MW	332
NET UNIT GENERATING CAPACITY WO/FGD - MW	344
EQUIVALENT SCRUBBED CAPACITY - MW	360
** UNIT DATA - BOILER AND STACK	
BOILER SUPPLIER	COMBUSTION ENGINEERING
BOILER TYPE	PULVERIZED COAL
BOILER SERVICE LOAD	BASE
DESIGN BOILER FLUE GAS FLOW - CU.M/S	674.82 (1430000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	143.9 (291 F)
STACK HEIGHT M	153. (503 FT)
STACK SHELL	CONCRETE
STACK TOP DIAMETER - M	5.0 (16.5 FT)
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20569. (8843 BTU/LB)
RANGE HEAT CONTENT - BTU/LB	8162-8897
AVERAGE ASH CONTENT - %	8.60
RANGE ASH CONTENT - %	6.1-12.6
AVERAGE MOISTURE CONTENT - %	23.90
RANGE MOISTURE CONTENT %	21.0-25.0
AVERAGE SULFUR CONTENT - %	.78
RANGE SULFUR CONTENT - %	0.4-1.0
AVERAGE CHLORIDE CONTENT - %	.01
RANGE CHLORIDE CONTENT - %	*****
*** PARTICLE CONTROL	
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	0
TYPE	NONE
** PARTICLE SCRUBBER	
NUMBER	3
NUMBER OF SPARES	0
INITIAL START-UP DATE	9/75
GENERIC TYPE	VENTURI TOWER
SPECIFIC TYPE	VARIABLE-THROAT/TOP-ENTRY PLUMB BOB
TRADE NAME/COMMON NAME	N/A
SUPPLIER	THYSSEN/CEA
DIMENSIONS FT	15.0 DIA
SHELL GENERIC MATERIAL	CARBON STEEL
SHELL SPECIFIC MATERIAL	AISI 1110
LINER GENERIC MATERIAL	INORGANIC
LINER SPECIFIC MATERIAL	PREFIRED BRICK/SHAPES
GAS CONTACTING DEVICE TYPE	NONE
NUMBER OF CONTACTING ZONES	1
LIQUID RECIRCULATION RATE - LITER/S	415.8 (6600 GPM)
L/G RATIO - LITER/CU.M	1.8 (13.8 GAL/1000ACF)
PH CONTROL ADDITIVE	LIME/ALKALINE FLY ASH
PRESSURE DROP KPA	4.2 (17.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	61.0 (200.0 FT/S)

MONTANA POWER: COLSTRIP 1 (CONT.)

INLET GAS FLOW RATE - CU.M/S	225.1	(477000 ACFM)
INLET GAS TEMPERATURE - C	143.9	(291 F)
PARTICLE REMOVAL EFFICIENCY - %	99.5	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	THYSSEN/CEA
A-E FIRM	BECHTEL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	60.00
ENERGY CONSUMPTION - %	3.3
CURRENT STATUS	1
COMMERCIAL START-UP	11/75
INITIAL START-UP	9/75
CONTRACT AWARDED	10/72

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT %	1.00	
DESIGN COAL HEAT CONTENT - J/G	18984.8	(8162 BTU/LB)
DESIGN COAL ASH CONTENT - %	12.60	
DESIGN MOISTURE CONTENT - %	25.00	
DESIGN CHLORIDE CONTENT - %	.01	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	152.0	

** QUENCHER/PRESATURATOR

NUMBER	0
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** ABSORBER

NUMBER	3	
NUMBER OF SPARES	0	
GENERIC TYPE	COMBINATION TOWER	
SPECIFIC TYPE	VENTURI/SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	THYSSEN/CEA	
DIMENSIONS - FT	35 DIA X 70.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER; INERT FLAKE-FILLED	
LINER MATERIAL TRADE NAME/COMMON TYPE	RIGIFLAK 4850; PLASITE 4020 & 4030	
GAS CONTACTING DEVICE TYPE	VENTURI THROAT AND SPRAY ZONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	479.	(7600 GPM)
L/G RATIO L/CU.M	2.4	(17.8 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	4.4	(17.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.7	(9.0 FT/S)
INLET GAS FLOW - CU. M/S	201.31	(426600 ACFM)
INLET GAS TEMPERATURE - C	48.9	(120 F)
SO2 REMOVAL EFFICIENCY - %	80.0	
PARTICLE REMOVAL EFFICIENCY - %	99.5	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	3
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
MANUFACTURER	HEIL
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	4

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONTANA POWER: COLSTRIP 1 (CONT.)

FREEBOARD DISTANCE - M	3.96	(13.0 FT)
DISTANCE BETWEEN VANES - CM	2.5	(1.00 IN)
VANE ANGLES - DEGREES	120	
PRESSURE DROP - KPA	.1	(.3 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	2.7	(8.7 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	BLENDED	
WASH FREQUENCY	CONTINUOUS UNDERSPRAY AND ONCE/DAY OVERSPRAY	
WASH RATE - L/S	51.1	(810 GAL/MIN)
** REHEATER		
NUMBER	3	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	STEAM	
TRADE NAME/COMMON TYPE	PLATECOIL	
LOCATION	IN DUCT AFTER ABSORBER	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	30.6	(55 F)
INLET FLUE GAS FLOW RATE - CU. M/S	201.31	(426600 ACFM)
INLET FLUE GAS TEMPERATURE - C	48.9	(120 F)
OUTLET FLUE GAS TEMPERATURE - C	79.4	(175 F)
NUMBER OF HEAT EXCHANGER BANKS	12	
NUMBER OF BUNDLES PER BANK	11	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM; NIC	
** FANS		
NUMBER	3	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	UNIT	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	223.21	(473000 ACFM)
FLUE GAS TEMPERATURE - C	79.4	(175 F)
PRESSURE DROP - KPA	11.0	(36.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; ORGANIC	
** DAMPERS		
NUMBER	3	
FUNCTION	SHUT-OFF	
GENERIC TYPE	BUTTERFLY	
SPECIFIC TYPE	N/A	
MANUFACTURER	ALLIS-CHALMERS	
MODULATION	OPEN/CLOSED	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	3	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	SIDE-ENTRY GUILLOTINE	
MANUFACTURER	MOSSER	
MODULATION	OPEN/CLOSED	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	
** DAMPERS		
NUMBER	6	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	

MONTANA POWER: COLSTRIP 1 (CONT.)

MANUFACTURER	BUFFALO FORGE
MODULATION	VARIOUS
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** DUCTWORK	
LOCATION	REHEATER
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	PASTE
MANUFACTURER	BIF
NUMBER	2
NUMBER OF SPARES	1
PRODUCT QUALITY - % SOLIDS	10.0
** TANKS	
SERVICE	NUMBER
-----	-----
VENTURI & ABSORBER RECYCLE	3
SLURRY TRANSFER	1
SLURRY STORAGE	1
EFFLUENT BLEED	1
TRAY WASH WATER RECYCLE	1
** PUMPS	
SERVICE	NUMBER
-----	-----
VENTURI RECIRCULATION	6
ABSORBER RECIRCULATION	6
POND RETURN	3
LIME SYSTEM	****
EFFLUENT BLEED	2
TRAY WASH WATER RECYCLE	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A

MONTANA POWER: COLSTRIP 1 (CONT.)

** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING [BENTONITE]
SITE DIMENSIONS	15 ACRE/20-30 FEET DEEP
SITE CAPACITY - CU.M	550350 (450.0 ACRE-FT)
SITE SERVICE LIFE - YRS	3
** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING [BENTONITE]
SITE DIMENSIONS	15 ACRE/20-30 FEET DEEP
SITE CAPACITY CU.M	550350 (450.0 ACRE-FT)
SITE SERVICE LIFE YRS	3
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING [BENTONITE]
SITE DIMENSIONS	150 ACRE/20-30 FEET DEEP
SITE CAPACITY - CU.M	5503500 (4500.0 ACRE-FT)
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	RECIRCULATING SLURRY
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	% SOLIDS, FLOW, PRESSURE
CONTROL LEVELS	PH 4.5 TO 5.5
MONITOR LOCATION	RECIRCULATION TANK
PROCESS CONTROL MANNER	MANUAL
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	1.9 (30 GPM)
POND SEEPAGE/RUNOFF WATER LOSS LITERS/S	0
MAKEUP WATER ADDITION - LITERS/S	18.3 (290 GPM)
SOURCE OF MAKEUP WATER	ME WASH, LIME SLAKER, AND SEAL WATER
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIME/FLY ASH
PRINCIPAL CONSTITUENT	90% CAO/16-21% CAO AND 5% MGO
SOURCE/SUPPLIER	PETE LIENE
CONSUMPTION	5 TPD [LIME]
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
SCRUBBER - %	20.0
ABSORBER %	20.0
MIST ELIMINATOR - %	.0
REHEATER - %	50.0
FAN %	20.0
SLAKER - %	100.0
EFFLUENT HOLD TANK %	20.0
RECIRCULATION PUMP - %	50.0
** FGD SPARE COMPONENT INDICES	
SCRUBBER	.5
ABSORBER	.5
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.5

MONTANA POWER: COLSTRIP 1 (CONT.)

SLAKER	1.0
EFFLUENT HOLD TANK	.5
RECIRCULATION PUMP	1.0

-----PERFORMANCE DATA-----										
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	FACTOR
9/75	SYSTEM	.0						720	72	.5
10/75	SYSTEM	.0						744	456	19.4
11/75	SYSTEM	.0						720	576	42.2
12/75	SYSTEM	.0						744	720	59.9
1/76	SYSTEM	90.0						744	672	63.8
2/76	SYSTEM	98.0						696	624	65.4
3/76	SYSTEM	97.6						744	576	57.0
4/76	SYSTEM	74.2						720	672	49.9
5/76	SYSTEM	96.8						744	336	26.0
6/76	SYSTEM	.0			.0			720	0	0 .0
7/76	SYSTEM	93.2						744	480	28.0
8/76	SYSTEM	94.7						744	552	37.8
9/76	SYSTEM	88.6						720	720	64.5
10/76	SYSTEM	79.9						744	720	73.1

** PROBLEMS/SOLUTIONS/COMMENTS

A TEMPERATURE EXCURSION RESULTED IN DAMAGE TO SYSTEM COMPONENTS CAUSING SYSTEM DOWNTIME.

THE EMERGENCY SCRUBBER QUENCH WATER SUPPLY SYSTEM FAILED TO OPERATE DURING A TEMPERATURE EXCURSION RESULTING IN INTERNAL DAMAGE.

THE LININGS WERE DAMAGED DURING THE OCTOBER TEMPERATURE EXCURSION.

MIST ELIMINATOR DAMAGE OCCURRED AS THE RESULT OF THE TEMPERATURE EXCURSION IN OCTOBER.

11/76	SYSTEM	62.7						720	720	55.6
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** PROBLEMS/SOLUTIONS/COMMENTS

A FAILURE OF AN ID FAN MOTOR OCCURRED IN NOVEMBER.

12/76	SYSTEM	73.8						744	744	67.2
1/77	SYSTEM	92.5						744	744	72.9
2/77	SYSTEM	95.4						672	48	3.0
3/77	SYSTEM	.0			.0			744	0	0 .0
4/77	SYSTEM	83.0						720	600	49.9
5/77	SYSTEM	85.4						744	624	64.1
6/77	SYSTEM	87.4						720	672	68.6

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONTANA POWER: COLSTRIP 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER BOILER HOURS	FGD CAP. HOURS FACTOR
7/77	SYSTEM	85.1						744	696 71.8
8/77	SYSTEM	93.3						744	
9/77	SYSTEM	92.5						720	
10/77	SYSTEM	95.6						744	
11/77	SYSTEM	96.3						720	
12/77	SYSTEM	98.3						744	
1/78	SYSTEM	95.7						744	
2/78	SYSTEM	99.5						672	
3/78	SYSTEM	92.0						744	
4/78	SYSTEM	99.8						720	
5/78	SYSTEM	66.0			1.3			744	10

** PROBLEMS/SOLUTIONS/COMMENTS

THE 66% MAY AVAILABILITY IS BASED UPON 9.92 HOURS OF OPERATION ON TWO SCRUBBERS WHILE THE UNIT WAS BEING BROUGHT BACK ON LINE AFTER COMPLETION OF ITS ANNUAL OVERHAUL.

THE ID FAN MOTOR FOR MODULE 1A WAS NOT AVAILABLE DURING UNIT RESTART IN MAY.

6/78	SYSTEM	76.0						720	
7/78	SYSTEM	95.7						744	
8/78	SYSTEM	97.0						744	
9/78	SYSTEM	96.0						720	
10/78	SYSTEM	95.0						744	
11/78	SYSTEM	91.0						720	
12/78	SYSTEM	96.7						744	
1/79	SYSTEM	97.6						744	
2/79	SYSTEM	90.3						672	
3/79	SYSTEM	97.3						744	
4/79	SYSTEM	98.9	88.4		80.2			720	597
5/79	SYSTEM	89.7						744	
6/79	SYSTEM	95.2						720	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY AND JUNE THE UNIT WAS BEING OVERHAULED. THE AVAILABILITY FOR THESE PERIODS IS BASED UPON OPERATIONS BEFORE AND AFTER OVERHAUL.

7/79	SYSTEM	98.0						744	
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MONTANA POWER: COLSTRIP 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
8/79	SYSTEM	97.3					744		
9/79	SYSTEM	95.2					720		
10/79	SYSTEM	92.9					744		
11/79	SYSTEM	97.5					720		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE ROUTINE MAINTENANCE CAN BE PERFORMED WHILE THE MODULES ARE ON LINE SO THE AVAILABILITY REMAINS HIGH.									
12/79	SYSTEM	95.9					744		
1/80	SYSTEM	96.5					744		
2/80	SYSTEM	97.4					696		
3/80	SYSTEM	95.4					744		
** PROBLEMS/SOLUTIONS/COMMENTS									
TOTAL SYSTEM AVAILABILITY CONTINUES TO BE HIGH WITH NO MAJOR FGD SYSTEM PROBLEMS REPORTED DURING THE FIRST QUARTER OF 1980.									
4/80	SYSTEM	99.8					720		
** PROBLEMS/SOLUTIONS/COMMENTS									
NO MAJOR PROBLEMS WITH THE FGD SYSTEM WERE REPORTED BY THE UTILITY DURING APRIL.									
5/80	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
NO AVAILABILITY DATA WERE REPORTED BY THE UTILITY BECAUSE OF A SCHEDULED BOILER AND FGD SYSTEM OUTAGE FOR ROUTINE MAINTENANCE.									
6/80	SYSTEM	77.7					720		
** PROBLEMS/SOLUTIONS/COMMENTS									
LOW AVAILABILITY DURING JUNE WAS A RESULT OF THE ANNUAL BOILER AND FGD SYSTEM MAINTENANCE OUTAGE.									
7/80	SYSTEM	98.6					744		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED DURING JULY.									
8/80	SYSTEM	99.3					744		
9/80	SYSTEM	98.3					720		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED FOR THE MONTHS OF AUGUST AND SEPTEMBER.									
10/80		96.2							

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONTANA POWER: COLSTRIP 1 (CONT.)

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	SYSTEM							744			
11/80	SYSTEM	98.2						720			
12/80	SYSTEM	99.0						744			
** PROBLEMS/SOLUTIONS/COMMENTS											
THE UTILITY REPORTED NO MAJOR FGD PROBLEMS DURING THE FOURTH QUARTER 1980.											
1/81	SYSTEM	96.0						744			
2/81	SYSTEM	97.4						672			
** PROBLEMS/SOLUTIONS/COMMENTS											
DURING JANUARY-FEBRUARY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.											
3/81	SYSTEM	99.8						744			
4/81	SYSTEM	96.6						720			
5/81	SYSTEM	97.1						744			
6/81	SYSTEM	.0						720		0	
** PROBLEMS/SOLUTIONS/COMMENTS											
DURING JUNE THE BOILER WAS OUT OF SERVICE FOR A SCHEDULED OVERHAUL. DURING THIS TIME ROUTINE PATCHING WAS PERFORMED ON THE FGD SYSTEM.											
7/81	SYSTEM	99.3						744			
8/81	SYSTEM	99.2						744			
9/81	SYSTEM	96.9						720			
** PROBLEMS/SOLUTIONS/COMMENTS											
DURING THE THIRD QUARTER NO FGD-RELATED PROBLEMS WERE ENCOUNTERED.											
10/81	SYSTEM	98.4						744			
11/81	SYSTEM	92.8						720			
12/81	SYSTEM	96.9						744			
** PROBLEMS/SOLUTIONS/COMMENTS											
DURING THE FOURTH QUARTER THE UTILITY REPORTED THAT NO PROBLEMS WERE ENCOUNTERED WITH THE FGD SYSTEM.											
1/82	SYSTEM	92.8						744			
2/82	SYSTEM	.0						672			
3/82	SYSTEM	.0						744			

MONTANA POWER: COLSTRIP 1 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY AND MARCH THE UNIT AND THE FGD SYSTEM WERE TAKEN OFF-LINE FOR AN ANNUAL OVERHAUL.

4/82	SYSTEM						720		
5/82	SYSTEM						744		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL AND MAY THE UNIT AND FGD SYSTEM WERE OFF-LINE FOR SCHEDULED MAINTENANCE.

6/82	SYSTEM	98.5					720		
7/82	SYSTEM	94.2					744		
8/82	SYSTEM	91.0					744		
9/82	SYSTEM	97.3					720		
10/82	SYSTEM	93.8					744		
11/82	SYSTEM	89.5					720		
12/82	SYSTEM	94.7					744		
1/83	SYSTEM	97.5					744		
2/83	SYSTEM	96.7					672		
3/83	SYSTEM	97.8					744		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE LAST TEN MONTHS OF OPERATION. DURING THIS PERIOD OF TIME THE AVERAGE FGD SYSTEM AVAILABILITY WAS 95.1 PERCENT.

4/83	SYSTEM	87.0					720		
5/83	SYSTEM	.0					744		
6/83	SYSTEM	.0					720		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY AND JUNE THE UNIT AND THE FGD SYSTEM WERE TAKEN OFF-LINE FOR A SCHEDULED SPRING OVERHAUL.

7/83	SYSTEM						744		
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** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE MONTH OF JULY.

8/83	SYSTEM	95.6					744		
9/83	SYSTEM	90.0					720		

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-----PERFORMANCE DATA-----
PERIOD  MODULE  AVAILABILITY  OPERABILITY  RELIABILITY  UTILIZATION  % REMOVAL  PER  BOILER  FGD  CAP.
              SO2  PART.  HOURS  HOURS  HOURS  HOURS  HOURS  HOURS  FACTOR
-----

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** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST AND SEPTEMBER.

10/83	SYSTEM								744
11/83	SYSTEM								720
12/83	SYSTEM								744

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.

1/84	SYSTEM	92.9							744
2/84	SYSTEM	90.6							696
3/84	SYSTEM	93.9							744

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE REPORTED DURING THE FIRST QUARTER OF 1984

4/84	SYSTEM	98.4							720
5/84	SYSTEM	96.9							744

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE REPORTED DURING APRIL AND MAY 1984.

6/84	SYSTEM								720
7/84	SYSTEM								744

** PROBLEMS/SOLUTIONS/COMMENTS

A SCHEDULED OVERHAUL WAS MADE DURING JUNE AND JULY 1984.

8/84	SYSTEM								744
9/84	SYSTEM								720

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.

SECTION 13

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MONTANA POWER	
PLANT NAME	COLSTRIP	
UNIT NUMBER	2	
CITY	COLSTRIP	
STATE	MONTANA	
REGULATORY CLASSIFICATION	D	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	516.	(1.200 LB/MMBTU)
NOX EMISSION LIMITATION - NG/J	301.	(.700 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	664	
GROSS UNIT GENERATING CAPACITY - MW	360	
NET UNIT GENERATING CAPACITY W/FGD - MW	332	
NET UNIT GENERATING CAPACITY WO/FGD - MW	344	
EQUIVALENT SCRUBBED CAPACITY - MW	360	
** UNIT DATA - BOILER AND STACK		
BOILER SUPPLIER	COMBUSTION ENGINEERING	
BOILER TYPE	PULVERIZED COAL	
BOILER SERVICE LOAD	BASE	
DESIGN BOILER FLUE GAS FLOW - CU.M/S	674.82	(1430000 ACFM)
BOILER FLUE GAS TEMPERATURE - C	143.9	(291 F)
STACK HEIGHT - M	153.	(503 FT)
STACK SHELL	CONCRETE	
STACK TOP DIAMETER - M	5.0	(16.5 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	20569.	(8843 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		8162-8897
AVERAGE ASH CONTENT - %	8.60	
RANGE ASH CONTENT - %	6.1-12.6	
AVERAGE MOISTURE CONTENT - %	23.90	
RANGE MOISTURE CONTENT - %	21.0-25.0	
AVERAGE SULFUR CONTENT - %	.78	
RANGE SULFUR CONTENT - %	0.4-1.0	
AVERAGE CHLORIDE CONTENT - %	.01	
RANGE CHLORIDE CONTENT - %	*****	
*** PARTICLE CONTROL		
** MECHANICAL COLLECTOR		
NUMBER	0	
TYPE	NONE	
** ESP		
NUMBER	0	
TYPE	NONE	
** PARTICLE SCRUBBER		
NUMBER	3	
NUMBER OF SPARES	0	
INITIAL START-UP DATE	5/76	
GENERIC TYPE	VENTURI TOWER	
SPECIFIC TYPE	VARIABLE-THROAT/TOP-ENTRY PLUMB BOB	
TRADE NAME/COMMON NAME	N/A	
SUPPLIER	THYSSEN/CEA	
DIMENSIONS - FT	15.0 DIA	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
LINER GENERIC MATERIAL	INORGANIC	
LINER SPECIFIC MATERIAL	REFIRED BRICK/SHAPES	
GAS CONTACTING DEVICE TYPE	NONE	
NUMBER OF CONTACTING ZONES	1	
LIQUID RECIRCULATION RATE - LITER/S	415.8	(6600 GPM)
L/G RATIO - LITER/CU.M	1.8	(13.8 GAL/1000ACF)
PH CONTROL ADDITIVE	LIME/ALKALINE FLY ASH	
PRESSURE DROP - KPA	4.2	(17.0 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/S	61.0	(200.0 FT/S)

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONTANA POWER: COLSTRIP 2 (CONT.)

INLET GAS FLOW RATE - CU.M/S	225.1	(477000 ACFM)
INLET GAS TEMPERATURE - C	143.9	(291 F)
PARTICLE REMOVAL EFFICIENCY - %	99.5	

*** FGD SYSTEM

** GENERAL DATA

SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT
SO2 REMOVAL MODE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
PROCESS ADDITIVES	NONE
SYSTEM SUPPLIER	THYSSEN/CEA
A-E FIRM	BECHTEL
DEVELOPMENT LEVEL	FULL SCALE
NEW/RETROFIT	NEW
UNIT DESIGN PARTICLE REMOVAL EFFICIENCY - %	99.50
UNIT DESIGN SO2 REMOVAL EFFICIENCY - %	60.00
ENERGY CONSUMPTION - %	3.3
CURRENT STATUS	1
COMMERCIAL START-UP	10/76
INITIAL START-UP	5/76
CONTRACT AWARDED	10/72

** DESIGN AND OPERATING PARAMETERS

DESIGN COAL SULFUR CONTENT - %	1.00	
DESIGN COAL HEAT CONTENT - J/G	18984.8	(8162 BTU/LB)
DESIGN COAL ASH CONTENT - %	12.60	
DESIGN MOISTURE CONTENT - %	25.00	
DESIGN CHLORIDE CONTENT - %	.01	
OPER. & MAINT. REQUIREMENT - MANHR/DAY	152.0	

** QUENCHER/PRESATURATOR

NUMBER	0
--------	---

** ABSORBER

NUMBER	3	
NUMBER OF SPARES	0	
GENERIC TYPE	COMBINATION TOWER	
SPECIFIC TYPE	VENTURI/SPRAY	
TRADE NAME/COMMON TYPE	N/A	
SUPPLIER	THYSSEN/CEA	
DIMENSIONS - FT	35 DIA X 70.5	
SHELL GENERIC MATERIAL	CARBON STEEL	
SHELL SPECIFIC MATERIAL	AISI 1110	
SHELL MATERIAL TRADE NAME/COMMON TYPE	N/A	
LINER GENERIC MATERIAL	ORGANIC	
LINER SPECIFIC MATERIAL	GLASS FLAKE-FILLED POLYESTER; INERT FLAKE-FILLED	
LINER MATERIAL TRADE NAME/COMMON TYPE	RIGIFLAK 4850; PLASITE 4020 & 4030	
GAS CONTACTING DEVICE TYPE	VENTURI THROAT AND SPRAY ZONE	
NUMBER OF CONTACTING ZONES	2	
LIQUID RECIRCULATION RATE - LITER/S	479.	(7600 GPM)
L/G RATIO - L/CU.M	2.4	(17.8 GAL/1000 ACF)
GAS-SIDE PRESSURE DROP - KPA	4.4	(17.5 IN-H2O)
SUPERFICIAL GAS VELOCITY - M/SEC	2.7	(9.0 FT/S)
INLET GAS FLOW - CU. M/S	201.31	(426600 ACFM)
INLET GAS TEMPERATURE - C	48.9	(120 F)
SO2 REMOVAL EFFICIENCY - %	80.0	
PARTICLE REMOVAL EFFICIENCY - %	99.5	

** MIST ELIMINATOR

PRE-MIST ELIMINATOR/MIST ELIMINATOR	PRIMARY COLLECTOR
NUMBER PER SYSTEM	3
NUMBER OF SPARES PER SYSTEM	0
NUMBER PER MODULE	1
GENERIC TYPE	IMPINGEMENT
SPECIFIC TYPE	BAFFLE
TRADE NAME/COMMON TYPE	CLOSED VANE
MANUFACTURER	HEIL
CONFIGURATION	HORIZONTAL
NUMBER OF STAGES	1
NUMBER OF PASSES PER STAGE	4

MONTANA POWER: COLSTRIP 2 (CONT.)

FREEBOARD DISTANCE - M	3.96	(13.0 FT)
DISTANCE BETWEEN VANES - CM	2.5	(1.00 IN)
VANE ANGLES - DEGREES	120	
PRESSURE DROP - KPA	.1	(.3 IN-H2O)
SUPERFICAL GAS VELOCITY - M/S	2.7	(8.7 FT/S)
CONSTRUCTION MATERIAL GENERIC TYPE	ORGANIC	
CONSTRUCTION MATERIAL SPECIFIC TYPE	POLYPHENYLENE	
WASH WATER SOURCE	BLENDED	
WASH FREQUENCY	CONTINUOUS UNDERSPRAY AND ONCE/DAY OVERSPRAY	
WASH RATE - L/S	51.1	(810 GAL/MIN)

** REHEATER

NUMBER	3	
NUMBER OF SPARES	0	
NUMBER PER MODULE	1	
GENERIC TYPE	IN-LINE	
SPECIFIC TYPE	STEAM	
TRADE NAME/COMMON TYPE	PLATECOIL	
LOCATION	IN DUCT AFTER ABSORBER	
PERCENT GAS BYPASSED - AVG	.0	
TEMPERATURE INCREASE - C	30.6	(55 F)
INLET FLUE GAS FLOW RATE - CU. M/S	201.31	(426600 ACFM)
INLET FLUE GAS TEMPERATURE - C	48.9	(120 F)
OUTLET FLUE GAS TEMPERATURE - C	79.4	(175 F)
NUMBER OF HEAT EXCHANGER BANKS	12	
NUMBER OF BUNDLES PER BANK	11	
CONSTRUCTION MATERIAL GENERIC TYPE	HIGH ALLOY	
CONSTRUCTION MATERIAL SPECIFIC TYPE	NICKEL BASE/CHROMIUM-IRON-COPPER-MOLYBDENUM; NIC	

** FANS

NUMBER	3	
NUMBER OF SPARES	0	
DESIGN	CENTRIFUGAL	
SUPPLIER	BUFFALO FORGE	
FUNCTION	UNIT	
APPLICATION	INDUCED DRAFT	
SERVICE	DRY	
FLUE GAS FLOW RATE - CU.M/S	223.21	(473000 ACFM)
FLUE GAS TEMPERATURE - C	79.4	(175 F)
PRESSURE DROP - KPA	11.0	(36.0 IN-H2O)
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL; ORGANIC	

** DAMPERS

NUMBER	3	
FUNCTION	SHUT-OFF	
GENERIC TYPE	BUTTERFLY	
SPECIFIC TYPE	N/A	
MANUFACTURER	ALLIS-CHALMERS	
MODULATION	OPEN/CLOSED	
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	

** DAMPERS

NUMBER	3	
FUNCTION	SHUT-OFF	
GENERIC TYPE	GUILLOTINE	
SPECIFIC TYPE	SIDE-ENTRY GUILLOTINE	
MANUFACTURER	MOSSER	
MODULATION	OPEN/CLOSED	
CONSTRUCTION MATERIAL GENERIC TYPE	STAINLESS STEEL	
CONSTRUCTION MATERIAL SPECIFIC TYPE	AUSTENITIC	
LINER GENERIC MATERIAL TYPE	NONE	
LINER SPECIFIC MATERIAL TYPE	N/A	

** DAMPERS

NUMBER	6	
FUNCTION	CONTROL	
GENERIC TYPE	LOUVER	
SPECIFIC TYPE	PARALLEL BLADE MULTILOUVER	

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONTANA POWER: COLSTRIP 2 (CONT.)

MANUFACTURER	BUFFALO FORGE
MODULATION	VARIOUS
CONSTRUCTION MATERIAL GENERIC TYPE	CARBON STEEL
CONSTRUCTION MATERIAL SPECIFIC TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	INLET
CONFIGURATION	CIRCULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** DUCTWORK	
LOCATION	OUTLET
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	CARBON STEEL
SHELL SPECIFIC MATERIAL TYPE	AISI 1110
LINER GENERIC MATERIAL TYPE	ORGANIC
LINER SPECIFIC MATERIAL TYPE	GLASS FLAKE-FILLED POLYESTER
** DUCTWORK	
LOCATION	REHEATER
CONFIGURATION	RECTANGULAR
SHELL GENERIC MATERIAL TYPE	STAINLESS STEEL
SHELL SPECIFIC MATERIAL TYPE	AUSTENITIC
LINER GENERIC MATERIAL TYPE	NONE
LINER SPECIFIC MATERIAL TYPE	N/A
** REAGENT PREPARATION EQUIPMENT	
FUNCTION	SLAKER
DEVICE	PASTE
MANUFACTURER	BIF
NUMBER	2
NUMBER OF SPARES	1
PRODUCT QUALITY - % SOLIDS	10.0
** TANKS	
SERVICE	NUMBER
-----	-----
VENTURI & ABSORBER RECYCLE	3
SLURRY TRANSFER	1
SLURRY STORAGE	1
EFFLUENT BLEED	1
TRAY WASH WATER RECYCLE	1
** PUMPS	
SERVICE	NUMBER
-----	-----
VENTURI RECIRCULATION	6
ABSORBER RECIRCULATION	6
POND RETURN	3
LIME SYSTEM	****
EFFLUENT BLEED	2
TRAY WASH WATER RECYCLE	2
** SOLIDS CONCENTRATING/DEWATERING	
DEVICE	NONE
*** SLUDGE	
** TREATMENT	
METHOD	BLEED
DEVICE	N/A
PROPRIETARY PROCESS	N/A

MONTANA POWER: COLSTRIP 2 (CONT.)

** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING [BENTONITE]
SITE DIMENSIONS	15 ACRE/20-30 FEET DEEP
SITE CAPACITY - CU.M	550350 (450.0 ACRE-FT)
SITE SERVICE LIFE - YRS	3
** DISPOSAL	
NATURE	INTERIM
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING [BENTONITE]
SITE DIMENSIONS	15 ACRE/20-30 FEET DEEP
SITE CAPACITY - CU.M	550350 (450.0 ACRE-FT)
SITE SERVICE LIFE - YRS	3
** DISPOSAL	
NATURE	FINAL
TYPE	POND
LOCATION	ON-SITE
SITE TRANSPORTATION METHOD	PIPELINE
SITE TREATMENT	CLAY LINING [BENTONITE]
SITE DIMENSIONS	150 ACRE/20-30 FEET DEEP
SITE CAPACITY - CU.M	5503500 (4500.0 ACRE-FT)
SITE SERVICE LIFE - YRS	10
** PROCESS CONTROL AND INSTRUMENTATION	
PROCESS STREAM	RECIRCULATING SLURRY
CHEMICAL PARAMETERS	PH
PHYSICAL VARIABLES	% SOLIDS, FLOW, PRESSURE
CONTROL LEVELS	PH 4.5 TO 5.5
MONITOR LOCATION	RECIRCULATION TANK
PROCESS CONTROL MANNER	MANUAL
PROCESS CHEMISTRY MODE	FEEDBACK
** WATER BALANCE	
WATER LOOP TYPE	CLOSED
EVAPORATION WATER LOSS - LITER/S	1.9 (30 GPM)
POND SEEPAGE/RUNOFF WATER LOSS - LITERS/S	0
MAKEUP WATER ADDITION - LITERS/S	18.3 (290 GPM)
SOURCE OF MAKEUP WATER	ME WASH, LIME SLAKER, AND SEAL WATER
** CHEMICALS AND CONSUMPTION	
FUNCTION	ABSORBENT
NAME	LIME/FLY ASH
PRINCIPAL CONSTITUENT	90% CAO/16-21% CAO AND 5% MGO
SOURCE/SUPPLIER	PETE LIENE
CONSUMPTION	5 TPD [LIME]
POINT OF ADDITION	SLAKER
** FGD SPARE CAPACITY INDICES	
SCRUBBER - %	20.0
ABSORBER - %	20.0
MIST ELIMINATOR - %	.0
REHEATER - %	50.0
FAN %	20.0
SLAKER - %	100.0
EFFLUENT HOLD TANK - %	20.0
RECIRCULATION PUMP - %	50.0
** FGD SPARE COMPONENT INDICES	
SCRUBBER	.5
ABSORBER	.5
MIST ELIMINATOR	.0
REHEATER	.0
FAN	.5

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONTANA POWER: COLSTRIP 2 (CONT.)

SLAKER	1.0
EFFLUENT HOLD TANK	.5
RECIRCULATION PUMP	1.0

-----PERFORMANCE DATA-----											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/76	SYSTEM	100.0						744	72		1.3
6/76	SYSTEM	99.7						720	384		23.2
7/76	SYSTEM	98.7						744	312		19.5
8/76	SYSTEM	95.8						744	240		13.0
9/76	SYSTEM	98.3						720	720		64.6
10/76	SYSTEM	90.3						744	744		77.0
11/76	SYSTEM	94.1						720	720		79.7
12/76	SYSTEM	92.5						744	744		82.3
1/77	SYSTEM	83.4						744	720		68.2
2/77	SYSTEM	93.8						672	648		75.3
3/77	SYSTEM	96.7						744	672		71.3
4/77	SYSTEM	84.5						720	696		68.2
5/77	SYSTEM	63.0						744	312		23.3
6/77	SYSTEM	87.8						720	672		61.4
7/77	SYSTEM	90.6						744	672		57.5
8/77	SYSTEM	81.0						744			
9/77	SYSTEM	89.8						720			
10/77	SYSTEM	77.0						744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE 77% OCTOBER AVAILABILITY FOR THIS SYSTEM INCLUDES NON-AVAILABLE HOURS DURING A BOILER OUTAGE. SCRUBBER MAINTENANCE WAS PERFORMED FOR PART OF THIS OUTAGE TIME. THE FIGURE COMES TO 98.1% WHEN THE BOILER OUTAGE OUTAGE TIME IS EXCLUDED FROM THE AVERAGING PERIOD.

11/77	SYSTEM	98.0						720		
12/77	SYSTEM	98.4						744		
1/78	SYSTEM	97.3						744		
2/78	SYSTEM	94.5						672		
3/78	SYSTEM	89.1						744		

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN FOR AN ANNUAL OVERHAUL ON APRIL 18.

THE UTILITY REPORTED AN AVAILABILITY OF 89.1% FOR MARCH BASED ON 17 DAYS OF OPERATION BEFORE THE UNIT SHUTDOWN FOR THE ANNUAL BOILER OVERHAUL. IF THE SCRUBBING SYSTEM IS ASSUMED TO BE AVAILABLE, I.E. NOT UNDERGOING MAJOR

MONTANA POWER: COLSTRIP 2 (CONT.)

-----PERFORMANCE DATA-----
 PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL PER BOILER FGD CAP.
 SO2 PART. HOURS HOURS HOURS FACTOR

REPAIRS DURING THE BOILER OVERHAUL, THE AVAILABILITY COMES TO 93.8%.

4/78 SYSTEM 86.9 720

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED AN AVAILABILITY OF 86.9% FOR APRIL BASED ON EIGHT DAYS OF OPERATION AFTER THE UNIT SHUTDOWN FOR THE ANNUAL BOILER OVERHAUL. IF THE SCRUBBING SYSTEM IS ASSUMED TO BE AVAILABLE, I.E. NOT UNDERGOING MAJOR REPAIRS DURING THE BOILER OVERHAUL, THE AVAILABILITY COMES TO 96.5%.

5/78	SYSTEM	99.1		744		
6/78	SYSTEM	97.4		720		
7/78	SYSTEM	96.4		744		
8/78	SYSTEM	99.0	.0	744	0	0
9/78	SYSTEM	94.0	.0	720	0	0
10/78	SYSTEM	99.0	.0	744	0	0
11/78	SYSTEM	99.0	.0	720	0	0
12/78	SYSTEM	91.2		744		
1/79	SYSTEM	94.3		744		
2/79	SYSTEM	98.3		672		
3/79	SYSTEM	94.3		744		
4/79	SYSTEM	100.0		720		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE UNIT WAS BEING OVERHAULED. THE AVAILABILITY FOR THIS TIME IS BASED UPON OPERATIONS BEFORE AND AFTER THE OVERHAUL.

5/79	SYSTEM	94.4		744		
6/79	SYSTEM	98.4		720		
7/79	SYSTEM	96.4		744		
8/79	SYSTEM	99.3		744		
9/79	SYSTEM	92.3		720		
10/79	SYSTEM	92.9		744		
11/79	SYSTEM	98.4		720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE ROUTINE MAINTENANCE CAN BE PERFORMED WHILE THE MODULES ARE ON LINE SO THE AVAILABILITY REMAINS HIGH.

12/79	SYSTEM	95.8		744		
1/80	SYSTEM	92.7		744		
2/80	SYSTEM	98.1		696		

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART. HOURS	PER BOILER HOURS	FGD CAP. HOURS FACTOR
3/80	SYSTEM	98.2						744	
** PROBLEMS/SOLUTIONS/COMMENTS									
TOTAL FGD SYSTEM AVAILABILITY CONTINUES TO BE HIGH WITH NO MAJOR PROBLEMS REPORTED FOR THE FIRST QUARTER OF 1980.									
4/80	SYSTEM							720	
** PROBLEMS/SOLUTIONS/COMMENTS									
NO AVAILABILITY DATA WERE REPORTED BY THE UTILITY BECAUSE OF A BOILER AND FGD SYSTEM OUTAGE THAT WAS SCHEDULED FOR ROUTINE MAINTENANCE.									
5/80	SYSTEM	93.5						744	
** PROBLEMS/SOLUTIONS/COMMENTS									
NO MAJOR PROBLEMS WITH THE FGD SYSTEM WERE REPORTED BY THE UTILITY DURING MAY.									
6/80	SYSTEM	96.0						720	
7/80	SYSTEM	99.7						744	
** PROBLEMS/SOLUTIONS/COMMENTS									
NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THE JUNE-JULY PERIOD.									
8/80	SYSTEM	96.2						744	
9/80	SYSTEM	90.5						720	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTHS OF AUGUST AND SEPTEMBER.									
10/80	SYSTEM	96.0						744	
11/80	SYSTEM	96.1						720	
12/80	SYSTEM	92.4						744	
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED NO MAJOR FGD PROBLEMS DURING THE FOURTH QUARTER 1980.									
1/81	SYSTEM	97.5						744	
2/81	SYSTEM	97.4						672	
** PROBLEMS/SOLUTIONS/COMMENTS									
DURING JANUARY AND FEBRUARY NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED.									
3/81	SYSTEM	98.0						744	
4/81	SYSTEM	94.5						720	
5/81	SYSTEM	.0						744	

MONTANA POWER: COLSTRIP 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE BOILER WAS OUT OF SERVICE FOR A SCHEDULED OVERHAUL. DURING THIS TIME ROUTINE PATCHING WAS PERFORMED ON THE FGD SYSTEM.

6/81	SYSTEM	99.3					720		
7/81	SYSTEM	98.4					744		
8/81	SYSTEM	96.7					744		
9/81	SYSTEM	94.2					720		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE BOILER WAS OUT OF SERVICE FOR A SCHEDULED OVERHAUL. DURING THE THIRD QUARTER NO FGD-RELATED PROBLEMS WERE ENCOUNTERED.

10/81	SYSTEM	98.0					744		
11/81	SYSTEM	92.6					720		
12/81	SYSTEM	96.1					744		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FOURTH QUARTER THE UTILITY REPORTED THAT NO PROBLEMS WERE ENCOUNTERED WITH THE FGD SYSTEM.

1/82	SYSTEM	92.5					744		
2/82	SYSTEM	93.1					672		
3/82	SYSTEM						744		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE UNIT AND THE FGD SYSTEM WERE TAKEN OUT OF SERVICE FOR AN ANNUAL OVERHAUL.

4/82	SYSTEM	96.7					720		
5/82	SYSTEM	94.9					744		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL AND MAY THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE EXPERIENCED.

6/82	SYSTEM	90.0					720		
7/82	SYSTEM	95.0					744		
8/82	SYSTEM	97.8					744		
9/82	SYSTEM	96.0					720		
10/82	SYSTEM	96.2					744		
11/82	SYSTEM	93.4					720		
12/82	SYSTEM	97.0					744		

UTILITY FGD SURVEY: OCTOBER 1983 - SEPTEMBER 1984

MONTANA POWER: COLSTRIP 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART. HOURS	PER BOILER HOURS	FGD HOURS	CAP. FACTOR
1/83	SYSTEM	94.8					744		
2/83	SYSTEM	99.9					672		
3/83	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE LAST SEVEN MONTHS OF OPERATION. DURING THIS PERIOD OF TIME THE AVERAGE FGD SYSTEM AVAILABILITY WAS 95.1 PERCENT.									
THE UTILITY REPORTED THAT NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER 1983. THE UNIT WAS SHUTDOWN IN MARCH FOR A SCHEDULED YEARLY SPRING OVERHAUL.									
4/83	SYSTEM	.0					720		
5/83	SYSTEM	98.4					744		
6/83	SYSTEM	99.1					720		
** PROBLEMS/SOLUTIONS/COMMENTS									
THE SPRING OVERHAUL ENDED IN APRIL AND THE UNIT AND FGD SYSTEM WERE PLACED BACK INTO SERVICE. THE UTILITY REPORTED THAT NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE REMAINDER OF THE SECOND QUARTER.									
7/83	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE MONTH OF JULY.									
8/83	SYSTEM	97.1					744		
9/83	SYSTEM	97.0					720		
** PROBLEMS/SOLUTIONS/COMMENTS									
NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING AUGUST AND SEPTEMBER.									
10/83	SYSTEM						744		
11/83	SYSTEM						720		
12/83	SYSTEM						744		
** PROBLEMS/SOLUTIONS/COMMENTS									
INFORMATION WAS UNAVAILABLE FOR THE FOURTH QUARTER OF 1983.									
1/84	SYSTEM	90.4					744		
2/84	SYSTEM	97.0					696		
3/84	SYSTEM	95.1					744		

MONTANA POWER: COLSTRIP 2 (CONT.)

-----PERFORMANCE DATA-----									
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2 PART.	PER BOILER HOURS	FGD HOURS	CAP. HOURS FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED OUTAGES WERE REPORTED DURING THE FIRST QUARTER OF 1984

4/84	SYSTEM							720	
5/84	SYSTEM							744	
6/84	SYSTEM							720	

** PROBLEMS/SOLUTIONS/COMMENTS

A SCHEDULED OVERHAUL WAS MADE DURING THE ENTIRE SECOND QUARTER OF 1984.

7/84	SYSTEM	100.0						744	
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** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING JULY.

8/84	SYSTEM							744	
9/84	SYSTEM							720	

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS UNAVAILABLE FOR AUGUST AND SEPTEMBER 1984.

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

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4. TITLE AND SUBTITLE Utility FGD Survey October 1983 - September 1984 Volume 2, Part 1		5. REPORT DATE October 1984	
7. AUTHOR(S) M.T. Melia, R.S. McKibben, B.W. Pelsor		6. PERFORMING ORGANIZATION CODE	
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16. ABSTRACT This report, which is generated by a computerized data base system, represents a survey of operational and planned domestic utility flue gas desulfurization (FGD) system. The three volume set summarizes information contributed by the utility industry, system and equipment suppliers, system designers, research organizations, and regulatory agencies. The data cover system design, fuel characteristics, operating history, and actual system performance. Also included is a unit-by-unit discussion of problems and solutions associated with the boilers, scrubbers, and FGD systems. The development status (operational, under construction, or in the planning stages), system supplier, process, waste disposal practice, and regulatory class are tabulated alphabetically by utility company. Simplified process flow diagrams of FGD systems, definitions, and a glossary of terms are attached to the report. Current data for domestic FGD systems show 124 systems in operation, 25 systems under construction, and 68 systems planned. The current FGD-controlled capacity in the United States is 47,255 MW.			
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