

DOE/MC/24132 -- 5037

~~DOE/MC/24132 -- 5037~~

Volume II

(DE96003781)

Tidd PFBC Demonstration Project First Three Years of Operation Appendix Section

Topical Report

April 1995

Work Performed Under Contract No.: DE-FC21-87MC24132

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
Ohio Power Company
Columbus, Ohio

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

rs

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, 175 Oak Ridge Turnpike, Oak Ridge, TN 37831; prices available at (615) 576-8401.

Available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; phone orders accepted at (703) 487-4650.

**Tidd PFBC Demonstration Project
First Three Years of Operation
Appendix Section**

Topical Report

Work Performed Under Contract No.: DE-FC21-87MC24132

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880

By
Ohio Power Company
1 Riverside Plaza
Columbus, Ohio 43216-6631

April 1995

Table of Contents

Startup TD-SU-92-01-01 - January 8 - January 11, 1992	25
Startup TD-SU-92-01-02 - January 11 - January 11, 1992	25
Startup TD-SU-92-02-01 - January 12 - January 12, 1992	26
Startup TD-SU-92-02-02 - January 13 - January 16, 1992	26
Startup TD-SU-92-03-01 - January 21 - January 25, 1992	27
Startup TD-SU-92-04-01 - February 2 - February 10, 1992	28
Startup TD-SU-92-05-01 - February 15 - February 16, 1992	29
Startup TD-SU-92-05-02 - February 16 - February 21, 1992	29
Startup TD-SU-92-06-01 - February 28 - March 5, 1992	30
Startup TD-SU-92-07-01 - March 15 - March 16, 1992	31
Startup TD-SU-92-07-02 - March 17 - March 17, 1992	31
Startup TD-SU-92-08-01 - May 20 - May 23, 1992	31
Startup TD-SU-92-09-01 - June 8 - July 10, 1992	33
Startup TD-SU-92-10-01 - July 26 - July 27, 1992	35
Startup TD-SU-92-11-01 - August 1 - August 2, 1992	36
Startup TD-SU-92-11-02 - August 3 - August 4, 1992	37
Startup TD-SU-92-12-01 - August 8 - August 27, 1992	37
Startup TD-SU-92-13-01 - September 13 - September 15, 1992	39
Startup TD-SU-92-14-01 - September 19 - September 21, 1992	39
Startup TD-SU-92-14-02 - September 22 - September 22, 1992	40
Startup TD-SU-92-14-03 - September 22 - September 24, 1992	40
Startup TD-SU-92-15-01 - September 28 - October 1, 1992	41
Startup TD-SU-92-16-01 - October 26 - November 2, 1992	42
Startup TD-SU-92-17-01 - November 14 - November 17, 1992	44
Startup TD-SU-92-18-01 - November 20 - November 25, 1992	45
Startup TD-SU-92-18-02 - November 25 - December 7, 1992	46
Startup TD-SU-92-19-01 - December 12 - December 17, 1992	47
Startup TD-SU-92-20-01 - December 27 - December 28, 1992	48
Startup TD-SU-92-20-02 - December 29 - December 31, 1992	49
Startup TD-SU-93-01-01 - January 18 - January 31, 1993	50
Startup TD-SU-93-02-01 - February 5 - February 6, 1993	51
Startup TD-SU-93-03-01 - February 8 - February 9, 1993	51
Startup TD-SU-93-04-01 - June 26 - July 3, 1993	52
Startup TD-SU-93-05-01 - July 4 - July 5, 1993	53
Startup TD-SU-93-06-01 - July 17 - August 5, 1993	54
Startup TD-SU-93-07-01 - August 8 - August 9, 1993	55
Startup TD-SU-93-08-01 - August 10 - August 14, 1993	56
Startup TD-SU-93-09-01 - August 14 - August 15, 1993	57
Startup TD-SU-93-10-01 - August 18 - August 24, 1993	57
Startup TD-SU-93-11-01 - August 29 - September 23, 1993	58
Startup TD-SU-93-12-01 - October 9 - October 10, 1993	60
Startup TD-SU-93-12-02 - October 10 - October 11, 1993	61
Startup TD-SU-93-13-01 - October 13 - October 14, 1993	61
Startup TD-SU-93-14-01 - October 16 - November 6, 1993	62
Startup TD-SU-93-15-01 - November 25 - December 6, 1993	64
Startup TD-SU-94-01-01 - January 8 - January 11, 1994	66

Table of Contents

Startup TD-SU-94-02-01 - January 14 - January 29, 1994	67
Startup TD-SU-94-03-01 - February 15 - February 18, 1994	68
Startup TD-SU-94-03-02 - February 18 - February 25, 1994	69
Appendix II - Tidd Operations/Testing/Outage/Overview Log	71
TD-SU-90-01-01	71
TD-SU-90-02-01	71
TD-SU-90-03-01	71
TD-SU-90-03-02	72
TD-SU-90-04-01	72
TD-SU-90-05-01	72
TD-SU-90-05-02	73
TD-SU-90-05-03	73
TD-SU-90-06-01	74
TD-SU-90-07-01	74
TD-SU-91-01-01	75
TD-SU-91-02-01	75
TD-SU-91-02-02	75
TD-SU-91-03-01	76
TD-SU-91-04-01	76
TD-SU-91-05-01	77
TD-SU-91-06-01	78
TD-SU-91-07-01	78
TD-SU-91-07-02	78
TD-SU-91-08-01	79
TD-SU-91-09-01	79
TD-SU-91-10-01	80
TD-SU-91-11-01	80
TD-SU-91-12-01	81
TD-SU-91-12-02	81
TD-SU-91-13-01	82
TD-SU-91-14-01	83
TD-SU-91-14-02	83
TD-SU-91-15-01	83
TD-SU-91-16-01	84
TD-SU-91-17-01	84
TD-SU-91-18-01	85
TD-SU-91-18-02	85
TD-SU-91-19-01	86
TD-SU-91-19-02	86
TD-SU-91-20-01	87
TD-SU-91-21-01	87
TD-SU-91-22-01	88
TD-SU-91-23-01	88
TD-SU-91-24-01	89
TD-SU-91-24-02	90

Table of Contents

TD-SU-91-24-02	90
TD-SU-91-25-01	91
TD-SU-91-26-01	92
TD-SU-91-27-01	92
TD-SU-91-28-01	93
TD-SU-91-29-01	94
TD-SU-91-30-01	94
TD-SU-91-31-01	95
TD-SU-91-32-01	95
TD-SU-91-33-01	95
TD-SU-91-34-01	97
TD-SU-91-35-01	98
TD-SU-91-36-01	98
TD-SU-92-01-01	99
TD-SU-92-01-02	99
TD-SU-92-02-01	100
TD-SU-92-02-02	100
TD-SU-92-03-01	101
TD-SU-92-04-01	102
TD-SU-92-05-01	103
TD-SU-92-05-02	103
TD-SU-92-06-01	104
TD-SU-92-07-01	105
TD-SU-92-07-02	106
TD-SU-92-08-01	106
TD-SU-92-09-01	107
TD-SU-92-10-01	108
TD-SU-92-11-01	109
TD-SU-92-11-02	109
TD-SU-92-12-01	110
TD-SU-92-13-01	111
TD-SU-92-14-01	111
TD-SU-92-14-03	112
TD-SU-92-15-01	112
TD-SU-92-16-01	113
TD-SU-92-17-01	114
TD-SU-92-18-01	115
TD-SU-92-18-02	115
TD-SU-92-19-01	116
TD-SU-92-20-01	117
TD-SU-92-20-02	118
TD-SU-93-01-01	118
TD-SU-93-02-01	119
TD-SU-93-03-01	120
TD-SU-93-04-01	121
TD-SU-93-05-01	122

Table of Contents

TD-SU-93-06-01	122
TD-SU-93-07-01	124
TD-SU-93-08-01	124
TD-SU-93-09-01	125
TD-SU-93-10-01	125
TD-SU-93-11-01	126
TD-SU-93-12-01	129
TD-SU-93-12-02	130
TD-SU-93-13-01	130
TD-SU-93-14-01	131
TD-SU-93-15-01	133
TD-SU-94-01-01	135
TD-SU-94-02-01	136
TD-SU-94-03-01	139
TD-SU-94-03-02	139
Appendix III - Tidd PFBC Operations Time Log	141
1990 Operating Hours Data	141
1991 Operating Hours Data	145
1992 Operating Hours Data	159
1993 Operating Hours Data	170
1994 Operating Hours Data	176
Appendix IV - General Arrangement Drawings	178
Gen. Arg't Plant On-Site Plan	179
Gen. Arg't Combustor Building Plans @ El. 652' and 660'	180
Gen. Arg't Combustor Building Plans @ El. 676' and 686'	181
Gen. Arg't Combustor Building Plans @ El. 703' and 728'	182
Gen. Arg't Precipitator and Economizer Plan	183
Gen. Arg't Plan & Sections Precipitator 1A & 1B Duct Modifications	184
Gen. Arg't Plan & Sections Precipitator 1A & 1B Duct Modifications	185
Gen. Arg't Ash Handling Facility	186
Gen. Arg't Combustor Building Sections	187
Gen. Arg't Combustor Building Sections	188
Gen. Arg't Combustor Building Sections	189
Gen. Arg't Combustor Building Sections	190
Gen. Arg't Waste Water Pumps Structure Plan & Sections	191
Gen. Arg't Combustor Building Plans @ El. 744' and Roof	192
General Cross Section of Plant Unit #1	193
General Cross Section of Plant Unit #1	194
Floor Plans of Turbine Room Elev's @ 608', 624', and 636', Unit #1	195
Basement Floor Plan of Plant Elev's @ 650' and 665', Unit #1	196
Basement Floor Plan of Plant Elev's @ 650', Unit #1	197
Main Floor Plan of Plant Elev. 676', Unit #1	198
Main Floor Plan of Plant Elev. 676', Unit #1	199

Table of Contents

Floor Plans of Boiler Room & Heater Bay Elev's @ 707', 708', 710', 727', 720', and 732', Unit #1	200
Floor Plans of Boiler Room & Heater Bay Elev's @ 741', 747', & 751'; Fan floor Elev. 766', Unit#1	201
Longitudinal Section Heater Bay and Turbine Room Unit #1	202
Screen House General Arrangement	203

Appendix I - Operations Narrative of Runs

Appendix I - Operations Narrative of Runs

The following is an operations narrative for each of the runs during the first three years of operation.

Startup TD-SU-91-01-01 - January 5 - January 9, 1991

The unit was started up on January 7, 1991. The gas turbine was rolled and paralleled on January 7, 1991 at 2332 hours. The bed preheater was placed in service on January 8, 1991 at 1034 hours. The steam turbine was rolled and paralleled at 1311 hours on this date. Soon after the bed preheater was fired, it was noticed that the temperatures on P16 and P11 primary ash cyclones were running considerably lower than the rest of the cyclones. Initially, it was suspected that this was due to pluggage in these two cyclones. Based on this, a decision was made to remove the unit from service to inspect this system. Inspections indicated that the problem with P16 and P11 primary ash cyclones was caused by in-leakage of air from the pressure vessel to the cyclones at the first flange downstream of the bellows box.

Startup TD-SU-91-02-01 - January 10 - January 13, 1991

The unit was started up on January 10, 1991. During start-up, it was noticed that the S26 secondary cyclone temperature was significantly lower than the other cyclones. It was suspected that this was due to pluggage in this cyclone. As start-up continued, bed level was increased to approximately 40 inches, and sorbent injection was initiated. During this period, the temperature on P16 primary cyclone increased to the point that it was suspected that there was a fire in this cyclone. Air flow was increased by 100 kpph in an attempt to reduce overall cyclone temperatures. During this activity, a gas turbine trip was generated by the failure of the air flow controller.

The unit was secured in a normal manner and prepared for restarting.

Startup TD-SU-91-02-02 - January 13 - January 14, 1991

The unit was restarted on January 13, 1991. The gas turbine was placed in service on January 13, 1991 at 0838 hours, followed by the bed preheater at 1624 hours. The combustor was tripped at 1737 hours due to an extreme high alarm on S26 cyclone air cooling temperature. The bed preheater was returned to service at 1750 hours, followed by the steam turbine at 2026 hours. Coal injection was initiated at 2141. Bed level was increased in steps to approximately 60 inches, and sorbent injection was initiated. During this period, it became evident that several of the secondary cyclones were becoming plugged. A steam turbine trip was generated at 0451 hours on January 14, 1991, due to the failure of the steam turbine stop valve to open during transfer from full arc to partial arc admission. A combustor trip was generated at 0501 hours on January 14, 1991, when the belt drive on the splitting air compressor failed, resulting in a low nitrogen buffer tank pressure trip.

The unit was secured in a normal manner and released to the Maintenance Department for outage work.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-03-01 - January 19 - January 22, 1991

The unit was started up on January 19, 1991. The gas turbine was rolled and paralleled at 1901 hours on January 20, 1991. The bed preheater was placed in service at 0834 hours on January 21, 1991, but tripped at 1022 hours to check thermocouples. The bed preheater was returned to service at 1036 hours and then tripped again at 1121 hours due to loss of flame. The bed preheater was returned to service at 1333 hours, with flames being monitored locally by Operations. The steam turbine was rolled and paralleled at 1537 hours. Coal injection was initiated at 1718 hours. Bed level was increased to 47 inches, at which point a leak was discovered in the north sorbent injection line at a flanged connection. Bed level was reduced to 30 inches and the sorbent injection system removed from service to repair the leak. During this period, it became evident that secondary cyclone S21 had become plugged. Air flow was increased slowly to 650 kpph in an effort to remove the obstruction. This did not prove to be successful, and a decision was made to remove the unit from service to inspect this cyclone.

The gas turbine was tripped at 0345 hours on January 22, 1991, and preparations made to turn the unit over to Maintenance for outage activities.

Startup TD-SU-91-04-01 - January 26 - January 29, 1991

The unit was started up on January 27, 1991. The gas turbine was placed in service at 1658 hours on January 27, 1991. While holding at 2500 RPM, a frequency converter trip was suffered. No reason for this trip was immediately evident, and the gas turbine was rolled back off at 1739 hours and paralleled at 1744 hours. No further problems were encountered.

The bed preheater was placed in service at 0821 hours on January 29, 1991. The steam turbine was rolled and paralleled at 1131 hours, coal injection was established at 1236 hours, and sorbent injection was initiated at 1418 hours. Over the next several hours, bed level was increased to 57 inches and the following activities were performed:

1. Cyclone monitoring for indications of pluggage and/or fires.
2. Biasing of individual paste pump flows to balance bed temperature distribution.
3. Verifying operation of mechanical components and logics in System 268, sorbent injection system.

At 2143 hours, the boiler circulation pump stopped automatically. This resulted in a vertical separator level upset. When the vertical separator level increased to over 9 feet, a steam turbine trip was generated. As a result of this trip, a combustor trip was generated at 2146 hours due to high secondary superheater outlet temperature. The combustor and steam turbine were secured following the trips and preparations made to hot restart the unit.

The bed reheater was placed in service at 2254 hours on January 28, 1991, and coal injection initiated at 0158 hours on January 29, 1991. The steam turbine was rolled and paralleled at 0330 hours. Over the next several hours, bed level was increased to 65 inches, while the following activities were performed.

1. At approximately 0730 hours, indications of pluggage in secondary cyclones S21 and S27 were noted.
2. Biasing of paste pumps continued during the period to attempt to balance bed temperature distribution.
3. Sorbent injection system testing continued.

Appendix I - Operations Narrative of Runs

At 1149 hours, the cyclone ash sample connection flange was discovered to be leaking significant quantities of ash and gas. As a result of this and increasing suspicion of pluggage in S21 and S27 secondary cyclones, a decision was made to remove the unit from service.

The combustor was tripped via the panel push button at 1149 hours. The gas turbine was tripped via the panel push button at 1727 hours. The unit was secured in a normal manner and plans made to turn the unit over to Maintenance for outage work.

Startup TD-SU-91-05-01 - February 3 - February 5, 1991

The unit was started up on February 3, 1991. The gas turbine was rolled and paralleled at 0708 hours on February 4, 1991. The bed preheater was placed in service at 1755 hours this date. The steam turbine was rolled and paralleled at 2348 hours, and coal fire was established at 0034 hours on February 5, 1991. Over the next several hours, bed level was gradually increased to 55 inches. Sorbent injection was established at 0255 hours via the east injection line. During this time period, the #1 and #6 paste pumps were biased to balance the bed temperature distribution. The results of this biasing was very favorable, with the higher bed temperature being approximately 1575 F.

At 0658 hours, sorbent injection flow was lost due to the premature opening of the east vessel vent valves. This line had been tripped earlier and due to the failure of the east sorbent injection vessel discharge valve HCV-B815 to receive a close command, the shutdown sequence had been interrupted. The operator at this time determined that this was a feeder trip instead of a system trip and had, therefore, restarted the feeder in manual. Sorbent injection flow was then continued due to leakage of material through the open HCV-B815 valve to the now manually running feeder. At 0658 hours, while attempting to place the west sorbent injection line in service, a manual trip of the west line was initiated in an effort to realign the logics to start the injection sequence. This manual trip, in conjunction with standing trip on the east line, initiated a command to reduce transport air flow to its purge flow rate. As purge flow is not adequate to inject material, the injection piping was quickly plugged by the material being fed from the east vessel, and transport air flow decreased to 0. At this time, a bed level decrease was initiated due to the loss of sorbent. Due to the sudden loss of transport air flow, the operator then placed the flow control valve (FCV-P230) in manual and increased its output to 100%. This resulted in the material that had plugged the line being swept into the boiler. At this time, it became evident that secondary cyclone S21 was beginning to plug. Several attempts were made over the next hour to reestablish sorbent flow with no success. During this time, a suspected reverse flow of gas was occurring through the north injection nozzle. When the temperature on the north line increased to 656 F, a decision was made to abort the attempts to reestablish sorbent flow and remove the unit from service.

The combustor was tripped at 0900 hours via the MCS. The bed was cooled with the gas turbine, and the gas turbine was tripped at 1403 hours via the MCS. The unit was secured in a normal manner and preparations made to release the unit to Maintenance for outage work.

DOE/MC/24132 -- 5037

~~CONFIDENTIAL~~

Volume II

(DE96003781)

Tidd PFBC Demonstration Project First Three Years of Operation Appendix Section

Topical Report

April 1995

Work Performed Under Contract No.: DE-FC21-87MC24132

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
Ohio Power Company
Columbus, Ohio

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

RA

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, 175 Oak Ridge Turnpike, Oak Ridge, TN 37831; prices available at (615) 576-8401.

Available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; phone orders accepted at (703) 487-4650.

**Tidd PFBC Demonstration Project
First Three Years of Operation
Appendix Section**

Topical Report

Work Performed Under Contract No.: DE-FC21-87MC24132

**For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880**

**By
Ohio Power Company
1 Riverside Plaza
Columbus, Ohio 43216-6631**

April 1995

Forward

This Final Report on the Ohio Power Company's Tidd PFBC Demonstration Plant covers the period from initial plant startup through completion of the first three years of operation on February 28, 1994.

The Tidd Pressurized Fluidized Bed Combustion (PFBC) Demonstration Plant is the first utility-scale pressurized fluidized bed combustor to operate in combined-cycle mode in the United States. The plant is owned and operated by Ohio Power Company (OPCo) and is located on the banks of the Ohio River, approximately 75 miles downstream of Pittsburgh, Pennsylvania.

The 45-year old pulverized coal plant was repowered with PFBC components in order to demonstrate that PFBC combined-cycle technology is an economic, reliable, and environmentally superior alternative to conventional technology in using high-sulfur coal to generate electricity.

This project received cost sharing from the U.S. Department of Energy (DOE), administered by the Morgantown Energy Technology Center in accordance with DOE Cooperative Agreement No. DE-FC21-87 MC24132.000. The project also received cost sharing from the State of Ohio, under the Ohio Coal Development Office agreement No. CDO/D-86-28.

Detailed design work on the project began in May, 1986, and site construction work started in April, 1988. Unit start-up was initiated in November, 1990 and the first combined cycle operation was achieved on November 29, 1990. The three-year demonstration period started on February 28, 1991. A fourth year of plant operations was begun on March 1, 1994 and is not addressed as part of this report.

Section 1.0 of this report is an executive summary of the first three years of operations of the Tidd PFBC Demonstration Plant. Section 2.0 is an introduction to the plant and a brief description of the plant systems and layout. Section 3.0 covers the project history, three year overview and operating statistics. Section 4.0 addresses unit testing that was accomplished during the first three years. Section 5.0 reviews the significant process related findings and plant modifications required during the first three years. Section 6.0 describes the individual PFBC systems installed in the plant, a brief system description, and their operational and modification overview. Appendix I is an operational narrative of each of the unit runs. Appendix II is a line item log of each run listing the significant operations, testing, and outage requirements of each unit run. Appendix III is a log of the operational hours and statistics of each run. Appendix IV provides the plant general arrangement drawings.

The report was prepared by the American Electric Power Service Corporation as agent for the Ohio Power Company. Assistance and input for this report was provided by the staff of the Tidd PFBC Demonstration Plant. The following individuals prepared this report:

American Electric Power Service Corporation, Columbus, Ohio:

David A. Bauer	James L. Corey
John D. Hoffman	Mario Marrocco
Michael J. Mudd	William P. Reinhart
Greg. D. Soulsby	H. Kevin Stogran

Ohio Power Company, Tidd PFBC Demonstration Plant, Brilliant, Ohio:

Ronald A. Baker	Stephen W. Burge
Russel W. Gwin	Wayne L. Irons
Thomas R. Marosi	Dennis J. Rathburn
William S. Smith	

Table of Contents

Table of Contents of Appendices

Appendix I - Operations Narrative of Runs	1
Startup TD-SU-91-01-01 - January 5 - January 9, 1991	1
Startup TD-SU-91-02-01 - January 10 - January 13, 1991	1
Startup TD-SU-91-02-02 - January 13 - January 14, 1991	1
Startup TD-SU-91-03-01 - January 19 - January 22, 1991	2
Startup TD-SU-91-04-01 - January 26 - January 29, 1991	2
Startup TD-SU-91-05-01 - February 3 - February 5, 1991	3
Startup TD-SU-91-06-01 - February 8 - February 10, 1991	4
Startup TD-SU-91-07-01 - February 18 - February 19, 1991	4
Startup TD-SU-91-07-02 - February 19 - February 22, 1991	4
Startup TD-SU-91-08-01 - February 26 - February 28, 1991	5
Startup TD-SU-91-09-01 - February 28 - March 1, 1991	6
Startup TD-SU-91-10-01 - March 7 - March 9, 1991	6
Startup TD-SU-91-11-01 - March 10 - March 12, 1991	6
Startup TD-SU-91-12-01 - March 12 - March 13, 1991	7
Startup TD-SU-91-12-02 - March 13 - March 16, 1991	8
Startup TD-SU-91-13-01 - April 1 - April 4, 1991	8
Startup TD-SU-91-14-01 - April 17 - April 19, 1991	9
Startup TD-SU-91-14-02 - April 19 - April 19, 1991	10
Startup TD-SU-91-15-01 - April 19 - April 19, 1991	10
Startup TD-SU-91-16-01 - April 19 - April 22, 1991	10
Startup TD-SU-91-17-01 - April 25 - May 3, 1991	11
Startup TD-SU-91-18-01 - May 15 - May 16, 1991	12
Startup TD-SU-91-18-02 - May 17 - May 17, 1991	12
Startup TD-SU-91-19-01 - May 17 - May 19, 1991	13
Startup TD-SU-91-19-02 - May 19 - May 20, 1991	13
Startup TD-SU-91-20-01 - May 20 - May 24, 1991	14
Startup TD-SU-91-21-01 - June 2 - June 4, 1991	14
Startup TD-SU-91-22-01 - June 6 - June 7, 1991	15
Startup TD-SU-91-23-01 - June 12 - June 15, 1991	16
Startup TD-SU-91-24-01 - June 24 - June 27, 1991	16
Startup TD-SU-91-24-02 - June 28 - July 1, 1991	17
Startup TD-SU-91-25-01 - July 21 - July 23, 1991	18
Startup TD-SU-91-26-01 - July 28 - August 1, 1991	19
Startup TD-SU-91-27-01 - August 7 - August 8, 1991	20
Startup TD-SU-91-28-01 - August 8 - August 13, 1991	20
Startup TD-SU-91-29-01 - August 22 - August 24, 1991	21
Startup TD-SU-91-30-01 - August 24 - August 26, 1991	21
Startup TD-SU-91-31-01 - September 3 - September 5, 1991	22
Startup TD-SU-91-32-01 - September 5 - September 8, 1991	22
Startup TD-SU-91-33-01 - September 11 - September 12, 1991	23
Startup TD-SU-91-34-01 - December 7 - December 10, 1991	23
Startup TD-SU-91-35-01 - December 12 - December 13, 1991	24
Startup TD-SU-91-36-01 - December 15 - December 19, 1991	24

Table of Contents

Startup TD-SU-92-01-01 - January 8 - January 11, 1992	25
Startup TD-SU-92-01-02 - January 11 - January 11, 1992	25
Startup TD-SU-92-02-01 - January 12 - January 12, 1992	26
Startup TD-SU-92-02-02 - January 13 - January 16, 1992	26
Startup TD-SU-92-03-01 - January 21 - January 25, 1992	27
Startup TD-SU-92-04-01 - February 2 - February 10, 1992	28
Startup TD-SU-92-05-01 - February 15 - February 16, 1992	29
Startup TD-SU-92-05-02 - February 16 - February 21, 1992	29
Startup TD-SU-92-06-01 - February 28 - March 5, 1992	30
Startup TD-SU-92-07-01 - March 15 - March 16, 1992	31
Startup TD-SU-92-07-02 - March 17 - March 17, 1992	31
Startup TD-SU-92-08-01 - May 20 - May 23, 1992	31
Startup TD-SU-92-09-01 - June 8 - July 10, 1992	33
Startup TD-SU-92-10-01 - July 26 - July 27, 1992	35
Startup TD-SU-92-11-01 - August 1 - August 2, 1992	36
Startup TD-SU-92-11-02 - August 3 - August 4, 1992	37
Startup TD-SU-92-12-01 - August 8 - August 27, 1992	37
Startup TD-SU-92-13-01 - September 13 - September 15, 1992	39
Startup TD-SU-92-14-01 - September 19 - September 21, 1992	39
Startup TD-SU-92-14-02 - September 22 - September 22, 1992	40
Startup TD-SU-92-14-03 - September 22 - September 24, 1992	40
Startup TD-SU-92-15-01 - September 28 - October 1, 1992	41
Startup TD-SU-92-16-01 - October 26 - November 2, 1992	42
Startup TD-SU-92-17-01 - November 14 - November 17, 1992	44
Startup TD-SU-92-18-01 - November 20 - November 25, 1992	45
Startup TD-SU-92-18-02 - November 25 - December 7, 1992	46
Startup TD-SU-92-19-01 - December 12 - December 17, 1992	47
Startup TD-SU-92-20-01 - December 27 - December 28, 1992	48
Startup TD-SU-92-20-02 - December 29 - December 31, 1992	49
Startup TD-SU-93-01-01 - January 18 - January 31, 1993	50
Startup TD-SU-93-02-01 - February 5 - February 6, 1993	51
Startup TD-SU-93-03-01 - February 8 - February 9, 1993	51
Startup TD-SU-93-04-01 - June 26 - July 3, 1993	52
Startup TD-SU-93-05-01 - July 4 - July 5, 1993	53
Startup TD-SU-93-06-01 - July 17 - August 5, 1993	54
Startup TD-SU-93-07-01 - August 8 - August 9, 1993	55
Startup TD-SU-93-08-01 - August 10 - August 14, 1993	56
Startup TD-SU-93-09-01 - August 14 - August 15, 1993	57
Startup TD-SU-93-10-01 - August 18 - August 24, 1993	57
Startup TD-SU-93-11-01 - August 29 - September 23, 1993	58
Startup TD-SU-93-12-01 - October 9 - October 10, 1993	60
Startup TD-SU-93-12-02 - October 10 - October 11, 1993	61
Startup TD-SU-93-13-01 - October 13 - October 14, 1993	61
Startup TD-SU-93-14-01 - October 16 - November 6, 1993	62
Startup TD-SU-93-15-01 - November 25 - December 6, 1993	64
Startup TD-SU-94-01-01 - January 8 - January 11, 1994	66

Table of Contents

Startup TD-SU-94-02-01 - January 14 - January 29, 1994	67
Startup TD-SU-94-03-01 - February 15 - February 18, 1994	68
Startup TD-SU-94-03-02 - February 18 - February 25, 1994	69
Appendix II - Tidd Operations/Testing/Outage/Overview Log	71
TD-SU-90-01-01	71
TD-SU-90-02-01	71
TD-SU-90-03-01	71
TD-SU-90-03-02	72
TD-SU-90-04-01	72
TD-SU-90-05-01	72
TD-SU-90-05-02	73
TD-SU-90-05-03	73
TD-SU-90-06-01	74
TD-SU-90-07-01	74
TD-SU-91-01-01	75
TD-SU-91-02-01	75
TD-SU-91-02-02	75
TD-SU-91-03-01	76
TD-SU-91-04-01	76
TD-SU-91-05-01	77
TD-SU-91-06-01	78
TD-SU-91-07-01	78
TD-SU-91-07-02	78
TD-SU-91-08-01	79
TD-SU-91-09-01	79
TD-SU-91-10-01	80
TD-SU-91-11-01	80
TD-SU-91-12-01	81
TD-SU-91-12-02	81
TD-SU-91-13-01	82
TD-SU-91-14-01	83
TD-SU-91-14-02	83
TD-SU-91-15-01	83
TD-SU-91-16-01	84
TD-SU-91-17-01	84
TD-SU-91-18-01	85
TD-SU-91-18-02	85
TD-SU-91-19-01	86
TD-SU-91-19-02	86
TD-SU-91-20-01	87
TD-SU-91-21-01	87
TD-SU-91-22-01	88
TD-SU-91-23-01	88
TD-SU-91-24-01	89
TD-SU-91-24-02	90

Table of Contents

TD-SU-91-24-02	90
TD-SU-91-25-01	91
TD-SU-91-26-01	92
TD-SU-91-27-01	92
TD-SU-91-28-01	93
TD-SU-91-29-01	94
TD-SU-91-30-01	94
TD-SU-91-31-01	95
TD-SU-91-32-01	95
TD-SU-91-33-01	95
TD-SU-91-34-01	97
TD-SU-91-35-01	98
TD-SU-91-36-01	98
TD-SU-92-01-01	99
TD-SU-92-01-02	99
TD-SU-92-02-01	100
TD-SU-92-02-02	100
TD-SU-92-03-01	101
TD-SU-92-04-01	102
TD-SU-92-05-01	103
TD-SU-92-05-02	103
TD-SU-92-06-01	104
TD-SU-92-07-01	105
TD-SU-92-07-02	106
TD-SU-92-08-01	106
TD-SU-92-09-01	107
TD-SU-92-10-01	108
TD-SU-92-11-01	109
TD-SU-92-11-02	109
TD-SU-92-12-01	110
TD-SU-92-13-01	111
TD-SU-92-14-01	111
TD-SU-92-14-03	112
TD-SU-92-15-01	112
TD-SU-92-16-01	113
TD-SU-92-17-01	114
TD-SU-92-18-01	115
TD-SU-92-18-02	115
TD-SU-92-19-01	116
TD-SU-92-20-01	117
TD-SU-92-20-02	118
TD-SU-93-01-01	118
TD-SU-93-02-01	119
TD-SU-93-03-01	120
TD-SU-93-04-01	121
TD-SU-93-05-01	122

Table of Contents

TD-SU-93-06-01	122
TD-SU-93-07-01	124
TD-SU-93-08-01	124
TD-SU-93-09-01	125
TD-SU-93-10-01	125
TD-SU-93-11-01	126
TD-SU-93-12-01	129
TD-SU-93-12-02	130
TD-SU-93-13-01	130
TD-SU-93-14-01	131
TD-SU-93-15-01	133
TD-SU-94-01-01	135
TD-SU-94-02-01	136
TD-SU-94-03-01	139
TD-SU-94-03-02	139
Appendix III - Tidd PFBC Operations Time Log	141
1990 Operating Hours Data	141
1991 Operating Hours Data	145
1992 Operating Hours Data	159
1993 Operating Hours Data	170
1994 Operating Hours Data	176
Appendix IV - General Arrangement Drawings	178
Gen. Arg't Plant On-Site Plan	179
Gen. Arg't Combustor Building Plans @ El. 652' and 660'	180
Gen. Arg't Combustor Building Plans @ El. 676' and 686'	181
Gen. Arg't Combustor Building Plans @ El. 703' and 728'	182
Gen. Arg't Precipitator and Economizer Plan	183
Gen. Arg't Plan & Sections Precipitator 1A & 1B Duct Modifications	184
Gen. Arg't Plan & Sections Precipitator 1A & 1B Duct Modifications	185
Gen. Arg't Ash Handling Facility	186
Gen. Arg't Combustor Building Sections	187
Gen. Arg't Combustor Building Sections	188
Gen. Arg't Combustor Building Sections	189
Gen. Arg't Combustor Building Sections	190
Gen. Arg't Waste Water Pumps Structure Plan & Sections	191
Gen. Arg't Combustor Building Plans @ El. 744' and Roof	192
General Cross Section of Plant Unit #1	193
General Cross Section of Plant Unit #1	194
Floor Plans of Turbine-Room Elev's @ 608', 624', and 636', Unit #1	195
Basement Floor Plan of Plant Elev's @ 650' and 665', Unit #1	196
Basement Floor Plan of Plant Elev's @ 650', Unit #1	197
Main Floor Plan of Plant Elev. 676', Unit #1	198
Main Floor Plan of Plant Elev. 676', Unit #1	199

Table of Contents

Floor Plans of Boiler Room & Heater Bay Elev's @ 707', 708', 710', 727', 720', and 732', Unit #1	200
Floor Plans of Boiler Room & Heater Bay Elev's @ 741', 747', & 751'; Fan floor Elev. 766', Unit#1	201
Longitudinal Section Heater Bay and Turbine Room Unit #1	202
Screen House General Arrangement	203

Appendix I - Operations Narrative of Runs

Appendix I - Operations Narrative of Runs

The following is an operations narrative for each of the runs during the first three years of operation.

Startup TD-SU-91-01-01 - January 5 - January 9, 1991

The unit was started up on January 7, 1991. The gas turbine was rolled and paralleled on January 7, 1991 at 2332 hours. The bed preheater was placed in service on January 8, 1991 at 1034 hours. The steam turbine was rolled and paralleled at 1311 hours on this date. Soon after the bed preheater was fired, it was noticed that the temperatures on P16 and P11 primary ash cyclones were running considerably lower than the rest of the cyclones. Initially, it was suspected that this was due to pluggage in these two cyclones. Based on this, a decision was made to remove the unit from service to inspect this system. Inspections indicated that the problem with P16 and P11 primary ash cyclones was caused by in-leakage of air from the pressure vessel to the cyclones at the first flange downstream of the bellows box.

Startup TD-SU-91-02-01 - January 10 - January 13, 1991

The unit was started up on January 10, 1991. During start-up, it was noticed that the S26 secondary cyclone temperature was significantly lower than the other cyclones. It was suspected that this was due to pluggage in this cyclone. As start-up continued, bed level was increased to approximately 40 inches, and sorbent injection was initiated. During this period, the temperature on P16 primary cyclone increased to the point that it was suspected that there was a fire in this cyclone. Air flow was increased by 100 kph in an attempt to reduce overall cyclone temperatures. During this activity, a gas turbine trip was generated by the failure of the air flow controller.

The unit was secured in a normal manner and prepared for restarting.

Startup TD-SU-91-02-02 - January 13 - January 14, 1991

The unit was restarted on January 13, 1991. The gas turbine was placed in service on January 13, 1991 at 0838 hours, followed by the bed preheater at 1624 hours. The combustor was tripped at 1737 hours due to an extreme high alarm on S26 cyclone air cooling temperature. The bed preheater was returned to service at 1750 hours, followed by the steam turbine at 2026 hours. Coal injection was initiated at 2141. Bed level was increased in steps to approximately 60 inches, and sorbent injection was initiated. During this period, it became evident that several of the secondary cyclones were becoming plugged. A steam turbine trip was generated at 0451 hours on January 14, 1991, due to the failure of the steam turbine stop valve to open during transfer from full arc to partial arc admission. A combustor trip was generated at 0501 hours on January 14, 1991, when the belt drive on the splitting air compressor failed, resulting in a low nitrogen buffer tank pressure trip.

The unit was secured in a normal manner and released to the Maintenance Department for outage work.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-03-01 - January 19 - January 22, 1991

The unit was started up on January 19, 1991. The gas turbine was rolled and paralleled at 1901 hours on January 20, 1991. The bed preheater was placed in service at 0834 hours on January 21, 1991, but tripped at 1022 hours to check thermocouples. The bed preheater was returned to service at 1036 hours and then tripped again at 1121 hours due to loss of flame. The bed preheater was returned to service at 1333 hours, with flames being monitored locally by Operations. The steam turbine was rolled and paralleled at 1537 hours. Coal injection was initiated at 1718 hours. Bed level was increased to 47 inches, at which point a leak was discovered in the north sorbent injection line at a flanged connection. Bed level was reduced to 30 inches and the sorbent injection system removed from service to repair the leak. During this period, it became evident that secondary cyclone S21 had become plugged. Air flow was increased slowly to 650 kpph in an effort to remove the obstruction. This did not prove to be successful, and a decision was made to remove the unit from service to inspect this cyclone.

The gas turbine was tripped at 0345 hours on January 22, 1991, and preparations made to turn the unit over to Maintenance for outage activities.

Startup TD-SU-91-04-01 - January 26 - January 29, 1991

The unit was started up on January 27, 1991. The gas turbine was placed in service at 1658 hours on January 27, 1991. While holding at 2500 RPM, a frequency converter trip was suffered. No reason for this trip was immediately evident, and the gas turbine was rolled back off at 1739 hours and paralleled at 1744 hours. No further problems were encountered.

The bed preheater was placed in service at 0821 hours on January 29, 1991. The steam turbine was rolled and paralleled at 1131 hours, coal injection was established at 1236 hours, and sorbent injection was initiated at 1418 hours. Over the next several hours, bed level was increased to 57 inches and the following activities were performed:

1. Cyclone monitoring for indications of pluggage and/or fires.
2. Biasing of individual paste pump flows to balance bed temperature distribution.
3. Verifying operation of mechanical components and logics in System 268, sorbent injection system.

At 2143 hours, the boiler circulation pump stopped automatically. This resulted in a vertical separator level upset. When the vertical separator level increased to over 9 feet, a steam turbine trip was generated. As a result of this trip, a combustor trip was generated at 2146 hours due to high secondary superheater outlet temperature. The combustor and steam turbine were secured following the trips and preparations made to hot restart the unit.

The bed reheater was placed in service at 2254 hours on January 28, 1991, and coal injection initiated at 0158 hours on January 29, 1991. The steam turbine was rolled and paralleled at 0330 hours. Over the next several hours, bed level was increased to 65 inches, while the following activities were performed.

1. At approximately 0730 hours, indications of pluggage in secondary cyclones S21 and S27 were noted.
2. Biasing of paste pumps continued during the period to attempt to balance bed temperature distribution.
3. Sorbent injection system testing continued.

Appendix I - Operations Narrative of Runs

At 1149 hours, the cyclone ash sample connection flange was discovered to be leaking significant quantities of ash and gas. As a result of this and increasing suspicion of pluggage in S21 and S27 secondary cyclones, a decision was made to remove the unit from service.

The combustor was tripped via the panel push button at 1149 hours. The gas turbine was tripped via the panel push button at 1727 hours. The unit was secured in a normal manner and plans made to turn the unit over to Maintenance for outage work.

Startup TD-SU-91-05-01 - February 3 - February 5, 1991

The unit was started up on February 3, 1991. The gas turbine was rolled and paralleled at 0708 hours on February 4, 1991. The bed preheater was placed in service at 1755 hours this date. The steam turbine was rolled and paralleled at 2348 hours, and coal fire was established at 0034 hours on February 5, 1991. Over the next several hours, bed level was gradually increased to 55 inches. Sorbent injection was established at 0255 hours via the east injection line. During this time period, the #1 and #6 paste pumps were biased to balance the bed temperature distribution. The results of this biasing was very favorable, with the higher bed temperature being approximately 1575 F.

At 0658 hours, sorbent injection flow was lost due to the premature opening of the east vessel vent valves. This line had been tripped earlier and due to the failure of the east sorbent injection vessel discharge valve HCV-B815 to receive a close command, the shutdown sequence had been interrupted. The operator at this time determined that this was a feeder trip instead of a system trip and had, therefore, restarted the feeder in manual. Sorbent injection flow was then continued due to leakage of material through the open HCV-B815 valve to the now manually running feeder. At 0658 hours, while attempting to place the west sorbent injection line in service, a manual trip of the west line was initiated in an effort to realign the logics to start the injection sequence. This manual trip, in conjunction with standing trip on the east line, initiated a command to reduce transport air flow to its purge flow rate. As purge flow is not adequate to inject material, the injection piping was quickly plugged by the material being fed from the east vessel, and transport air flow decreased to 0. At this time, a bed level decrease was initiated due to the loss of sorbent. Due to the sudden loss of transport air flow, the operator then placed the flow control valve (FCV-P230) in manual and increased its output to 100%. This resulted in the material that had plugged the line being swept into the boiler. At this time, it became evident that secondary cyclone S21 was beginning to plug. Several attempts were made over the next hour to reestablish sorbent flow with no success. During this time, a suspected reverse flow of gas was occurring through the north injection nozzle. When the temperature on the north line increased to 656 F, a decision was made to abort the attempts to reestablish sorbent flow and remove the unit from service.

The combustor was tripped at 0900 hours via the MCS. The bed was cooled with the gas turbine, and the gas turbine was tripped at 1403 hours via the MCS. The unit was secured in a normal manner and preparations made to release the unit to Maintenance for outage work.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-06-01 - February 8 - February 10, 1991

The unit was started up on Friday, February 8, 1991. The gas turbine was rolled and paralleled at 0336 hours on February 9, 1991. The bed preheater was placed in service at 1232 hours on this date. The steam turbine was rolled and paralleled at 2045 hours on this date. At 2122 hours, a coal fire was established. At 2300 hours, the sorbent injection system was placed in service and sorbent flow was established via the west injection train.

At approximately 2330 hours, the trended indication on the plant monitoring computer for secondary cyclone S26 dip leg temperature rate of change suddenly increased. At this time, the dip leg temperature was observed to be increasing. This temperature increased approximately 20 F over 5 minutes and then began decreasing at a rate of approximately 11 F/min. This temperature continued to decrease over the next hour and it was decided that this cyclone was plugged.

At this time, a decision was made to remove the unit from service due to pluggage in secondary cyclone S26. The combustor was tripped from the panel push button at 0059 hours on February 10, 1991. The combustor was cooled via the gas turbine until 0304 hours this date, at which time the gas turbine was tripped via the panel push button. The unit was secured in a normal manner and preparations were made to release the unit to Maintenance for outage activities.

Startup TD-SU-91-07-01 - February 18 - February 19, 1991

The unit was started up on February 18, 1991. The gas turbine was rolled and paralleled at 2056 hours on February 18, 1991. The bed preheater was placed in service at 0811 hours on February 19, 1991. At 0856 hours, a gas turbine trip was suffered due to an excessive vertical separator level swing. This was caused by the sudden opening of the vertical separator pressure control valve PCV-B200. It was found that this valve was locked in the closed position due to the valve operator handwheel being run down to the closed position. The valve was placed in manual control from the MCS, and the handwheel then run to the open position. At this time, the valve pulsed to auto and immediately went to the full open position due to vertical separator pressure being greater than set point. The sudden opening of this valve caused the vertical separator level to go high. When the vertical separator level increased to a level over 9 feet, the feed water flow control valve was ordered closed. This caused a gas turbine trip due to low total boiler circulation flow. As the vertical separator level increased, PCV-B200 was ordered closed automatically to prevent carryover to the superheaters. This action forced the vertical separator level low.

The unit was secured in a normal manner and preparations made for a hot restart.

Startup TD-SU-91-07-02 - February 19 - February 22, 1991

The unit was restarted on February 19, 1991. The gas turbine was rolled and paralleled at 1206 hours. The bed preheater was placed in service at 1416 hours. At 1630 hours, the steam turbine was rolled and paralleled. A one hour sparge duct relaxation procedure was performed and completed at 1838 hours. Bed material was then added and bed level increased to 28 inches. Fuel injection was initiated at 0023 hours on February 20, 1991. Bed level was then increased to 40 inches and sorbent injection was established at 0220 hours.

Appendix I - Operations Narrative of Runs

Over the next several hours, bed level was increased to 55 inches. During this period of time, problems developed in the fuel preparation system. At 0420 hours, the #1 paste tank agitator tripped. This was found to be due to very dry material in the paste tanks. Over the course of the evening, several trips of the coal crusher had occurred and during this period it was suspected that the block valve in the water supply to the mixer was ordered closed and not reopened. This led to the delivery of dry coal to the paste tanks. Further investigation revealed that the #1 agitator motor had failed. At 0558 hours, the #5 and #6 paste pumps tripped due to high injection line differential pressure.

At 0601 hours, the combustor was tripped via the panel push button and the unit was secured in a normal manner. A decision was made to not remove the gas turbine from service in anticipation of a quick repair to the failed agitator motor. This motor was repaired at a local shop and returned to the site at approximately 1800 hours.

At 2224 hours on February 20, 1991, the bed preheater was placed in service. During the course of the evening, the status of secondary cyclone S24 was closely monitored. The air cooling temperature has consistently indicated a problem with flow through this dip leg.

Bed level was increased to 28 inches and at 0309 hours on February 21, 1991, fuel injection was placed in service. Bed level was then increased to 40 inches, and sorbent injection was established at 0550 hours via the west injection line. Over the next several hours, bed level was increased to 65 inches and preparations made to transfer to once-through operation. During this period, it became increasingly evident that secondary cyclone S24 was plugging.

At 1449 hours, the boiler circulation pump was removed from service and once-through operation achieved. During the next hour, the main steam attemperator was placed in service and unit gross load stabilized at approximately 33 MW.

At 1600 hours, the combustor was tripped due to excessive vertical separator pressure swings. The unit was cooled down and the gas turbine was tripped at 2015 hours. This unit was secured in a normal manner and preparations made to release the unit to Maintenance for outage activities.

Startup TD-SU-91-08-01 - February 26 - February 28, 1991

The unit was started up on February 26, 1991. During this run, new procedures were to be implemented to improve warming of the secondary ash dip legs, internal secondary ash coolers and associated piping.

Following the revised warming procedures, the gas turbine was rolled and paralleled at 1700 hours on February 27, 1991. The bed preheater was placed in service at 2252 hours and bed level was increased to 28 inches for steam turbine roll and fuel injection.

The steam turbine was rolled and paralleled at 0138 hours on February 28, 1991. Fuel injection was initiated at 0318 hours. At 0322 hours, the #3 paste pump was removed from service due to a plugged injection nozzle. After attempting to clear the plugged line for approximately 1 hour, a decision was made to trip the combustor. The combustor was tripped via the manual push button at 0415 hours and the unit secured in a normal manner.

Appendix I - Operations Narrative of Runs

The gas turbine was tripped from the MCS at 0733 hours to permit Maintenance to clear the obstruction from the #3 fuel line.

Startup TD-SU-91-09-01 - February 28 - March 1, 1991

The unit was started up on February 28, 1991. The gas turbine was rolled and paralleled at 1153 hours on February 28, 1991. The bed preheater was placed in service at 1428 hours. At 1637 hours, the steam turbine was rolled and paralleled. At 1740 hours, sorbent injection was initiated via the west line. At 1742 hours, fuel injection was initiated.

Over the next several hours, bed level was increased to approximately 73 inches and preparations made to transfer to once-through operation. During this period of time, evidence of plugging of secondary cyclones S25 and S27 was seen.

At 73 inches, bed level preparations were made to transfer to once-through operation. As this was done, a sudden increase in vertical separator level was experienced. Due to this, PCV-B200 was ordered to its minimum opening. The resulting upset to vertical separator level pressure and feed water flow caused the boiler circulation pump to auto stop.

At this time, the primary and secondary superheater tube temperatures were observed to be rapidly increasing. At 2221 hours, a combustor trip was generated due to high secondary superheater temperature. The unit was then secured and cooled in a normal manner.

At 0127 hours on March 1, 1991, a gas turbine trip was initiated via the MCS and preparations made to turn the unit over to Maintenance for outage activities.

Startup TD-SU-91-10-01 - March 7 - March 9, 1991

The unit was started up on March 7, 1991. At approximately 0430 hours on March 8, 1991, the high level alarm on the combustor belly drain was received. Over the next 4 hours, several gallons of water were removed via the drain from the combustor bottom. At 0800 hours, a decision was made to suspend warming procedures and to hydro the boiler for leaks. When Systems 741 (boiler ventilation system) and 758 (process air system) were removed from service, the amount of moisture at the belly drain significantly decreased. The results of the hydro showed no leakage from the boiler. At 1033 hours, warming procedures were restarted.

The gas turbine was rolled and paralleled at 1653 hours. At 1803 hours, water was observed coming from the secondary ash piping at the economizer. At this time, a decision was made to trip the gas turbine. The unit was then secured in a normal manner and preparations made to turn the unit over to Maintenance for outage activities.

Startup TD-SU-91-11-01 - March 10 - March 12, 1991

The unit was started up on March 10, 1991. The dip leg warming procedure was initiated at 2206 hours on March 10, 1991. For this start-up, warming flow through the secondary ash system was established by pulling air through the system by attaching a portable vacuum source at the secondary ash outlet pipe outside the

Appendix I - Operations Narrative of Runs

combustor penetration. Gas recirculation via Systems 741 (boiler ventilation system) and 758 (process air system) was initiated at 2215 hours. At 0900 hours on March 11, 1991, the bed preheater bypass valve, HCV-P100, was manually closed to increase boiler wall differential and, thereby, increase warming flow through the dip legs. During this time, the test thermocouples on S21 and S24 ash line and purge air lines were showing conflicting indications as to the effectiveness of the warming procedures. At 1530 hours, the vacuum source at the secondary ash outlet was removed and a reverse flow of heated dry air from the external ash cooler was initiated. The results of this indicated that all secondary ash lines were open and warming.

At 1658 hours, the start-up fans were placed in the start-up pressurization mode and the gas turbine rolled to 2500 RPM. This mode of operation was continued for approximately 45 minutes to force warm air through the dip legs. At 1742 hours, the gas turbine generator was paralleled and air flow established through the combustor. At 2348 hours, the bed preheater was placed in service and immediately tripped due to high burner temperatures. At this time, it became apparent that the boiler wall differential was significantly lower than expected for this mode of operation.

At 0000 hours on March 12, 1992, a combustor trip was initiated from the panel in order to reopen HCV-P100 to check the change in boiler wall differential. At this time, a decision was made to remove the unit from service for inspection of combustor internals to determine the reasons for the low boiler wall differential.

The gas turbine was tripped at 0212 hours, and the unit secured in a normal manner. Preparations were then made to turn the unit over to Maintenance for outage activities.

Startup TD-SU-91-12-01 - March 12 - March 13, 1991

The unit was started up on March 12, 1991. At 1726 hours on March 12, 1992, gas circulation flow was established to prewarm the combustor internals. At 1734 hours, secondary dip leg warming was established.

The gas turbine was rolled and paralleled at 2316 hours. Bed level was then increased to 28 inches. At 0804 hours on March 13, 1991, an oil fire was established. The steam turbine was rolled at 1018 hours. A steam turbine trip was generated at 1120 hours when the generator field automatic circuit breaker was closed. Investigation revealed no problems with this automatic circuit breaker and the turbine was then rolled and paralleled at 1240 hours.

Sorbent injection was initiated at 1245 hours via the west line. At 1251 hours, fuel injection was initiated.

At 1328 hours, a gas turbine trip was experienced due to a surge of the high pressure compressor. Investigation revealed that a gas turbine control card had failed.

The unit was secured in a normal manner and preparations made to restart the unit.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-12-02 - March 13 - March 16, 1991

The unit was started up on March 13, 1991. The gas turbine was rolled and paralleled at 2136 hours on March 13, 1991. The bed preheater was placed in service at 0144 hours on March 14, 1991. The steam turbine was rolled and paralleled at 0429 hours. At 0447 hours, sorbent injection was initiated via the west line. Fuel injection was initiated at 0453 hours.

Over the next several hours, bed level was increased to an indicated 70 inches and conditions allowed to stabilize. At 1042 hours, the main steam temperature control was placed in automatic. At 1043 hours, the boiler circulation pump was removed from service and once-through operation established. At 1152 hours, sorbent feed rate was increased due to a suspected fire in primary cyclone P11 and P17. The result of this was an increase in cyclone temperatures. At this point, sorbent flow was then decreased and air flow increased. This resulted in a decrease in cyclone temperatures. At 1532 hours, the steam turbine voltage regulator was placed in automatic. At 1550 hours, the vertical separator level control valve was placed in automatic and set to control the vertical separator level at less than 7 feet. At 1554 hours, the #1 paste pump was biased to 0.7. This action appeared to also help the fire in P17 cyclone.

The unit was held at a stable load for approximately 12 hours. Beginning at 2209 hours, problems with the west sorbent rotary feeder were experienced. Over the next three hours, this feeder tripped a total of four times. Investigation revealed that the feeder was mechanically binding. The feeder was operated several times in the forward and reverse directions locally, and Maintenance loosened the packing at the shaft penetrations. These actions resolved the problem. The west injection line was returned to service at 0241 hours on March 14, 1991, and no further problems were experienced.

At 0538 hours, the deaerator steam supply was transferred from pegging Station "C" to Station "A" (auxiliary steam to sixth stage extraction).

Over the next several hours, bed level was increased to an indicated level of 95 inches. At 1133 hours, the steam turbine generator was placed in automatic. At 1331 hours, the rupture diaphragm at the V-102 orifice failed. Prior to this failure, an ash leak had developed on the rotary feeder and this feeder had been removed from service for maintenance. An immediate load decrease was initiated. At 1345 hours, the boiler circulation pump auto started. At 1402 hours, auxiliary power was transferred from normal to reserve. At 1407 hours, a combustor trip occurred due to high bed temperature.

At 1431 hours, the gas turbine was tripped by operator action. The unit was secured in a normal manner and preparation made to release the unit to Maintenance for outage activities.

Startup TD-SU-91-13-01 - April 1 - April 4, 1991

The unit was started on April 1, 1991. The gas turbine was rolled and paralleled at 1331 hours. At 2140 hours, the bed preheater was placed in service. At 0006 hours on April 2, 1991, the steam turbine was rolled and paralleled.

At 0719 hours, fuel injection was initiated. The #1 and #6 paste pumps started, the other pumps were blocked from starting due to the low splitting air flow not being tuned out when the revised splitting air flow control scheme was implemented. As a result of this, the function group was ordered off. This resulted in an increased

Appendix I - Operations Narrative of Runs

demand for splitting air flow to prevent a backflow of material into the nozzles. At this time, the splitting air compressor was in "MANUAL UNLOAD" and was, therefore, unable to supply this demand. This resulted in a combustor trip at 0721 hours.

The unit was secured in a normal manner and at 0758 hours, the bed preheater was returned to service. At 0922 hours, the steam turbine was rolled and paralleled. At 1014 hours, sorbent injection flow was established via the east line. At 1028 hours, fuel injection was established.

At 1618 hours, the unit was transferred to once-through operation. Over the next several hours, bed level was increased to 91 inches. At 0313 hours on April 3, 1991, a combustor trip was experienced due to all three vertical separator level instruments showing out of range. This was due to a low vertical separator level caused by level swings during once-through operation.

The unit was secured in a normal manner and preparations were made to restart the unit. At 0434 hours, the bed preheater was placed in service. At 0706 hours, sorbent injection was initiated via the east line. At 0716 hours, fuel injection was initiated. On starting, all six fuel lines indicated a high line differential pressure and the function group was ordered off. At 1010 hours, the steam turbine was rolled and paralleled. Fuel injection was attempted several times with high line differential pressure resulting. At this time, water was added to the paste tank. This resulted in the fuel line differential pressure decreasing to normal.

At 1731 hours, the unit was transferred to once-through operation. Over the next several hours, bed level was increased to 97 inches. At 2130 hours, it became apparent that secondary cyclone S23 had plugged. At 2344 hours, the vertical separator bypass valve was opened. This resulted in an upset to boiler pressure and at 2350 hours, this valve was reclosed.

At 0115 hours, a slow increase in bed level was initiated to determine the upper operating limit. As bed level increased, the gas temperature to the HPT approached the maximum limit. At this time, bed temperature set point was gradually decreased to 1515 F. At approximately 0115 hours, secondary cyclone S23 dip leg and ash cooler temperatures began to increase. Over the next hour, it appeared that this cyclone had cleared itself of the pluggage.

At 0258 hours, bed level had reached a level of 106 inches. At this time, a bed level decrease was initiated to stabilize conditions. At 0259 hours, a gas turbine trip was experienced due to high temperature (1058 F) at the LPT inlet.

The unit was secured in a normal manner and preparations were made to release the unit to maintenance for outage activities.

Startup TD-SU-91-14-01 - April 17 - April 19, 1991

The gas turbine was rolled and paralleled at 2313 hours on April 18, 1991. Air preheating requirements were met and the bed preheater placed in service at 0759 hours. At 0800 hours, a gas turbine trip was experienced due to high fictive disc temperatures.

The unit was secured in a normal manner and preparations were made to restart the unit.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-14-02 - April 19 - April 19, 1991

The unit was restarted on April 19, 1991. The gas turbine was rolled and paralleled at 1116 hours. At 1220 hours, a gas turbine trip was initiated by the operator. This was due to a leak at the System 271 ash sampler connection.

The unit was secured and preparations made for maintenance to repair the leak.

Startup TD-SU-91-15-01 - April 19 - April 19, 1991

The unit was restarted on April 19, 1991. The gas turbine was rolled and paralleled at 1514 hours. At 1558 hours, a gas turbine trip was initiated by the operator. This was due again to a leak at the System 271 ash sampler connection.

The unit was secured and preparations were made for maintenance to repair the leak.

Startup TD-SU-91-16-01 - April 19 - April 22, 1991

The unit was restarted on April 19, 1991. The gas turbine was rolled and paralleled at 1911 hours. The bed preheater was placed in service at 2250 hours.

At 0309 hours on April 20, 1991, the steam turbine was rolled and paralleled. At 0355 hours, sorbent injection was initiated via the east line. At 0405 hours, fuel injection was initiated.

Over the next several hours, bed level was increased to 65 inches and preparations were made to transfer to once-through operation. At 1247 hours, the boiler circulation pump was removed from service and once-through operation established.

Bed level was raised to 90 inches by a combination of bed reinjection and sorbent injection. During this time period, the following activities were performed:

1. Splitting air flow was reduced to .3 of the original curve.
2. Economizer test sootblower was operated two times and data taken.
3. Repaired a leak on the expansion joint on the bottom of the west sorbent injection vessel.
4. Biased paste pump flows to obtain optimum bed temperature distribution.

At 2300 hours, the bed ash removal system was placed in manual and bed level allowed to begin increasing from sorbent injection. At 0030 hours on April 21, 1991, the bed level increase was stopped at 105 inches and operating data was taken.

At 0137 hours, bed level was decreased to 100 inches due to secondary cyclones #22 and #23 dip leg temperatures increasing above freeboard temperature. During this period, the moisture content of the fuel was reduced from approximately 29 percent to approximately 26 percent. This action lowered the cyclone temperatures.

Appendix I - Operations Narrative of Runs

At 0228 hours, the bed level was allowed to begin increasing from sorbent injection. At 0350 hours, splitting air flow was further reduced from .3 to .25 of the original curve. At approximately 0700 hours, a bed level of 126 inches was achieved. Over the next one and one half hours, bed temperature set point was gradually increased from 1525 F to 1560 F. At 1560 F, the gas turbine inlet temperature was observed to be approaching its limit. Due to this, the bed temperature set point was gradually reduced to 1527 F.

Bed level was then slowly reduced to 80 inches. As bed level was reduced, the boiler and bed temperature distribution deteriorated and bed level indication became erratic.

At 2050 hours, the boiler circulation pump was placed in service. At 2103 hours, a bed level decrease to 65 inches was initiated. At 2128 hours, the combustor tripped on low bed temperatures in zone one due to partial defluidization of the bed (outage inspections revealed "egg" sinter formation in the bed). The steam turbine was tripped at 2129 hours.

At 0105 hours on April 22, 1991, the gas turbine was tripped via the panel bush button. The unit was secured in a normal manner and preparations made to release the unit to maintenance for outage activities.

Startup TD-SU-91-17-01 - April 25 - May 3, 1991

The unit was started up on April 25, 1991. While setting up equipment for the start-up, an unusual hissing noise was heard while racking in VCB 1C2 (one of the gas turbine generator breakers). Initial investigations led us to believe that the phase #3 vacuum interrupter had failed. A Siemens representative was summoned to the site. The breaker was disassembled and all three vacuum bottles were tested, reassembled and high potted. These tests revealed no problems. Final resolution was that as the VCB was racked in, the capacitance of the VCB caused a hissing noise as the breaker stabs came into contact with the bus.

Start-up activities continued on April 29, 1991. Over the next two days, a total of four gas turbine trips were experienced due to high horizontal vibration on #1 bearing. These trips occurred as the turbine was released to ramp from 2500 RPM to rated speed. An investigation was made but revealed no physical problems, as the indicated high vibration could not be substantiated with test vibration equipment. The turbine was successfully rolled to rated speed and paralleled at 0823 hours on May 1, 1991.

At 1800 hours, the bed preheater was placed in service. The steam turbine was rolled and paralleled at 2012 hours. At 2131 hours, sorbent injection was established via the west line. Fuel injection was initiated at 2137 hours. Bed level was then increased to 45 inches.

At 0316 hours on May 2, 1991, bed level was increased to 65 inches and the unit transferred to once-through operation. At 0512 hours, bed level was increased to 75 inches and conditions stabilized. This condition was maintained for approximately eight hours while the steam turbine was warmed to meet overspeed requirements.

At 1102 hours, a bed level decrease was initiated in preparation for steam turbine overspeed tests. At 1309 hours, the steam turbine generator was removed from parallel. Over the next two hours, the following tests were completed.

Appendix I - Operations Narrative of Runs

1. Steam turbine governor high and low speed stops checked.
2. Steam turbine overspeeds checked:
 - ▶ Test #1 1911 RPM
 - ▶ Test #2 1908 RPM
 - ▶ Test #3 1907 RPM

At 1556 hours, the steam turbine was paralleled with the system and start-up activities continued. Over the next eight hours, bed level was increased to 123 inches in preparation for a loss of feedwater (boiler injection) test.

At 0004 hours on May 3, 1991, the feedwater flow control valve (FCV-F100) was placed in manual and closed to initiate a loss of feedwater. At this time, the following trips were experienced as listed.

1. Combustor trip.
2. Steam turbine trip.
3. Gas turbine trip.

The test was unsuccessful due to logic and control problems. Changes were made to the logics and controls based on the test and plans made for another test.

Startup TD-SU-91-18-01 - May 15 - May 16, 1991

The unit was started up on May 15, 1991, for the purpose of testing the boiler injection system.

The gas turbine was rolled and paralleled at 0826 hours on May 16, 1991. Bed level was then increased to 26 inches and an oil fire established at 1537 hours. The steam turbine was rolled and paralleled at 1835 hours. Sorbent injection was initiated via the east line at 1937 hours. Fuel injection was initiated at 1942 hours.

Over the next several hours, bed level was increased to 65 inches. At 2359 hours, a gas turbine trip was experienced due to high vibration on the epicyclic gear housing. Investigation revealed that this was again a false indication. The unit was secured in a normal manner and preparations were made to restart the unit.

Startup TD-SU-91-18-02 - May 17 - May 17, 1991

The unit was started up on May 17, 1991, for the purpose of testing the boiler injection system.

The gas turbine was rolled and paralleled at 0746 hours. At 0910, the bed level was reduced to 26 inches. An oil fire was established at 1212 hours. At 1523 hours, the steam turbine was rolled and paralleled. At 1539 hours, sorbent injection was initiated via the east line. At 1614 hours, fuel injection was initiated. At 1617 hours, the #5 paste pump tripped due to high fuel line differential pressure. Over the next one and one half hours, attempts were made to clear the #5 paste line. When this did not prove successful, a decision was made to trip the combustor at 1754 hours.

The gas turbine was then tripped at 1904 hours and preparations made for maintenance to mechanically clean the #5 paste line.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-19-01 - May 17 - May 19, 1991

The unit was started up on May 17, 1991, for the purpose of testing the boiler injection system.

The gas turbine was rolled at 2325 hours and at 2333 hours, tripped due to high vibration on the LPC #1 bearing rear horizontal pickup. The gas turbine was rolled and paralleled on May 18, 1991 at 0022 hours.

An oil fire was established at 0208 hours. The steam turbine was rolled and paralleled at 0520 hours. At 0545 hours, sorbent injection was initiated via the east line. At 0553 hours, fuel injection was initiated.

Over the next three hours, bed level was increased to 70 inches. Once-through operation was achieved at 0856 hours.

Bed level was allowed to increase via fuel and sorbent injection. At 1345 hours, the vertical separator bypass valve (HCV-B205A) was opened. At 1348 hours, this valve tripped closed due to bad steam quality indication. This was determined to be false and the valve was reopened at 1353 hours.

During the period of time that bed level was increasing, numerous trips of the fuel preparation system were experienced. This led to a decrease in paste tank level to one inch.

At 1634 hours, the boiler injection test was initiated by manually closing the feedwater flow control valve (FCV-F100). This action initiated a gas turbine trip with satisfactory operation of all boiler protection schemes.

At 1850 hours, the feedwater flow control valve was returned to service and feedwater flow established. The unit was secured in a normal manner and preparations made to restart the gas turbine to remove the bed material to the bed ash reinjection vessels.

Startup TD-SU-91-19-02 - May 19 - May 20, 1991

The unit was started up on May 19, 1991. Combustor warming was initiated at 1112 hours.

The gas turbine was rolled and paralleled at 0112 hours on May 20, 1991. An oil fire was established at 0715 hours. The steam turbine was rolled and paralleled at 1046 hours. Sorbent injection was initiated at 1145 hours. Fuel injection was initiated at 1152 hours. The #1 and #6 paste pumps showed over hydraulic pressure (plugged lines) and the function group was placed in the off position immediately.

While investigating the problems with #1 and #6 fuel lines, low splitting air flow was indicated on both lines which initiated a combustor trip.

Investigation revealed that the #1 and #6 fuel lines were plugged. The combustor was cooled via the gas turbine. At 1318 hours, the gas turbine was tripped and preparations were made to release the unit to maintenance for cleaning the obstructed fuel lines.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-20-01 - May 20 - May 24, 1991

The unit was started up on May 20, 1991. The gas turbine was rolled and paralleled at 2012 hours. At 2331 hours, an oil fire was established.

At 0247 hours on May 21, 1991, the steam turbine was rolled and paralleled. Sorbent injection was initiated at 0324 hours. Fuel injection was initiated at 0326 hours. At 0327 hours, fuel injection was stopped due to a plugged line on #5 paste pump. At 0350 hours, sorbent injection stopped. At 0359 hour, sorbent injection was returned to service. After reversing all six paste pumps and clean blowing all six paste lines, fuel injection was initiated at 0406 hours with no further problems.

Bed level was then increased to 70 inches and at 0802 hours, once-through operation was achieved.

At this time, bed level was further increased to 90 inches and held for the next 40 hours. During this time period, the following activities were performed.

1. Systems tuning.
2. Check for effects of turbulence on lower vertical separator level taps.
3. Increasing bed temperature.
4. Testing the bed reinjection system bed level control.
5. Opening and closing vertical separator bypass valve to determine effects on boiler operation.
6. Varying splitting air flow to determine effects on combustion.

At 1413 hours on May 23, 1991, a bed level increase to 100 inches was initiated. At 1700 hours, a leak was discovered in the sorbent injection piping. At 1711 hours, a bed level decrease was initiated and auxiliary power was transferred to the reserve source. At 1716 hours, a combustor trip was initiated due to the sorbent system leak.

The combustor was cooled via the gas turbine and the gas turbine was tripped at 2012 hours. Preparations were then made to release the unit to maintenance for outage activities.

Startup TD-SU-91-21-01 - June 2 - June 4, 1991

The unit was started up on June 2, 1991. The gas turbine was rolled and paralleled at 0055 hours on June 3, 1991. The bed preheater was placed in service at 0754 hours. At 0714 hours, the LPC was injected with Carboblast material. This appeared to have no negative effect on gas turbine operation. At 0833 hours, the LPC was injected a second time with Carboblast. The bed preheater was placed in service at 0859 hours. The steam turbine was rolled and paralleled at 1226 hours.

At 1447 hours, the west sorbent injection line was placed in service to test single line operation. At 1510 hours, sorbent injection was transferred to the east line due to pluggage in the west vessel. At 1532 hours, the west line was returned to service and unplugged by closing the equalizing line and pressurizing the vessel by opening the fluidizing line.

Appendix I - Operations Narrative of Runs

At 1714 hours, the fuel injection function group was placed in service. The function group was then taken back off due to #2 paste line being plugged. At 1720 hours, sorbent injection was stopped while the #2 paste line was clean blown.

At 1820 hours, sorbent injection was initiated via the west line. At 1821 hours, fuel injection was initiated. At this time, the #1 paste pump was determined to be not pumping. At 1907 hours, the combustor was tripped by the operator due to one bed temperature being above 1700 F and unstable evaporator tube temperatures.

At 2025 hours, the bed preheater was placed in service. At 2305 hours, the steam turbine was rolled and paralleled. At 2319 hours, sorbent injection was initiated via the west line. At 2320 hours, fuel injection was initiated.

At 2350 hours, a bed level increase to 45 inches was initiated. At 0051 hours, the combustor was tripped by the operator, due to #11 primary ash cyclone pluggage. This pluggage was suspected to have been caused by the modified sorbent nozzle "T"s which had been installed during the outage. The unit was then cooled down via the gas turbine. The gas turbine was then tripped at 0208 hours and the unit released to Maintenance for outage work.

Startup TD-SU-91-22-01 - June 6 - June 7, 1991

The unit was started up on June 5, 1991. The gas turbine was rolled and paralleled at 1202 hours on June 6, 1991. The bed preheater was placed in service at 2055 hours. The steam turbine was rolled and paralleled at 2336 hours.

At 0343 hours on June 7, 1991, the fuel injection function group was placed in service. At 0346 hours, the function group was taken back off due to #2 paste line being plugged. After the line was clean blown, the function group was placed in service at 0419 hours.

At 0500 hours, sorbent injection was initiated using the west line.

Bed level was gradually increased to 70 inches. A low velocity test was performed on the sorbent injection system. The transport air flow was slowly lowered and when the velocity reached 12 feet per second, the line appeared to plug and the velocity was increased back to the normal setting of 26 feet per second. At 0955 hours, it was observed that #25 secondary cyclone appeared to be plugged. The #3 paste pump was tripped at 1123 hours to test the effects of losing a paste pump. The combustor was tripped at 1128 hours because of high bed temperatures.

The gas turbine tripped at 1132 hours because of a LPC surge. The gas turbine lube oil system was removed from service to repair a leak on the gear piping. The lube oil system was returned to service and the gas turbine restarted at 1629 hours to cool the combustor. The gas turbine was then tripped at 2324 hours and cooling was continued with combustor cooling and released to Maintenance.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-23-01 - June 12 - June 15, 1991

The unit was started up on June 12, 1991. The gas turbine was rolled and paralleled at 1736 hours on June 12, 1991. Problems were experienced with the LPT inlet guide vane position amplifier and the turbine was tripped from the MCS at 1233 hours. This problem was corrected and the gas turbine was restarted and paralleled at 1752 hours. The bed preheater was placed in service at 2236 hours. The steam turbine was rolled and paralleled at 0201 hours on June 13, 1991.

At 0243 hours, the fuel injection function group was placed in service. Sorbent injection was initiated using the east line at 0312 hours. Bed level was gradually increased to 90 inches with the bed ash reinjection system. Problems were experienced when #3 and #5 coal paste pumps tripped because of low splitting air flow.

Secondary ash cyclones #24 and #26 indicated that they were at least partially plugged.

At 0427 on June 15, 1991, the combustor tripped on gas cleaning system temperatures because of a loss of communications with the safety node. During the cooling period, the gas turbine tripped because of the LPC pressure ratio trip. One of the gas turbine bypass valves (HCV-T120) stuck at approximately 25% open. The combustor cooling was completed with the boiler ventilation system and the combustor cooling fan for maintenance outage work.

Startup TD-SU-91-24-01 - June 24 - June 27, 1991

The unit was started up on June 24, 1991, to perform the stack monitoring test, to determine the dust loading before and after the precipitator, to perform testing for boiler tube surface evaluation, and to test sorbent utilization.

The gas turbine was rolled and paralleled at 0335 hours on June 24, 1991. The combustor was warmed and the bed preheater was placed in service at 0952 hours. The steam turbine was rolled and paralleled at 1248 hours.

At 1301 hours, the sorbent injection function group was placed in service using the east line. Coal injection was initiated at 1307 hours. The #2 paste pump injection line required clean blowing to clean the nozzle and was put in service at 1337 hours. Plugging problems were experienced with the west sorbent injection vessel outlet to the rotary feeder and in the transport line after the isolation valve. Bed level was gradually increased to 126 inches with the bed ash reinjection system and sorbent injection over the next day. Secondary ash cyclones #22 and #23 indicated high temperatures during this period of operation.

Preliminary data was collected on June 25 at full bed height for the boiler surface evaluation and sorbent utilization.

At 0818 hours on June 26, the #2 coal injection line plugged causing a bed temperature upset. Temperatures increased on the #12, #22 and #23 cyclones, resulting in a combustor trip at 0826 hours.

The bed level was lowered for bed preheater start and at 1531 hours on June 26, an oil fire was established. The steam turbine was rolled and paralleled at 1852 hours. Sorbent injection was started with the west line at 1746 hours and coal injection was attempted at 1836 hours. Problems with coal injection lines being plugged (#2, #4, #5 and #6) delayed coal fire. At 0224 hours on June 27, a coal fire was established. At 0716 hours, the #2 coal

Appendix I - Operations Narrative of Runs

injection line plugged. This resulted in high bed temperatures and the combustor was tripped from the control panel at 0724 hours. At 0727 hours, the gas turbine tripped because of a LPC pressure ratio trip. The bed was inerted with nitrogen and cooled with gas circulation. Maintenance cleaned the coal injection lines and the coal paste pumps were also cleaned. Water was added to the paste tank to increase moisture content to make it more pumpable.

Startup TD-SU-91-24-02 - June 28 - July 1, 1991

The unit was restarted on June 28, 1991, following the mechanical cleaning of the fuel lines. The gas turbine was rolled and paralleled at 0411 hours. The bed level was lowered and the bed preheater was placed in service at 0817 hours. The steam turbine was rolled and paralleled at 1048 hours.

At 1117 hours, the sorbent injection function group was placed in service using the east line. Coal injection was initiated at 1120 hours. Bed level was gradually increased to 110 inches with the bed ash reinjection system and sorbent injection. Bed level was then increased with only sorbent injection to 110 inches. During this time, #22 and #23 secondary cyclones temperatures increased to near the limit. Bed level was lowered to 100 inches in an attempt to lower these temperatures. The bed temperature set point was also lowered from 1540 to 1535 degrees for the same reason.

During the early hours of June 29, problems were encountered on the fuel preparation system. The screw feeder tripped and the crusher roll gap skew tripped the crusher drives. The bed level was lowered to 90 inches at this time to reduce coal demand in order for the preparation system to keep up with usage while the problems were being addressed.

Adjustments were made to the crusher drives and shortly after noon, the fuel preparation system seemed to be able to remain in service and keep ahead of the demand for a higher bed level. At 1204 hours, the #3 coal paste pump tripped because of low splitting air flow. This pump was quickly returned to service before the bed temperatures became spread. The bed level was increased to 100 inches. At 1608 hours, the #3 coal paste pump tripped again and was again returned to service. At this time, it was determined that #3 pump was tripped due to low splitting air flow caused by blowing the sootblowers, which take air from the splitting air system.

The LPT gas inlet temperature was approaching the high limit and the bed temperature set point was lowered to avoid excessively high temperature. The bed level was increased to 126 inches.

With stable conditions at 126 inches bed level, bed temperature of 1520 F, and sorbent flow demand to maintain less than .5 lbs/mBtu SO₂, the stack monitoring test was started at 1014 hours on June 30. This test was completed at 1637 hours and a one hour precipitator particle size test was conducted. During the rest of this day and the night, the bed level was maintained at 126 inches, and the bed temperature was controlled to keep the LPT inlet temperature below 1060 F. The bed temperature set point eventually was lowered to 1516 F.

At 0830 hours on July 1, precipitator testing began. Three tests were run, each lasting approximately two hours. During this time, data was also collected for the tube surface evaluation and sorbent utilization tests.

Appendix I - Operations Narrative of Runs

At 2032 hours, the bed temperature set point was lowered to 1509 F because of high temperature in #12 primary cyclone. At 2200 hours, the #3 coal paste pump tripped on low splitting air flow and at 2223 hours, the combustor tripped due to #12 primary cyclone temperature high trip.

The bed was lowered with the bed ash reinjection system and bed ash removal system. At 0553 hours on July 2, Bailey N-90 module "AD" failed issuing a combustor trip. Maintenance cleaned the #3 and #5 coal injection lines in preparation for a restart. At 1020 hours, the gas turbine was tripped from the MCS. When the gas turbine valves tripped closed, HCV-T121 (bypass valve) stuck approximately 20% open.

Inspection of the coal-water mixer revealed that the mixer blades were worn badly and some pieces were missing. The combustor was cooled and the unit released to maintenance for the planned outage.

Startup TD-SU-91-25-01 - July 21 - July 23, 1991

The unit was started on July 21, 1991. The gas turbine was rolled and paralleled at 2338 hours. During unit warm-up, a system response rate test was conducted on the bed ash reinjection system. The bed preheater was initiated, but did not light. The Performance Department investigated the problem, but found no cause for the problem. The bed preheater was successfully placed in service at 0842 hours on July 22, 1991. The steam turbine was rolled and paralleled at 1308 hours.

Sorbent injection was initiated at 1329 hours with the east line. Problems were experienced when attempting fuel injection with #1 and #4 pumps not pumping. Sorbent injection was removed from service, the coal injection lines were clean blown, and the #1 splitting air line was also blown out. Sorbent injection was restarted at 1657 hours. Coal injection was then successfully initiated at 1707 hours. (A logic problem was found that was limiting the signal to the paste pumps.)

At 1713 hours, the #3 coal paste pump tripped due to low splitting air flow. The other pumps were biased in an attempt to stabilize bed temperatures. The #3 paste line was clean blown and the splitting air lines blown out with higher pressure air and nitrogen. The pump was then put back in service at 1938 hours.

The east sorbent injection feeder tripped twice. It was returned to service once, then the west was placed in service so that the east rotary feeder could be repacked.

Bed level was increased to a level for once-through boiler operation, but was lowered when the vertical separator level became unstable. Once again bed level was raised, the boiler circulation pump shut off automatically, and once-through boiler operation was achieved at 0050 hours on July 23, 1991. Bed level was maintained at 75" with the bed ash reinjection system in bed level control.

It was observed about this time that #16 primary cyclone was plugged. The gas turbine opacity was at a higher value than normal, and the #16 dip leg temperature and ash cooler temperatures were much lower than the others. Sorbent injection was stopped for a short time in an attempt to unplug the cyclone, but was unsuccessful.

At 0306 hours, the combustor was tripped from the MCS because of the plugged #16 cyclone. The steam turbine tripped at 0307 hours.

Appendix I - Operations Narrative of Runs

The boiler circulation pump failed to start due to motor overload on decreasing steam flow after the combustor trip. The feedwater flow control was placed on hand and lowered to 100 kpph to keep the vertical separator level from going too high. At 0404 hours, the gas turbine tripped because of high fictive disk temperatures.

Startup TD-SU-91-26-01 - July 28 - August 1, 1991

The unit was started on July 28, 1991. The warming procedure was accomplished by having the secondary ash piping disconnected and pulling vacuum on cyclones while circulating feedwater and using boiler ventilation system in the warming mode until the temperatures for dew point were exceeded. The gas turbine was rolled and paralleled at 2206 hours. The bed preheater was initiated at 0531 hours on July 29, but did not light. The Performance Department investigated this, but found no problem. The preheater was successfully placed in service at 0731 hours. The steam turbine was rolled and paralleled at 1056 hours.

Sorbent injection was initiated at 1114 hours with the west line. Coal injection was initiated at 1135 hours.

Bed level was increased toward a level for once-through boiler operation. Once-through boiler operation was achieved at 1648 hours, with an indicated bed level of 56 inches. Bed level taps looked fine, but the bed density seemed to be high. Bed level was maintained to control main steam flow at approximately 220 kpph with System 272 in-bed level control. The indicated density slowly decreased and indications of bed level slowly came together with the actual level.

At 0307 hours on July 30, 1991, the #4 coal injection line plugged at the nozzle. Splitting air flow and paste flow both stopped. Over the next day, several attempts were made to unplug them by using different methods. The coal nozzle was at least partially unplugged, but the primary splitting air flow tube appeared to remain plugged.

During the early hours of July 30, the #24 cyclone appeared to have plugged or have significant air leakage as evidence by the dip leg temperature decreasing drastically and the ash cooler temperatures dropping to pressure vessel air temperature. At 0530 hours on July 30, the #2 O₂ analyzer vent line plugged and pressurized the analyzer, causing damage to the pump, the cooler, and other components of the analyzer cabinet.

Over the next day, bias adjustments were made to the remaining five paste pumps in an attempt to maintain an evenly distributed bed temperature and to control evaporator tube temperatures. Conditions continued to deteriorate, with freeboard temperatures and cyclone temperatures increasing. The main steam attemporator bias was used to help control evaporator temperatures, and finally bed temperature and main steam temperature set points were lowered to keep bed temperatures from being too high.

At 1018 hours on July 31, the motor for crusher #2 at station #3 failed. At 1151 hours, the deluge system on coal conveyors actuated falsely. The cause was determined to be a defective section of Protectowire in the N-2 conveyor. The system was cleaned and returned to service with a standby fire watch.

At 0515 hours on August 1, the combustor was tripped because of the bed temperature imbalance and the inability to control temperatures.

Bed level was lowered by taking bed material up into the reinjection vessels, and then by removing material with bed ash removal. The gas turbine was tripped at 1200 hours from the MCS. The combustor was cooled with

Appendix I - Operations Narrative of Runs

the boiler ventilation system, combustor cooling fan, start-up fans, and condensate circulation in preparation for outage work.

During the run, adjustments were made to the coal crusher. Data and samples were taken for evaluation to determine which settings provide the best product.

Startup TD-SU-91-27-01 - August 7 - August 8, 1991

The unit was started on August 7, 1991. The warming procedure was accomplished by having the secondary ash piping disconnected and pulling vacuum on cyclones. The gas turbine was rolled and paralleled at 0932 hours on August 8. The air flow and the LPT inlet guide vane seemed abnormal as the warming was continued. At 1122 hours, the gas turbine was tripped as air flow was continuing to decrease. The inlet guide vane control circuit was checked, but no problems were found. Because of the nature of the failure, it was suspected that the position feedback circuit was again the problem. The amplifier for this feedback was replaced.

Startup TD-SU-91-28-01 - August 8 - August 13, 1991

Following repairs to the LPT inlet guide vane position feedback amplifier, the gas turbine was rolled and paralleled again at 1703 hours. The bed preheater was initiated at 2248 hours, with an oil fire at 2253 hours. The steam turbine was rolled and paralleled at 0146 hours on August 9. Coal injection was initiated at 0255 hours, air flow increased to 500 kpph, and sorbent initiated at 0300 hours with the east line. Sorbent was held until air flow was at 500 kpph to help ensure that cyclones would remain clear.

Bed level indication and density did not seem to be normal. The level was slowly increased and these indications seemed to work their way to normal. Coal paste pump biasing was done to equalize bed temperatures. Once-through boiler operation was achieved at 1049 hours, with an indicated bed level of 59 inches.

Bed level was increased to 75 inches and sorbent flow rate was increased to maintain SO₂ compliance. At 2047 hours, the #4 coal paste pump tripped, apparently because of water getting into the control cabinet. It was returned to service at 2256 hours in manual at an 11% demand, and was increased to match the others and returned to automatic.

While cleaning the coal-water mixer on the evening of August 9, it was discovered that the liner and blades were suffering from wear. Some sections of the liner were removed to prevent them from coming off and entering the paste tank. The mixer was removed from service for inspection, and repairs were made as time permitted between batch making of paste. (This continued until the unit tripped.)

On August 10, the bed level was increased to a 90 inch level and stabilized. At 0325 hours on August 10, the #17 primary cyclone dip leg temperature increased above freeboard temperatures. Bed temperature was lowered to keep the cyclone temperature from getting too high and the temperatures were closely monitored.

At 0134 hours on August 12, the sorbent preparation system was removed from service and a hole was discovered in the cyclone separator. Maintenance repaired this hole, and the system was returned to service.

Bed level was held at 90 inches because of the coal preparation system problems, sorbent preparation rate limitations, and high temperatures on #17 cyclone.

Appendix I - Operations Narrative of Runs

Relative accuracy tests were conducted on the stack monitoring equipment on August 13.

At 1639 hours on August 13, the combustor tripped when the boiler depressurized rapidly due to a large leak in the economizer. The steam turbine tripped at 1640 hours. The gas turbine was tripped at 1647 hours. The gas turbine outlet duct was flooded. Feedwater could not be maintained to the boiler. Bed bottom cooling was established and bed material reduced. The slumped bed temperature was 1200 F at this time. Combustor cooling was continued with the boiler ventilation and the process air system.

Startup TD-SU-91-29-01 - August 22 - August 24, 1991

The gas turbine was rolled and paralleled at 1531 hours on August 23. A combustor trip was experienced at 1608 hours when #2 and #5 splitting air flows went below the trip value. The combustor trip was reset. The bed preheater was initiated at 2357 hours. The steam turbine was rolled at 0235 hours on August 24. After testing the overspeed oil trip when increasing steam flow to the turbine, a combustor trip and a gas turbine trip were experienced because of low boiler circulation flow. The vertical separator level dropped very low (probably caused by the level control valve). The boiler circulation pump tripped on low net positive suction pressure. After nitrogen inerting and gas circulation cooling was complete, the bed cooling was completed by the process air system in the air cooling mode.

Startup TD-SU-91-30-01 - August 24 - August 26, 1991

The gas turbine was rolled and paralleled at 0821 hours on August 24, 1991. The bed preheater was initiated at 1022 hours. The steam turbine was rolled and paralleled at 1408 hours.

Fuel injection was initiated at 1456 hours. Air flow was increased and sorbent injection was initiated at 1545 hours with the west line.

As soon as coal fire was established, it was observed that #17 cyclone dip leg temperature did not increase and the ash cooler temperatures were lower than pressure vessel air temperature. Once-through boiler operation was achieved at 2226 hours, with an indicated bed level of 62 inches.

As the bed level was increased, the apparent leak on #17 cyclone disappeared and the temperatures came in line with the other cyclones.

At 0549 hours on August 25, while lowering bed level with the north bed reinjection line, the vent valves stuck open causing the bed level to decrease to 71 inches. At this time, several cyclones had fires in them. As conditions stabilized, all fires were brought under control.

At approximately 1200 hours, it was observed that #13 cyclone had plugged. Attempts were made to reduce the ash loading to this cyclone and allow it to unplug. No success was experienced. Evidence showed that #23 was getting significant ash carryover and at 1543 hours, the combustor was tripped because of the plugged #13 and #23 cyclones. Bed level was first lowered by the bed ash reinjection system, and then by the bed ash removal system.

The gas turbine was tripped at 2003 hours from the MCS and the unit cooled for outage work.

Appendix I - Operations Narrative of Runs

Startup TD-SU-91-31-01 - September 3 - September 5, 1991

The gas turbine was rolled and paralleled at 1452 hours on September 4, 1991. The bed preheater was initiated at 0039 hours on September 5. The boiler pressure control valve was not controlling pressure and was placed on manual. When the pressure was caught, the vertical separator level decreased rapidly, causing the low net positive suction head preventing the boiler circulation pump from running. At 0149 hours, a combustor trip and a gas turbine trip were issued because of low boiler circulation flow. The unit was secured and prepared to restart.

Startup TD-SU-91-32-01 - September 5 - September 8, 1991

The gas turbine was rolled and paralleled at 0520 hours on September 5. Bed level taps appeared to be plugged and the bed level was lowered and raised while the Performance Department worked at getting the taps unplugged. The bed preheater was initiated at 1442 hours. The steam turbine was rolled and paralleled at 1752 hours.

Fuel injection was initiated at 1851 hours, but the #6 pump tripped because of low differential pressure. The fuel lines sequenced through reversing and then were clean blown. The function group was again ordered on and a coal fire established at 2001 hours. Air flow was increased to 500 kpph, and sorbent injection was initiated at 2105 hours with the west line at minimum speed because of high fines in the sorbent.

At 2328 hours, a combustor and a steam turbine trip were experienced because of a low vertical separator level. At 0226 hours on September 6, an oil fire was established. The steam turbine was rolled and paralleled again at 0458 hours. At 0511 hours, a coal fire was established.

Air flow was raised to 500 kpph, and sorbent injection was initiated at 0613 hours with the west line.

Bed level was increased with bed ash reinjection, and once-through boiler operation was achieved at 0954 hours, with an indicated bed level of 64 inches. Bed level was allowed to increase from sorbent injection toward 90 inches. A bed temperature of 1545 F was maintained.

Problems were experienced during this period with the coal preparation system crushers. The problems were tracked to speed transmitters on the crusher motors.

At 0220 hours, the #24 cyclone dip leg temperature was observed to drop. This temperature and the ash cooler temperatures were watched closely, and it was determined that the cyclone was not plugged because of the dip leg temperature still being active.

A bed ash production test was conducted using the bed ash reinjection system. The test was run for approximately four hours, with an average production rate of 8.2 kpph.

Appendix I - Operations Narrative of Runs

At 0704 hours on September 7, the #6 coal paste pump tripped because of low differential pressure. The paste pump, the S-tube, and the high side of the differential pressure instrument were cleaned. The pump was returned to service at 0905 hours, with everything checking okay. At 1020 hours, the #3 paste pump tripped and was restarted without any problems (low differential pressure appeared to be the cause of the trip).

At 1745 hours, problems were experienced with the #6 coal paste pump flow control. Performance was called to investigate and at 0040 hours on September 8, the pump was removed from service to replace the speed control card. The pump was returned to service at 0200 hours.

At 0805 hours, a leak was discovered on the sorbent transport line and preparations were made to remove the unit from service. The combustor was tripped manually at 1205 hours, the steam turbine tripped at 1207 hours. The bed material was taken up into the bed ash reinjection vessels, and then the gas turbine was tripped at 1618 hours. Preparations were made to repair the sorbent piping leak and to investigate the #6 coal paste pump speed control problems.

Startup TD-SU-91-33-01 - September 11 - September 12, 1991

The gas turbine was rolled and paralleled at 1752 hours on September 11. Bed level tap #1 appeared to be plugged, and attempts to unplug it did not help. Tap #1 and tap #2 were valved together. Bed level was increased to 26 inches in preparation for bed preheater lighting. At 2345 hours, problems were noticed on the #4 coal paste pump. Upon investigation, it was found that part of the chrome lining of the paste cylinders was coming off.

It was decided to stop the start-up and secure the unit. Bed material from the reinjection vessels was removed into the bed and then taken out through the bed ash removal system.

The gas turbine was tripped from the MCS at 0730 hours on September 12. The unit was then released to Maintenance for the Fall outage.

Startup TD-SU-91-34-01 - December 7 - December 10, 1991

Boiler circulation was started at 1755 hours on December 7, and air heating started at 0233 hours on December 8. The gas turbine was rolled and paralleled at 1320 hours.

While running the splitting air compressor at the reduced loading of the new system design, the compressor was noticed to heat up. A bypass valve and line was temporarily installed back to the sorbent air receiver.

Problems were encountered with the bed preheater lighting. One problem was the needle valve sticking, and another was the ignitor not being energized from the control system. The bed preheater was successfully fired at 0342 hours on Monday, December 9, but a combustor trip was experienced at 0345 when the vertical separator level "swelled" and reached the high level trip.

The combustor trip was reset and the bed preheater was put back in service at 0430 hours. A combustor trip was suffered at 0556 hours when boiler circulation flow decreased to less than 24 kpph. The combustor trip was

Appendix I - Operations Narrative of Runs

reset and the bed preheater restarted at 0655 hours. The temperature set point was kept at minimum to comply with the bed zone refractory curing procedure. The bed zone refractory curing was completed.

Problems were experienced at this time with the vertical separator level and were traced to the drain valve (LCV-U200A) sticking. Silica was high on main steam, which caused a hold until the cycle was cleaned sufficiently to proceed.

During this time, the temperatures on the secondary cyclone ash removal system indicated that at least part of the cyclones were plugged, and it was determined to shut down after the sparge duct relaxing to clean/inspect the secondary cyclones. (During the outage, ash "peelings" were found in all of the secondary cyclone pickup pots, except for #23).

As the steam turbine was rolled, the speed did not act as normal, and the combustor was tripped to avoid further problems with the steam turbine. Upon further investigation, it was determined that the speed indication was faulty. At 2048 hours, the bed preheater was restarted. At 2238 hours, the steam turbine was rolled; and at 2347 hours, the generator was paralleled.

While raising the bed preheater temperature to the 1550 F sparge duct relaxing temperature point, a high wind box temperature trip was experienced at 0013 hours on December 10. The steam turbine was tripped at 0015 hours. The bed preheater was restarted at 0045 hours to continue the sparge duct relaxing. The sparge duct relaxation was completed and the bed preheater function group ordered off at 0324 hours. Cooling of the boiler/combustor was continued for maintenance outage work.

Startup TD-SU-91-35-01 - December 12 - December 13, 1991

Boiler circulation was started at 0137 hours on December 12, and air heating started at 0700 hours. The gas turbine was rolled and paralleled at 1321 hours.

The bed preheater oil fire was established at 1837 hours and at 1839 hours, the combustor tripped on high vertical separator level. The bed preheater was restarted with oil fire at 1901 hours, and the combustor tripped at 1902 hours on high vertical separator level. A third bed preheater ignition was accomplished at 1925 hours, with a combustor trip at 1926 hours (high vertical separator level). The vertical separator drain valve (LCV-U200A) and the vertical separator pressure control valve (PCV-B200) both were found to have control problems.

The bed preheater was initiated again at 1958 hours. At 2059 hours, the bed level was increased toward 25 inches.

At 2235 hours, it was decided that the temperatures on #14, #24 and #25 cyclones indicated that they were plugged.

At 2236 hours, the combustor was tripped because of the plugged cyclones. The combustor was cooled and at 0103 hours on December 13, the gas turbine was tripped from the MCS. (Outage inspection of the bed revealed that the bed material had a high concentration of fines for unknown reasons.)

Startup TD-SU-91-36-01 - December 15 - December 19, 1991

Appendix I - Operations Narrative of Runs

Boiler circulation was started at 2040 hours on December 15, and air heating started at 0211 hours on December 16. The gas turbine was rolled and paralleled at 1617 hours.

The bed preheater oil fire was established at 2139 hours. Bed level was increased with 274 System to a start bed level of 25 inches (using sand).

At 0200 hours on December 17, the steam turbine generator was paralleled. Coal fire was established at 0503 hours and sorbent injection started with the west line at 0522 hours.

The gas turbine seal air valves did not switch from the LPC supply to the HPC supply and had to be physically assisted. Problems were also experienced with the gas turbine air flow control again. The symptoms point to the LPT inlet guide vane position feedback.

Bed level was increased and pumps were biased for bed temperature distribution. Once-through boiler operation was established at 1226 hours at a bed level of 58 inches.

At 1909 hours, a combustor trip was experienced when adjusting a temperature trip point on the cyclone ash removal system. All systems were secured and an oil fire started at 2146 hours. We again experienced problems with the bed preheater light off, as the needle valves appeared to be stuck.

Startup TD-SU-92-01-01 - January 8 - January 11, 1992

The combustor was released at 1542 hours on January 8, 1992. Gas circulation warming was placed in service at 1952 hours on the same date. The gas turbine was rolled up, and at 1120 hours on January 9, 1992, it was paralleled with the system. At 1609 hours, an oil fire was achieved. At this time, #24 cyclone showed signs of being plugged. Used "stirring" air and secondary ash valve to try to get it to recover.

At 1951 hours, January 9, 1992, the freeboard mixing system was commissioned. The system seemed to have a significant impact on gas distribution once above 600 psig set point. A coal fire was established at 0034 hours on January 10, 1992, and at 1910 hours, the unit went to once-through operation.

At approximately 2000 hours on January 10, 1992, #24 cyclone unplugged. Shortly afterwards, it again showed signs that it was plugged. Pulsing the cyclone ash system cleared it.

At 2330 hours on January 10, 1992, the combustor tripped due to a logic problem that indicated two bed temperature thermocouples had failed.

At 0053 hours on January 11, 1992, the gas turbine tripped due to a HPT outlet thermocouple failing high. The bed temperature was low at the time; therefore, nitrogen cooling was not required.

Startup TD-SU-92-01-02 - January 11 - January 11, 1992

Following a trip due to a failed HPT outlet thermocouple, the gas turbine was rolled at 0415 hours and paralleled at 0430 hours on January 11, 1992. An oil fire was established at 0614 hours. At 0944 hours, a coal fire was established. At this time, #21, #24 and #27 cyclones appeared to be plugged. Pulsing of the outlet valve and blowing of stirring air cleared #21 and #27 cyclones, while #24 showed only a slight response.

Appendix I - Operations Narrative of Runs

At 1231 hours on January 11, 1992, the combustor tripped on high bed temperature as a result of losing #6 paste pump. At 1432 hours, an oil fire was reestablished. While bed temperatures were being increased, the fuel nozzles were blown clean.

The #2 paste line could not be cleared and at 2139 hours, the bed preheater was shut off and at 2143 hours, the gas turbine was tripped to facilitate the Maintenance Department's cleaning of the fuel lines.

Startup TD-SU-92-02-01 - January 12 - January 12, 1992

Following the shutdown for cleaning coal paste lines, the gas turbine was rolled at 1138 hours on January 12, 1992. At 1501 hours, an oil fire was established. Coal was lit at 2108 hours. At 2129 hours, the gas turbine tripped due to the lack of a breaker status feedback on a feed pump which logics used as a part of the loss of feedwater scheme.

Nitrogen inerting was required since bed temperatures were above 1100 F at the time of the slump. Gas recirculation mode was required to further cool the bed.

Startup TD-SU-92-02-02 - January 13 - January 16, 1992

The bed was cooled following a slumped bed trip, and the gas turbine was rolled at 0814 hours on January 13, 1992. At 1443 hours, an oil fire was established and coal was lit at 2052 hours. At 2055 hours, the fuel injection function group was taken off since #4 pump had not started pumping. The pump was reversed and blown clean and at 2100 hours, a coal fire was established. At this time, cyclones #23, #24 and #27 had low temperatures. At 2145 hours, the #23 cyclone temperatures increased and at 2330 hours, #24 cyclone temperatures increased, indicating that they unplugged.

At 0418 hours on January 14, 1992, #6 paste pump was removed from service because it was no longer pumping. At 0638 hours, the combustor tripped on low bed temperature while #6 paste line was being blown clean with nitrogen.

The gas turbine inlet guide vane DCS station required troubleshooting prior to lighting off again.

At 2157 hours on January 14, 1992, an oil fire was established and coal fire followed at 0258 hours on January 15, 1992. Cyclone suction nozzle temperatures were low on #23, #24, #25 and #27. As pressure vessel pressure was increased, the secondary cyclone ash lines cleared and by 0600 hours, #27 was the only one remaining with a low suction nozzle temperature.

Bed level was increased after the ash inventory in the bed ash recirculation vessels was high enough to "make a run" to approximately 110 inches. By 2250 hours on January 15, 1992, a bed level of approximately 115 inches was reached at an air flow of 690 kpph and a bed temperature of 1560 F. This provided 408 kpph steam flow and 63 megawatts.

At 0030 hours on January 16, 1992, the sorbent injection system tripped for unknown reasons and could not be restarted. At 2042 hours, #6 paste pump tripped on over hydraulic pressure. At 0059 hours, the combustor was tripped due to high temperature on #15 cyclone. At this time, it was decided to shut down the unit and cool for inspections and maintenance.

Appendix I - Operations Narrative of Runs

Startup TD-SU-92-03-01 - January 21 - January 25, 1992

The combustor was released at 1535 hours on January 20, 1992. Gas circulation mode warming was established at 2220 hours. The gas turbine was rolled at 0822 hours on January 21, 1992, paralleled at 0842 hours, and air flow established at 0848 hours. At 1317 hours, an oil fire was established. The steam turbine was rolled at 1600 hours and in parallel at 1652 hours.

A coal fire was established at 1852 hours on January 21, 1992. Air flow was increased to 500 kpph, and sorbent injection placed in service at 2005 hours.

At this time, we began experiencing difficulties with the coal crusher. The coal was not going through the crusher and was backing up in T1 hopper.

Once-through operation was achieved at 0630 hours on January 22, 1992, and bed level was increased. Cyclone fires were prevalent from 70 inches bed level to approximately 110 inches. Bed level was increased to 132 inches. Gross generation was 66 megawatts at an air flow of 710 kpph, fuel flow of 60 kpph, and a steam flow of 408 kpph.

At 1547 hours, #6 paste pump tripped on low splitting air flow. The pump was restarted, but tripped again on low splitting air flow. The local needle valve was opened and the pump restarted. It did not trip, but would not pump. The fuel master station was put on hand and lowered, pumps were biased, main steam temperature set point was lowered, attemperator bias was lowered, and in-bed level was reduced.

The unit was stabilized while #6 pump suction box was cleaned and the line blown clean. At 1646 hours, #6 pump was successfully returned to service.

The unit required 21 kpph sorbent flow for SO₂ compliance, and the bed ash removal system needed tuning to keep up. Throughout the night of January 22, 1992, bed density decreased, resulting in fuel flow decreasing, megawatts decreasing, freeboard and cyclone temperatures decreasing.

On January 21, 1992, it appeared that the north paste tank had wetter paste since pumps #1, #2 and #3 line differentials were lower than #4, #5 and #6, and the north tank agitator amps were lower than the south tank agitator amps. The associated cyclone strings (#5, #6 and #7) had much higher temperatures. At 1725 hours, sinters were observed in the bed ash. It was speculated that earlier testing of splitting air (down to .65 of the curve) may have caused the sinters.

At 1955 hours on January 23, 1992, #25 cyclone temperatures all dropped, indicating a plug.

On January 24, 1992, more problems were encountered with the crusher not taking coal. By the evening of January 24, 1992, the CWP tank level was approaching the low alarm point. Bed level was dropped rapidly, while the crusher was returned to the "old" mode of operation. Tank level was at "0" inches before the fuel preparation system began gaining on the tank level.

Appendix I - Operations Narrative of Runs

At 1407 hours on January 25, 1992, the unit tripped due to a BDD operation (transformer 1A differential protection) while starting a feed pump. (Later investigation showed 10A and 10B auxiliary transformer CT's polarity were reversed.) The gas turbine also tripped due to HCV-T120 (an intercept/bypass valve) coming off of its open limit switch. This occurred due to a drop in voltage at the trip when auxiliaries transferred in the middle of starting the south boiler feed pump. The voltage drop caused the control fluid pump breaker to open, which resulted in HCV-T120 moving.

Nitrogen inerting was required and gas recirculation was used to cool the bed. The unit was secured in preparation for a maintenance outage.

Startup TD-SU-92-04-01 - February 2 - February 10, 1992

The combustor was released at 1600 hours on February 2, 1992. Gas circulation mode warming was established at 2124 hours. The gas turbine was rolled on February 3, 1992 at 0939 hours and paralleled at 0952 hours. The valves were opened to establish air flow at 1003 hours.

An oil fire was established at 1444 hours on February 3, 1992, the steam turbine was rolled at 1703 hours and paralleled at 1759 hours. Establishing a start bed took longer than normal as it seemed that bed ash reinjection vessels had an abnormally high amount of fine material. A coal fire was established at 0052 hours on February 4, 1992. Sorbent injection was placed in service at 0152 hours.

On February 4, 1992 at 1120 hours, #6 paste pump stopped pumping for a short period and then started pumping again.

Once-through operation was achieved at 1514 hours on February 4, 1992.

Bed level was increased to 120 inches with no evidence of cyclone fires. At 2000 hours on February 4, 1992, bed level was increased to 128 inches. By 2155 hours, bed level had been increased but to 133 inches.

At 0528 hours on February 5, 1992, the #4 paste pump tripped on low splitting air flow. The pump was restarted and began pumping again.

The east sorbent injection feeder packing blew out and had to be changed. This required single line operation on sorbent injection. To vent, refill, repressurize and place back in service required 18 minutes.

The bed level was brought up to almost 140 inches early the morning of February 6, 1992, to check the effect of higher bed level on cyclone inlet temperatures. This was performed at a bed temperature of 1525 F. In general, conditions were worse than at 130 inches and higher bed temperature; therefore, bed level was decreased back to 130 inches.

The stack monitoring equipment testing was conducted on Friday, February 7, 1992. The unit operated smoothly throughout the test, although sinters were found in the bed ash samples. Early Saturday morning, February 8, 1992, the #5 paste pump became erratic. It ran until 1431 hours when it came into alarm and stopped pumping. At 1435 hours, it was restarted and it began pumping once again.

Appendix I - Operations Narrative of Runs

The unit ran along fairly smooth the remainder of the weekend, with the exception that it appeared that a sorbent accumulation in the tube bundle was developing.

Evaporator tube temperatures, in the area of the north sorbent injection nozzle, indicated that heat transfer was not very good in this area. (Outage inspection revealed a sorbent accumulation in this area.)

On Monday, February 10, 1992 at 1059 hours, the combustor was manually tripped by the operator due to 30 kpph mismatch in steam flow versus feedwater flow and numerous superheater tube temperature high alarms. It was later discovered that two economizer pressure transmitter impulse lines had separated at union fittings and the water flow was blowing to atmosphere. The unit was cooled down in a normal manner in preparation for a maintenance outage.

Startup TD-SU-92-05-01 - February 15 - February 16, 1992

The combustor was released on February 15, 1992 at 2003 hours. At 2346 hours, gas recirculation was placed in service to warm the combustor. The gas turbine was rolled on February 15, 1992 at 1650 hours, and paralleled at 1705 hours. Air flow was established 11 minutes later. The bed preheater was lit at 2144 hours, but tripped on low temperature on #1 burner. At 2158 hours, another attempt resulted in no flame. At 2212 hours, an oil fire was successful. At 2243 hours on February 16, 1992, the gas turbine tripped due to a logic problem.

Startup TD-SU-92-05-02 - February 16 - February 21, 1992

Following the gas turbine trip on February 16, 1992, the gas turbine was rolled at 0312 hours on February 17, 1992. The turbine was paralleled at 0332 hours, and an oil fire was established at 0406 hours. After oil firing, temperatures on the cyclone ash system showed that #22 and #26 cyclones were open, but the other secondary cyclones were plugged. The cyclones were pulsed and all but #23 were cleared.

At 1809 hours on February 17, 1992, coal injection was placed in service. At 1902 hours, a coal fire was established. At 2000 hours, air flow was increased to 500 kpph. At this time, #23 cyclone cleared. At 2146 hours, sorbent injection was placed in service. No obvious effects of the new "T"s in the sorbent feed nozzles and skateboards were immediately apparent. The unit was brought to 50 inch bed level for testing.

A freeboard mixing steam test was run, which indicated that 650 to 750 psig is the best pressure range for gas distribution.

At 2000 hours on February 18, 1992, a splitting air test was conducted, which indicated that 1.5 times our original curve is best at this 50 inch bed level.

Sorbent testing was started at 0930 hours on February 19, 1992, to evaluate the effects of single nozzle feed.

At 1900 hours on February 19, 1992, the bed level dropped 10 inches rapidly, and the south bed ash removal system tripped on high temperature.

At 0300 hours on February 20, 1992, bed level was increased with intent to come to 125 inches. Once-through operation occurred at 0350 hours.

Appendix I - Operations Narrative of Runs

At 0911 hours, a bed level of 125 inches was reached. Evaporator tube temperatures indicated the presence of a sorbent accumulation in the tube bundle.

Paste pump biases were changed to near 1.0 on all six pumps. At 1619 hours on February 20, 1992, splitting air flow was brought down to a bias of 1.0 for testing. At 1713 hours, splitting air was brought back to 1.1 to check repeatability.

At 1846 hours, bed temperature was dropped to 1520 F to bring the bed to full bed height.

At approximately 2100 hours, the bed level was brought to 142 inches. The post-bed combustion was very limited. The paste being made seemed to have more fines due to the crusher being operated heavily loaded. Moisture in the paste has been drastically reduced. Bed temperature was increased in steps from 1540 to 1575 F. At 0148 hours on February 21, 1992, gross generation peaked at 70 megawatts at a steam flow of 429 kpph.

Many paste pump problems were experienced during this run.

At 0345 hours, the combustor was tripped for cooldown and inspection of tube bundle for deposits.

Startup TD-SU-92-06-01 - February 28 - March 5, 1992

The gas turbine was rolled at 1532 hours, and was paralleled at 1548 hours on February 28, 1992. Air flow was established at 1558 hours, and an oil fire achieved at 2147 hours.

A coal fire was established at 0608 hours on February 28, 1992.

The north reinjection vessel would not feed out any bed material.

A stable operating condition was achieved on the crusher with 5 to 8 kwh/ton energy input. It did not appear, however, that more fines were achieved with the higher energy input as was expected.

The paste moisture content was decreased as the energy input to the crusher was increased, having expected better fines. This may have led to more problems than normal with the paste pumps plugging.

Due to evaporator temperatures indicating the possibility of having formed a deposit, sorbent transport velocity was increased. At 1325 hours on March 2, 1992, the velocity was set to 30.5 ft/sec.

During the run, the south reinjection vessel also seemed to plug up and would not allow bed material to flow out of it to the bed.

Also during the run, the #26 cyclone appeared to plug, but later unplugged and returned to normal conditions.

At 0029 hours on March 3, 1992, the #5 paste pump tripped on low splitting air flow. The next 15 hours were spent trying to return the pump to service. It was returned to service at 1606 hours. At 2013 hours, the #4 paste pump tripped on over hydraulic pressure. All attempts to return it to service were unsuccessful. At 1749 hours on March 4, 1992, the #5 paste pump again tripped on low splitting air flow and the combustor was tripped by the operator at 1753 hours due to unstable firing conditions, with two paste pumps out of service.

Appendix I - Operations Narrative of Runs

Startup TD-SU-92-07-01 - March 15 - March 16, 1992

The gas turbine was rolled at 1347 hours on March 15, 1992, and paralleled at 1403 hours, and air flow established at 1418 hours.

The bed preheater was lit at 2035 hours, and the steam turbine was rolled at 2326 hours and paralleled at 0159 hours. While establishing start bed level via bed ash reinjection, it was observed that the ash evidently consisted of a high number of fines. Secondary cyclones #23, #24 and #25 showed signs of pluggage, and opacity ran high.

A coal fire was not established because of the inability to produce an acceptable coal paste. The crusher was skewing badly and oversized material was getting through. This coal appeared to be much drier than the coal used during the coal crusher testing of the previous week. At 1143 hours on March 16, 1992, the bed preheater was removed from service, followed by the gas turbine. Maintenance started on installation of water spray nozzles above the crusher to attempt to correct the crusher skewing problems.

Startup TD-SU-92-07-02 - March 17 - March 17, 1992

Water sprays were installed in the chute above the crusher to try to correct the crusher skewing problem. This worked well and following testing of the coal preparation system, the gas turbine was rolled on March 17, 1992 at 0519 hours, paralleled at 0536 hours, and air flow established at 0601 hours.

Throughout the entire day of March 17, 1992, the bed preheater could not be lit off. A decision was made to shut down and inspect the bed preheater. The gas turbine was tripped at 1652 hours on March 17, 1992.

Startup TD-SU-92-08-01 - May 20 - May 23, 1992

The bed ash reinjection vessels, particularly the south, was injecting material into the bed without any pulsing.

The steam turbine generator was rolled and paralleled at 0039 hours on December 18. A coal fire was established at 2026 hours. Sorbent injection was started at 0322 hours with the west line. Bed level was increased and paste pumps were biased in order to obtain better bed temperature distribution.

Bed level was increased to the point to match the 40.5 kpph fuel input (previously 90 inches), and then held there to evaluate. At this time, #13 cyclone dip leg temperature increased to 100 F above freeboard. Paste pump biases were returned to 1.0, air flow was increased, and bed temperature set point was raised all in an attempt to put out the fire in #13 cyclone dip leg temperature. After changing the pump biases, all primary cyclone dip leg temperatures increased to above freeboard. Air flow was increased and bed temperature was increased to try to get the cyclone fires out. Bed level was then reduced to 70 inches. This seemed to at least control the primary cyclone temperatures from going any higher. Splitting air flow was increased to 115% and then lowered to 95%, with no success in lowering the temperatures.

Appendix I - Operations Narrative of Runs

At 0202 hours on December 19, the #23 cyclone was determined to be plugged. Air flow was increased in an attempt to unplug. At 0304 hours, a combustor trip was initiated because of the plugged secondary cyclone. At 0306 hours, the steam turbine tripped.

The gas turbine was tripped from the panel at 0445 hours, and the combustor was continued to be cooled with the boiler ventilation system for outage work.

The combustor was released by the Maintenance Department at 1545 hours on May 19, 1992. Warming this start-up included hot gas clean up bypass cyclone and associated inlet and outlet piping. Secondary cyclone warming was aided by pulling a vacuum on the line during start-up.

A number of attempts at rolling the gas turbine up to speed were unsuccessful due to HPC outlet pressure taps being plugged, causing false trips on HPC low efficiency.

The gas turbine was successfully rolled at 1917 hours on May 20, 1992, and air flow was established at 2012 hours. There was a hold while preheating with the gas turbine to dry out the HGCU refractory.

The bed preheater was lit off at 0429 hours on May 21, 1992. The bypass cyclone was noted to have several hot spots right after the oil fire, with the manway nozzle being at 150 F for a 450 F gas temperature to the cyclone. Oil fire was held to maintain temperature requirements for HGCU refractory curing.

At 1221 hours on May 21, 1992, the steam turbine was rolled; parallel occurred at 1411 hours.

Coal fire was initiated at 2026 hours on May 21, 1992. At 2110 hours, #6 paste pump tripped on low-low splitting air flow. Number 6 pump could not be returned to service until 2342 hours on May 21, 1992, due to difficulties getting the line and splitting air nozzle blown clear.

During the early morning hours of May 22, 1992, testing was conducted, with ABB involvement, to get the LPT blade strain gauge data.

Number 24 cyclone plugged during the start-up and remained plugged to this point despite several air flow increases and resultant pressure vessel pressure increases.

At 0700 hours on May 22, 1992, conditions were:

Bed Level	58 inches
Bed Temp	1525 F
ST MW	14.5
GT MW	0
GT Opacity	79
Stack Opacity	70
Fuel Flow	25 kpph
Air Flow	530 kpph
Pressure Vessel Pressure	100 psig
Bypass Cyclone Inlet	955 F
Splitting Air Bias	1.0
Sorbent Flow	8 kpph

Appendix I - Operations Narrative of Runs

The unit had been experiencing high opacity, and after trying all combinations of rapper and TR set adjustments, the TR sets were put into "intermittent" operation, one at a time, and the stack opacity took four distinct step changes from 70% to approximately 40%. It appeared that the fields were in a "back corona" problem.

At 0715 hours, the unit went once-through. Bed level was increased to 75 inches, where additional GT tests were run for LPT blade testing (up to 5750 RPM LP shaft speed).

HGCU piping continued to have hot spots. Overall, piping was hotter than expected. Fans were required on several expansion joints and sections of piping.

At 1405 hours on May 22, 1992, the TR sets were placed back in energy management from intermittent operation as a test. Opacity dropped from 36% to 20%. Back corona testing showed that it was no longer present.

At 1715 hours, May 22, 1992, #24 cyclone was unplugged by pulsing the stirring air.

During the early morning hours on May 23, 1992, the 43% inlet guide vane gas turbine tests were run (additional LPT blade stress testing).

The bed level was increased to 141 inches, with a bed temperature of 1535 F. The HPT disc temperature reached 840 F, and bed level was dropped to 135 inches at a bed temperature of 1525 F.

At approximately 0741 hours on May 23, 1992, the combustor and GT were tripped due to failure of the #4 expansion joint in the hot gas clean up system.

Startup TD-SU-92-09-01 - June 8 - July 10, 1992

The #1 cyclone string was effectively blocked off and following other outage work being completed, the combustor was released by the Maintenance Department at 0947 hours on June 7, 1992. Normal gas recirc warming was accomplished on the six internal cyclone ash strings. The vacuum on the secondary ash line was again used.

The gas turbine was rolled at 0515 hours on June 8, 1992, but a high vibration trip was experienced from #1, #3, and #4 bearings before reaching 250 RPM hold speed.

The gas turbine was successfully rolled at 0604 hours, paralleled at 0624 hours, and air flow established through the combustor at 0629 hours.

Start bed level was established with sand and the bed preheater was lit off at 1048 hours on June 8, 1992.

The steam turbine was rolled and paralleled at 1412 hours on June 8, 1992.

A coal fire was established at 1805 hours on June 8, 1992.

Bed level was then increased. The #24 secondary cyclone plugged during start-up, but was successfully pulsed open.

Appendix I - Operations Narrative of Runs

A problem with indicated bed level caused unit control problems. The main steam temperature control station ran into saturation, and main steam temperature was extremely high, which resulted in a combustor trip at 0211 hours on June 9, 1992.

The unit was secured, bed level was lowered to below the paste nozzles, and the paste lines were reversed and clean blown with air.

The bed level was reduced to no indicated differential on bed level taps, and the bed pre-heater was started again at 0950 hours on June 9, 1992.

The steam turbine was rolled and paralleled at 1336 hours.

Coal fire was initiated at 1800 hours.

Bed level was increased and once-through boiler operation was achieved at 0622 hours on June 10, 1992.

Gas turbine inlet guide vane testing was done at 40", 50", 70", 80", 90" and 100" bed levels.

The stack opacity fluctuated around 22% from start bed level to 90", and no improvement could be made with the precipitators.

The #24 cyclone plugged again during this coal fire period. (No. 24 remained plugged for the entire run.)

The gas turbine #1 bearing vertical and #3 and #4 bearing vertical and horizontal vibration were in and out of alarm several times during the start-up and run.

During the entire run, the paste tank level was limited because of agitator amps (due to drier paste which was achieved due to the crusher producing desired fines).

Full load acceptance testing was accomplished on June 12, 13 and 14, 1992, with a bed ash production test being performed on June 16, 1992 (9,200 lbs/hr at 131" bed level).

On June 16, 1992, a failing current transformer (CT) was found on the steam turbine generator "A" winding Phase 2 neutral winding. The temperature of the CT was monitored closely. The loading of the steam turbine generator was limited to approximately 40 MW to limit overheating of this CT.

A dust loading test on the economizer/GT duct was conducted on June 23, 1992. A short bed ash production test was conducted during this dust loading test (9,000 lbs/hr at 115" bed level).

On June 26, 1992, the Phase 2 ST generator "A" winding CT temperature started to increase. The load was reduced on the generator, the steam diverted to the condenser, bed level dropped, and the steam turbine was tripped at 1158 hours. Bed level was reduced to approximately 55 inches, steam flow lowered to 155 kpph, and the boiler circulation pump started. The CT was replaced, and at 0112 hours on June 27, 1992, the steam turbine was paralleled and load backup.

Appendix I - Operations Narrative of Runs

During the run, the performance of the sorbent prep system deteriorated to the point where we could only hold our own at 116" bed level (approximately 18-20 kpph). This was with all material, including the fines going to the storage vessel. The percentage of fines (-60 mesh) was sometimes as high as 40%.

During this run, both of the expansion joints on the sorbent storage vessel outlets failed. The east one was contained very quickly. The west one caused a considerable mess before it was repaired.

During this run, one of the LPT speed pickups failed. The spare one was connected.

The #2 precipitator TR field shorted to ground, tripped, and could not be reset. (During the outage inspection, a broken wire was found.) Also, the #3 TR set tripped several times on low D.C. voltage, causing several opacity exceedances. Opacity was a continuing problem throughout the run. The fields seemed to "saturate" with ash and would not clear unless they were de-energized.

Several control systems were tuned during the run, including the bed mass controller and the combustion master.

During the scheduled shutdown July 10, 1992, a test was performed by taking the freeboard mixing system out of service. Ash loading changed, but not significantly. Excess air on #2 cyclone went even lower than it was previously. The O₂ readings on #4 and #7 cyclone strings increased. The system was returned to service for better distribution in the freeboard.

A test was also conducted to determine if the secondary ash could be removed by a baghouse. (Duct opacity did not drop during this test.)

The bed level was lowered to approximately 95", and at 1400 hours on July 10, 1992, the combustor was tripped. A steam turbine trip followed at 1403 hours.

After the trip, the paste nozzles were reversed while the bed level was still above the nozzles, using LP nitrogen for the splitting air supply. This appeared to have worked very well.

The gas turbine was tripped at 2025 hours on July 10, 1992. Air cooling and feedwater circulation was continued in preparation for maintenance outage activities.

Full load acceptance testing, a 30-day reliability run, and 740 hours of continuous coal fire were accomplished during the run.

Startup TD-SU-92-10-01 - July 26 - July 27, 1992

The combustor was released by Maintenance at 1500 hours on July 25, 1992. Gas recirculation warming began at 1235 hours on July 26, 1992.

The gas turbine was rolled at 2111 hours and paralleled at 2127 hours on July 26, 1992. Intercept and bypass valves were opened at 2137 hours.

Problems were experienced while attempting to light the bed preheater. After the initial light-off, when the temperature control valve was released to go to minimum fire position, the flame became unstable and the

Appendix I - Operations Narrative of Runs

preheater tripped on loss of flame. After trying several solutions for correcting the problem, the bed preheater was successfully lit at 0405 hours on July 27, 1992, by not allowing the control valve to go to minimum fire position.

The #24 cyclone showed signs of being plugged as soon as temperatures in the boiler began increasing. (Number 24 cyclone remained plugged for the entire run.)

At 0903 hours, the steam turbine was rolled and paralleled.

The duct opacity was high the entire time while bringing the bed to start level. Fine bed ash material carryover limited the rate of bed level increase that was possible because of primary cyclone ash flow and pressure limitations. While increasing the bed level with 274 System, the south reinjection vessel outlet "L" valve plugged. All attempts at unplugging it failed.

At 1247 hours on July 27, 1992, coal fire was initiated with a bed level of 24".

As bed temperature increased to the point where the controls for fuel master and bed temperature are pulsed to auto, the temperatures began to decrease. (It was determined later that the bed temperature station had been mistakenly left in manual with a zero output.) Bed temperatures were not able to be brought back up quickly enough and at 1300 hours, the combustor was manually tripped. The steam turbine tripped at 1032 hours. The unit was secured following the trip. Because of the plugged reinjection vessel, there was not enough bed material available for another start-up. It was then decided to cool and open the combustor to unplug the south bed ash reinjection vessel, as well as #24 secondary cyclone.

Startup TD-SU-92-11-01 - August 1 - August 2, 1992

The combustor was released by Maintenance at 1025 hours on August 1, 1992. Gas recirculation warming was started at 1940 hours.

The gas turbine was rolled and paralleled at 0219 hours on August 2, 1992, with the valves being opened at 0224 hours.

The bed preheater again had flame-out when the temperature control valve was ordered to the minimum fire position. The minimum fire position was increased and the preheater fire established at 0852 hours.

Again, #24 cyclone showed no signs of any ash flow.

The steam turbine was rolled and paralleled at 1353 hours on August 2.

Duct opacity was high throughout bed level increase, as was ash loading in the primary cyclone ash system.

A coal fire was initiated at 1954 hours, but was ordered off because #4 coal nozzle was plugged. Attempts to clean it were unsuccessful and at 2245 hours, the combustor was tripped. At 2335 hours, the gas turbine was tripped. The Maintenance Department was issued a clearance to allow mechanical removal and cleaning of #4 coal nozzle. (The #1 coal nozzle was also removed and cleaned.)

Appendix I - Operations Narrative of Runs

Startup TD-SU-92-11-02 - August 3 - August 4, 1992

The mechanical cleaning of the paste nozzles was completed by the Maintenance Department and the gas turbine was rolled and paralleled at 0511 hours on August 3, 1992. Combustor air flow was established at 0518 hours; oil fire was initiated at 0558 hours.

The #24 cyclone was still plugged.

The steam turbine was rolled and paralleled at 0911 hours.

The duct opacity again was high while establishing start bed level, and also the primary ash loading in the transport piping. This limited the rate of bed level increase.

A coal fire was initiated at 1231 hours, but was ordered off when the #4 coal paste pump did not pump through the nozzle. Attempts at clearing it were unsuccessful. A successful coal fire with five pumps was established at 1617 hours on August 3, 1992.

After increasing air flow and pressure vessel pressure, the #24 cyclone was pulsed and showed signs of at least some ash flow. (Later it plugged again.)

Sorbent injection was initiated with the east line at 1850 hours.

Bed level was increased to approximately 40 inches and bed material inventory was built to enable increase to once-through operation. Throughout this period, adjustments were made to the precipitator TRs to optimize the dust collection. The opacity was never reduced below approximately 45% during the entire period.

At 0743 hours on August 4, 1992, several indications pointed to a tube leak on the outside of the boiler (inside the combustor). The combustor was tripped at 0821 hours in order to avoid further damage from the suspected leak. Outage inspection revealed a leak in a drain connection weld on the boiler bottom header.

The gas turbine was tripped from the MCS at 1154 hours on August 4, 1992.

Startup TD-SU-92-12-01 - August 8 - August 27, 1992

The combustor was released by the Maintenance Department at 1435 hours on August 8, 1992. Gas recirculation warming was initiated at 1745 hours.

The gas turbine was rolled at 2337 hours, paralleled at 2356 hours, and the turbine valves were opened at 0001 hours on August 9, 1992.

The bed preheater was lit off at 0558 hours on August 9, 1992. Increased minimum firing set point was again used.

Appendix I - Operations Narrative of Runs

The bed level was increased using bed ash reinjection. The steam turbine was rolled and paralleled at 1254 hours, with a coal fire being initiated at 1349 hours.

Sorbent injection was started at 1616 hours with the east line.

Bed level was increased to approximately 50 inches and maintained to build bed ash inventory.

The stack opacity was unusually high from the time bed material was started into the bed until a bed level of approximately 80 inches was attained. Tests were conducted on the precipitator TR sets and it was determined that "back corona" existed and was preventing collection of the ash. ("Power off" rapping of each field for approximately 45 minutes cured the problem and the stack opacity was maintained at 10% in energy management mode for the remainder of the run.)

During the lower bed level condition, a total of seven dust loading tests on the precipitator inlet duct were conducted. At 0117 hours on August 10, 1992, the #4 paste pump tripped due to low splitting air flow. Manual reversing cleared the splitting air tube, but the nozzle was still plugged. Several hours later, after many unsuccessful attempts, the nozzle was cleared and the pump was returned to service at 0849 hours.

While increasing air flow, the low pressure turbine speed was quickly brought through the critical speed range of 4550 - 4610 RPM by closing the LPC inlet guide vane and increasing the air flow demand.

During the next several days, problems were experienced with #4, #5, and #6 paste pumps pumping inconsistently. The problem was, once again, caused by poor distribution of paste in the tanks.

At 0310 hours on August 13, the sorbent prep system vibrating screen motor bearings failed. Bed level was lowered to reduce sorbent usage while repairs were made. The motor was repaired and at 1514 hours, sorbent prep was started and bed level was increased.

Problems were experienced very early in the start-up with the coal prep system crusher. Skewing was a problem and the recycle rate could not be operated high enough to obtain a good product (fines) and to keep the throughput high enough to support the needed firing rate. On August 14, 1992, the screws were reinstalled above the crusher and both throughput and an acceptable coal paste were achieved.

Prepared sorbent mixing with the coal paste was tested during the week of August 17. A 50% rate was tested from August 17 through August 19, 1992, and a 100% rate was tested from August 19 through August 21, 1992.

At 1320 hours on August 21, 1992, the return roller bearing on conveyor #2 failed. Bed level was reduced to conserve coal. The bearing was replaced and on August 22, 1992, the bed level was again increased for testing of sorbent fines.

The sorbent-fines mixed with the coal paste test was conducted August 24 through August 26, 1992.

After completion of the sorbent-in-paste testing and sample collection, the unit was shut down for tube bundle inspection. The combustor was tripped at 0341 hours on August 27, 1992, the unit was cooled and secured in the normal manner. The gas turbine tripped at 1028 hours. The combustor continued to be cooled for maintenance outage work.

Appendix I - Operations Narrative of Runs

Startup TD-SU-92-13-01 - September 13 - September 15, 1992

The combustor was released by the Maintenance Department at 1053 hours on September 13, 1992. Gas recirculation was started at 1536 hours; and vacuum was applied to the secondary ash line prior to starting the gas recirculation.

The gas turbine was rolled at 2251 hours and was paralleled at 2311 hours. The valves were reset and air heating of the combustor began at 2316 hours.

All secondary cyclone dip legs evidenced signs of being plugged, except for Numbers 22 and 24.

Bed level was increased and the steam turbine was rolled and paralleled at 1906 hours. During this time, the #24 secondary cyclone plugged.

Coal fire was ordered on at 0127 hours on September 15, 1992. The #3 paste pump failed to start and the function group was ordered off. The pump was run in recirculation locally and then was stopped. The function group was ordered on again at 0132 hours. Bed temperatures rose at an extremely fast rate. O₂ levels dropped rapidly, the boiler water circuits entered into a large swing, and the boiler circulation flow went low enough to trip the combustor at 0136 hours.

After securing the unit, the paste pumps were reversed. All indications were that the reverse sequence was acceptable.

The bed preheater was lit off at 0208 hours. The steam turbine was rolled and paralleled at 0443 hours.

At 0538 hours, a coal fire was ordered on, but the #3 coal paste pump again did not start. The function group was ordered off. It was recirculated again locally, then returned to automatic. At 0546 hours, a coal fire was again ordered on, but No. 5 paste pump was the only one which did not have an over hydraulic problem. Unsuccessful attempts were made to unplug the nozzles, and the combustor tripped at 1115 hours. The gas turbine tripped at 1257 hours.

The unit was then released to the Maintenance Department to clean the paste nozzles and the secondary cyclones.

Startup TD-SU-92-14-01 - September 19 - September 21, 1992

The gas turbine was rolled at 1332 hours on September 20, 1992, and was paralleled at 1349 hours. The valves were reset and air heating of the combustor began at 1400 hours.

The LPC was cleaned with Carboblast injection during the warming period.

The bed preheater was lit at 1922 hours. Bed level was increased. The steam turbine was rolled and paralleled at 1906 hours.

Appendix I - Operations Narrative of Runs

At 0121 hours on September 21, 1992, a coal fire was initiated. Bed temperatures rose very fast. Fuel master was cut, but the combustor tripped at 0128 hours on two bed temperature thermocouples greater than 1670 F.

After paste line reversing, the #2 and #3 nozzles were still plugged. The bed was taken back up into the reinjection vessels, and plans were made to remove the gas turbine from service to clean the fuel nozzles from outside of the combustor. At 0543 hours, the gas turbine tripped because of fictive disc temperature differential.

Startup TD-SU-92-14-02 - September 22 - September 22, 1992

After the cleaning of all six paste nozzles from the outside of the combustor, the gas turbine was rolled at 2107 hours on September 21, 1992, and was paralleled at 1349 hours. The valves were reset at 1400 hours.

The paste nozzles were checked for flow with LP nitrogen. The #1 nozzle did not show a clean flow of nitrogen. The bed level was lowered to six inches, and a reverse sequence attempted. This also failed to show good flow. It was determined that the isolation valve, HCV-B711, was not seating. The gas turbine was removed from service at 0139 hours on September 22, 1992, the valve was disassembled, and the seat repaired. The angle valve used for clean blowing was also replaced because of leakage and opening problems.

Startup TD-SU-92-14-03 - September 22 - September 24, 1992

Following the repair to the #1 paste line isolation valve, the gas turbine was rolled at 1001 hours on September 22, 1992. Parallel was at 1018 hours and the valves were opened at 1029 hours.

The bed preheater was lit at 1242 hours. Bed level was increased and the steam turbine rolled and paralleled at 1553 hours.

Coal ignition was accomplished at 1944 hours. Bed temperatures again increased very rapidly. The fuel master set point was lowered to 10.5%. Air flow was increased to 425 kpph, freeboard mixing was initiated, then sorbent injection with the east line was started at 2035 hours.

Bed level was increased to 45 inches and held there to build bed material inventory.

When sorbent injection swapped to the west line, material would not feed out of the bottom of the injection vessel. The system was operated on single-line operation with the east line. Maintenance worked on the west injection vessel outlet. Wet material was found to be the problem. (This line was returned to service at 1436 hours on September 23, 1992.)

Once-through operation was accomplished at 0740 hours on September 23, 1992, with an indicated bed level of 62 inches.

Increased bed level to the 112 inch tap to hold there for the intended limestone injection test.

Estimates are that the limestone sorbent arrived in the bed at 2200 hours.

Appendix I - Operations Narrative of Runs

At approximately 0200 hours on September 24, 1992, the bed conditions became unstable. Evaporator outlet tube temperatures were increasing into alarm, hot and cool spots were observed in the bed, and some sinters were found in the bed ash removal system.

The splitting air flow was increased and bed level decreased in an attempt to eliminate sintering and to improve the bed dynamics. Conditions did not improve and at 0510 hours, the combustor tripped because of three bed temperature thermocouples less than 1200 F.

All bed material was removed, the gas turbine removed from service at 1014 hours, the combustor was cooled and then released to the Maintenance Department for outage work.

Startup TD-SU-92-15-01 - September 28 - October 1, 1992

The combustor was released by Maintenance at 2000 hours on September 28, 1992.

The combustor warming was accomplished by starting the air circulation, establishing 0 pressure in the freeboard with 741/758 System, then warming the boiler circuits.

The gas turbine was rolled at 0706 hours on September 29, 1992. Parallel was at 0726 hours, and the valves were opened at 0733 hours. Unusual vibration and noise were detected on the LPC housing during the air heating period.

The bed preheater was lit at 1346 hours. The test O₂ analyzer lines were found to have leaks just outside of the combustor. These lines were plugged with high temperature RTV to prevent leaks.

Water mist nozzles were used on the inlet to the precipitator in an attempt to increase the collection of the ash. This appeared to help until after coal fire when the bed level was increased.

Bed level was increased for the steam turbine roll. The steam turbine stop valve trip solenoid coil failed and was replaced. At 2031 hours, the steam turbine was rolled and was paralleled at 2132 hours.

Coal fire was initiated at 2222 hours. The #3 paste pump was pumping much lower flow than the others. The bias was increased to 1.5. This helped, but tuning in logic was required to bring the flow up to what was needed. Bed temperatures increased slowly, and the fuel master set point was increased to 12.5%.

The vibration on #1 and #2 bearings of the gas turbine increased until air flow was increased above 375 kpph. Air flow increase was stopped at 400 kpph, splitting air flow bias set to 1.25, freeboard mixing was initiated, then sorbent injection with the east line was started at 2327 hours. Splitting air flow bias was increased .05% at a time to a bias of 1.55 at a bed level of 45 inches (splitting air flow at this time was 3875 ppm).

Bed level was maintained at 45 inches to build bed inventory.

Once-through operation was accomplished at 0557 hours on September 30, 1992.

Appendix I - Operations Narrative of Runs

At approximately 0800 hours, water was found in the economizer outlet duct drain. The precipitator inlet duct water injection was shut down to determine if this water was coming from that operation. (Outage inspection proved that this was true.)

At 1143 hours, air flow was decreased because of high vibration on the #1 bearing of the gas turbine.

Splitting air flow bias was increased to 1.58 and a flow of 3950 kpph.

Bed level was increased to the 112 inch tap to hold there for the intended limestone injection test.

Some sinters were found in the bed ash removal system and at approximately 2100 hours, the sinter production seemed to be increasing, and evaporator tube temperatures and bed temperatures became erratic. Water was added to the coal paste tank in an effort to cause the paste to split better in the bed. Splitting air flow was increased to try to improve conditions. Nothing appeared to have any significant effect.

The combustor was manually tripped at 0101 hours on October 1, 1992, because of the very poor bed dynamics.

All bed material was removed, the gas turbine removed from service at 0446 hours, and the combustor was cooled and then released to the Maintenance Department for outage work.

Startup TD-SU-92-16-01 - October 26 - November 2, 1992

The unit was started for the purpose of initial operation of the hot gas clean up advanced particle filter.

Hot gas piping modifications were completed and the combustor was released by the Maintenance Department at 1930 hours on October 26, 1992.

Gas recirculation was started at 2254 hours and combustor warming began at 2330 hours. Warming of the APF and backup cyclone began at 0142 hours on October 27, 1992.

At approximately 0200 hours, the HGCU air preheater was removed from service because of grounded elements. (A total of 11 elements were found to be grounded.) The HGCU back pulse compressor tripped twice while in this holding mode due to high fourth stage discharge pressure and at 0547 hours, the compressor was left out of service to clean the fourth stage discharge filter and the coalescing filter. Water and oil carryover from the first stage was accumulating in these filters.

At 1305 hours, the compressor was returned to service, air flow established and at 1325 hours, the air preheater was put in service.

The gas turbine was rolled at 2005 hours, paralleled at 2022 hours, and the valves opened and air flow established through the combustor and APF at 2040 hours. Back pulsing of the filter elements was initiated at this time.

An eight hour backup cyclone refractory curing period on air heating was observed before lighting the bed preheater. During this hold, a hot spot was detected on the dirty gas instrument spool piece at a future ash sample connection. This spot later cooled down to pipe temperature.

Appendix I - Operations Narrative of Runs

The bed preheater was lit at 0446 hours on October 28, 1992.

The steam turbine was rolled and paralleled at 1312 hours.

An eight hour backup cyclone refractory cooling period on oil fire was observed before initiating a coal fire. During this time period, hot spots were found on the clean gas instrument spool piece, on the backup cyclone, and on the APF vessel head.

At 1810 hours, a coal fire was established.

Boiler once-through operation was achieved at 0452 hours on October 29, 1992.

Load was held at approximately 65 inches of bed level because of an interference between clean gas piping and structural steel. Restraints were reinstalled on the piping and the unit was released for load increase at 1132 hours.

Problems were experienced at this time with the APF lockhopper ash removal system. The lockhopper vent and equalizing line plugged. The pressure transmitter impulse lines for the lockhopper and the surge hopper also plugged. These lines were unplugged and the system returned to service.

When 112 inches of bed level was reached, a very hot spot (850 F) was found on the clean gas instrument spool piece. Fans were installed to cool the piping. The dust detector instrument also failed and hot gases leaked out through the probe. This instrument was disconnected electrically and secured. Bed level was reduced to 107 inches to lower the gas temperatures and the hot spot temperatures.

At 0004 hours on October 30, 1992, the south paste tank agitator tripped on high current. The paste tank level was allowed to drop to 30 inches, fans were installed on both motors, and the south tank agitator was restarted at 0111 hours.

At approximately 1000 hours, bed level was lowered to 90 inches to decrease gas temperatures and piping temperatures to a lower, more stable, point for the next few days.

Problems were encountered over the next two days with the ash removal systems. First, the equalizing line at the bag filter plugged, then the bag filter itself required manual cleaning. After these problems were corrected, the APF ash removal lockhopper ash transport line plugged when the lockhopper failed to vent properly because of vent line pluggage.

After these items were repaired, the ash removal system functioned fairly well for the next day.

The #23 secondary cyclone plugged during the afternoon of October 31, 1992. Attempts at stirring did not help, nor did increasing pressure vessel pressure. Early in the morning of November 1, 1992, this cyclone unplugged.

At 1430 hours on November 1, 1992, the APF ash removal system again developed pluggage. The surge hopper to lockhopper pressure equalizing line plugged; also, the lockhopper inlet valve would not open. The vent line plug was removed, but the inlet valve could not be opened with the actuator nor with mechanical help. At 2332 hours, the combustor was tripped to prevent ash backing up into the APF elements.

Appendix I - Operations Narrative of Runs

The steam turbine tripped at 2335 hours.

Automatic reversing of all six paste lines was accomplished. Clean blowing of the nozzles was delayed until the boiler was opened. All six lines were able to be clean blown with 100 psig plant air.

Bed material was put in the bed as reinjection vessels, cooling with the gas turbine was completed, and the gas turbine tripped at 0354 hours on November 2, 1992.

The combustor and APF continued to be cooled using air circulation and combustor cooling. Cooling of the APF required forcing air flow through the cooling valves on the clean gas piping to the atmosphere by closing down on the combustor cooling outlet valve.

When the combustor, the APF, and the backup cyclone were cooled, the unit was released to the Maintenance Department for outage work.

The APF filter functioned well during this initial run and the back pulsing system was able to maintain a very reasonable differential pressure drop across the filter. No sign of ash leakage through the elements into the filter dome or into the backup cyclone was found.

Startup TD-SU-92-17-01 - November 14 - November 17, 1992

The combustor was released by Maintenance at 2028 hours on November 14, 1992. Air circulation warming was started at 2255 hours. While air circulation warming was in progress, work continued on HGCU revisions and reassembly of instrument purge air piping.

The gas turbine was rolled at 1759 hours on November 16, 1992. Parallel occurred at 1825 hours and the intercept valves were opened at 1845 hours.

Oil fire was established at 2321 hours. The bed bottom was filled with bed material which had been put in the east sorbent injection vessel. The primary cyclone ash transport system pressure and flow were low during the entire period of time that start bed level was being established.

The steam turbine was rolled at 0251 hours on November 17, 1992, and was paralleled at 0358 hours.

Coal fire was achieved at 0933 hours on November 17, 1992. Soon after coal fire, #13, #14 and #15 primary cyclones plugged. Air flow was increased to provide more transport air pressure and freeboard mixing was put in service in an attempt to reduce ash loading to these primary cyclones. The #15 cyclone cleared, but #13 and #14 remained plugged and started to carry over into #23 and #24 secondary cyclones. At 1050 hours, the combustor was tripped.

Automatic-reversing of the fuel nozzles was accomplished with the larger nitrogen supply line.

The gas turbine was used to cool the bed material and then was removed from service at 1132 hours. All bed material was then removed to below the sparge ducts.

Appendix I - Operations Narrative of Runs

During the heating period, hot spots were found on the APF at the upper seal weld area and on the backup cyclone at the inlet pipe.

The combustor was cooled and released to maintenance for outage work.

Startup TD-SU-92-18-01 - November 20 - November 25, 1992

The combustor was released by Maintenance at 1515 hours on November 20, 1992. Air circulation warming was started at 1701 hours.

The gas turbine was rolled at 0338 hours, paralleled at 0354 hours, and air flow established through the combustor at 0407 hours on November 21, 1992.

An oil fire was established at 1008 hours. System 274 (sand) was used to increase the bed level.

The steam turbine was rolled at 1412 hours and was paralleled at 1501 hours.

A coal fire was established at 1841 hours. Air flow was increased and freeboard mixing put in service. The sorbent injection system was placed in service at 2007 hours.

Once-through boiler operation was accomplished at 0324 hours on November 22, 1992.

The hot spots at the top of the APF dome and on the backup cyclone inlet reached approximately 600 F.

Bed level was increased to a maximum height of 138 inches at 1252 hours on November 23, 1992.

On November 23, 1992, the back pulse compressor fourth stage cylinder failed. Low pressure nitrogen was connected to the primary accumulator tank to supply purge air to the instruments until a high pressure supply could be obtained for back pulsing.

Load was reduced on the unit to reduce the APF differential. This differential had steadily increased because of the absence of back pulsing medium. On November 24, 1992, high pressure nitrogen was used from a bulk truck to pressurize the primary accumulator tank.

After back pulsing was resumed with the high pressure nitrogen, the differential could not be reduced to the previous level. Back pulsing was again stopped, the differential allowed to build to 200 inches WG, and then back pulsed with a higher pressure in an attempt to remove the cake from the candles. After this back pulsing, problems were experienced with the APF ash removal. The ash was hanging up in the bottom of the APF, as evidenced by the high level alarm and the dropping of the ash outlet temperatures.

Problems were then experienced with the fuel prep system crusher and with pluggage in the sizer (caused by wet incoming coal) during the evening of November 24, 1992. Load was reduced to conserve fuel, but the paste tank level continued to drop. The combustor was tripped at 2250 hours when the tank level was so low that the pumps were in danger of losing suction.

Appendix I - Operations Narrative of Runs

The bed was taken up into the 274 vessels and at 0408 hours on November 25, 1992, the gas turbine was removed from service.

The coal prep system was cleaned and returned to service. The ash was removed from the bottom of the APF. The back pulse compressor was returned to service after being repaired.

Preparations were then made to hot restart the unit.

Startup TD-SU-92-18-02 - November 25 - December 7, 1992

The unit was prepared for a hot restart after the fuel prep system was purged of the wet coal and cleaned. The APF ash hopper had been cleaned and the back pulse compressor repaired and returned to service.

The gas turbine was rolled at 0721 hours, paralleled at 0733 hours, and air flow established through the combustor at 0740 hours on November 25, 1992.

An oil fire was established at 0752 hours. Bed level was increased with little to no problem with dust carryover to the ash removal system.

The steam turbine was rolled at 1048 hours and was paralleled at 1118 hours.

A coal fire was established at 1211 hours. Air flow was increased and freeboard mixing put in service and at 1257 hours, the sorbent injection system was placed in service.

Once-through boiler operation was accomplished at 1542 hours.

While increasing bed level, a cyclone fire was experienced in #11 primary cyclone. Air flow was increased and the water content in the paste decreased. The high temperatures in the cyclone decreased as a result of these actions when bed level was increased.

The back pulse compressor failed again on November 27, 1992. (Fourth stage cylinder and cylinder 2-3 crosshead.) High pressure nitrogen again was obtained for back pulsing. (Approximately one day without back pulsing the APF.) After this period without pulsing, the filter differential had increased to over 200 inches WG. When back pulsing was resumed with HP nitrogen, the differential could not be lowered to the base line that was previously achieved.

While holding the level constant at approximately 100 inches, the bed density never stabilized. Sinters were being made in the bed. Splitting air flow was raised, the water content in the paste was increased, and the bed temperature was lowered in an attempt to reduce sinter production. Conditions stabilized and over the next two days, sinters disappeared from the bed.

On November 30, 1992, the #7 expansion joint developed a hot spot of approximately 500 F. Also, the pressure on the telltale pressure gauge increased to 30 psig. This was closely monitored for any change.

Appendix I - Operations Narrative of Runs

On December 1, 1992, load was reduced to approximately 40 inches bed level, and the APF filters were back pulsed on half hour sequence intervals with 1300 psi supply pressure for a two hour period. This lowered the tube sheet differential to 1.9 psid from 4.9 psid.

Bed level was increased to approximately 115 inches. The APF tube sheet differential gradually increased.

High levels of ash were again experienced in the APF ash hopper, as evidenced by the high level alarm, decreased temperatures at the ash outlet, as well as dropping temperatures at the top of the lower cone. The bottom of the APF was pounded with rubber hammers and ash blowdown air was used in attempts to remove the ash.

On December 2, 1992, ash was discovered in the backup cyclone, indicating a leak through the APF.

On December 3, 1992, the APF tube sheet differential pressure had increased to 7.2 psid. Load was reduced to approximately 100 inches to keep the temperature at the tube sheet below 1400 F to protect the tube sheet.

On December 4, 1992, the unit was again brought to a minimum load of 40 inches bed level to try to clean the filter elements by back pulsing at a higher pressure and more frequent sequence. After back pulsing at this minimum load, the tube sheet differential pressure dropped from approximately 5 to 1 psid.

Unit load was then increased to approximately 110 inches bed level and maintained (trying to keep APF inlet temperature below 1400 F). The APF tube sheet differential operated between 2 and 4 psid for the remainder of the run.

The back pulse compressor was repaired and returned to service on December 4, 1992, and remained in service for the rest of the run.

On December 6, 1992, the telltale pressure gauge on #7 expansion joint increased to 86 psig, indicating a possible inner bellows leak. On December 7, 1992, this leak was verified and the unit was removed from service at 0956 hours.

All bed material was cooled to be removed with 272 system and at 1713 hours, the gas turbine was removed from service.

The combustor was cooled and released to the Maintenance Department for outage work.

Approximately 60 tons of #6A Harrison Mine coal was run through the fuel prep system on December 7, 1992, to determine how the crusher would handle this coal. No adverse effects were observed.

Startup TD-SU-92-19-01 - December 12 - December 17, 1992

After isolating HGCU and configuring the ash removal system to a six string operation, the combustor was released to operations at 2340 hours on December 12, 1992.

Air circulation warming was started at 0152 hours on December 13, 1992.

Appendix I - Operations Narrative of Runs

The gas turbine was rolled at 1301 hours, paralleled at 1315 hours, and intercept valves opened at 1323 hours.

An oil fire was established at 1917 hours. Secondary cyclones #22 and #26 appeared to be plugged at this time.

The steam turbine was rolled at 2223 hours and was paralleled at 2322 hours.

Bed level was increased to 26 inches and a coal fire was established at 0302 hours on December 14, 1992 (6A Harrison Mine coal). Air flow was increased and freeboard mixing put in service and at 0439 hours, the sorbent injection system was placed in service.

Once-through boiler operation was accomplished at 1209 hours.

Bed level was increased to 115 inches and maintained to allow the bed conditions to stabilize.

On the evening of December 15, 1992, conditions were set to 114 inches bed level, 1540 F bed temperature, and air flow of 620 kpph for a sorbent utilization test to begin the next morning. The test was started at 0800 hours. During the test, wet incoming coal which was being dumped from the incoming trucks into the truck hopper caused an increase in the moisture content of the paste. This resulted in post-bed combustion in the freeboard. The water content of the paste was decreased and the freeboard temperatures stabilized.

The incoming wet coal caused unstable fuel prep crusher operation and a decrease in the paste tank level.

Unit load was decreased to conserve fuel. While at lower load, #23 and #24 secondary cyclones plugged.

Paste quality in the tank was poor due to the unstable operation of the crusher system. The #1 paste pump nozzle plugged. It was removed from service, reversed, cleaned and returned to service. Later, #2 paste pump nozzle plugged and the pump was removed from service to clean. While the #2 pump was out of service, the #5 paste pump nozzle plugged.

The combustor was manually tripped at 0951 hours on December 17, 1992 because of the loss of these two paste pumps.

All bed material was cooled to be removed with 272 system and at 1139 hours, the gas turbine was removed from service.

The combustor was cooled and released to the Maintenance Department for outage work.

Startup TD-SU-92-20-01 - December 27 - December 28, 1992

The combustor was released by the Maintenance Department at 1200 hours on December 23, 1992. Clearances were picked up and support systems readied for a start-up after the holiday.

Air warming was started at 0835 hours on December 27, 1992. The gas turbine was rolled at 2343 hours, parallel occurred at 2358 hours, and the intercept valves were opened at 0011 hours on December 28, 1992. The LPC was cleaned using Carboblast during the air preheating period.

Appendix I - Operations Narrative of Runs

An oil fire was established at 0745 hours. The #13 primary cyclone suction nozzle did not respond to the oil fire temperature as the other primary cyclones did.

The steam turbine was rolled at 1208 hours and paralleled at 1316 hours on December 28, 1992.

When the coal paste pumps were put into recirc preparing for a coal fire, over hydraulic pressure alarms were received on #1 and #3 pumps. These pumps were checked and the strainer on #3 pump was removed and cleaned. The #2 and #3 pumps also experienced high differential pressure while in recirc. Large pieces of coal were found in the suction boxes of these pumps. Inspection of the fuel prep system sizer found a rip and a hole in the fine screen. This screen was replaced.

It was determined to go ahead and try to coal fire with this tank of paste. A coal fire was initiated at 1620 hours on December 28, 1992. At 1645 hours, the #3 paste pump tripped on low splitting air flow. At 1651 hours, the #2 paste pump went over hydraulic pressure and quit pumping. At 1701 hours, the #2 pump was returned to service and at 1712 hours, the #3 pump was returned to service. At 1727 hours, the #1 paste pump tripped; at 1729 hours the #2 and #3 paste pumps tripped. (All three tripped on low splitting air flow.) The combustor was manually tripped at 1730 hours.

The gas turbine was removed from service at 1902 hours.

The paste tank was emptied, the tank and pumps and "S" tubes were cleaned.

Startup TD-SU-92-20-02 - December 29 - December 31, 1992

Following the paste tank emptying and cleaning of the tank and pumps, the gas turbine was rolled at 0445 hours, paralleled at 0458 hours, and the intercept valves opened at 0516 hours on December 29, 1992.

An oil fire was established at 0609 hours with 20 inches of sand bed level. The #13 cyclone and #23 cyclone suction nozzle temperatures remained slightly low during the oil firing period.

The steam turbine was rolled at 0832 hours and paralleled at 0905 hours on December 29, 1992.

A coal fire was initiated at 1029 hours. The #5 paste pump flow was swinging around, but finally stabilized. At 1242 hours, the #2 paste pump tripped due to low splitting air flow. The fuel line was operated in reverse sequence, clean blown, and returned to service.

Once-through boiler operation was accomplished at 2037 hours.

The #13 primary cyclone seemed to have an in-leak of air, but was collecting and removing ash. The #23 cyclone plugged and unplugged unexplainably during the run.

At approximately 2240 hours, throttle pressure control started swinging following the stop valve testing. This started a swing in feedwater. The steam turbine governor was put in manual and the turbine bypass valve was put in pressurization mode and the swing stopped. The governor was then returned to auto and the TBV returned to manual and all was well.

Appendix I - Operations Narrative of Runs

Bed level was increased to 104 inches and held for the controls to integrate into a better range while displacing the sand with bed material. Bed level was then increased to 115 inches and held to allow the bed to stabilize for the upcoming sorbent utilization test.

The sorbent preparation vibrating feeder outlet to the drying mill began to plug with wet sorbent accumulations. This material was removed and the system returned to service.

On the evening of December 30, 1992, conditions were set for the sorbent utilization test on the following day.

At approximately 0400 hours on December 31, 1992, the #16 primary cyclone showed signs of not collecting or transporting ash. Air flow was increased and sorbent injection stopped to try to unplug this cyclone. No changes were observed.

At 0759 hours, the combustor was tripped because of the #16 primary cyclone carryover into the #26 secondary cyclone.

Startup TD-SU-93-01-01 - January 18 - January 31, 1993

The combustor was released by the Maintenance Department at 1930 hours on January 18, 1993. Air warming was accomplished and the gas turbine rolled at 1023 hours, paralleled at 1043 hours, and air flow established through the combustor at 1049 hours on January 19, 1993.

Problems were experienced with the needle valves sticking on the bed preheater.

An oil fire was established at 2356 hours on January 19, 1993. Coal fire was initiated at 0605 hours and bed level increased. Once-through boiler operation was achieved at 1040 hours. The No. 23 secondary cyclone plugged during this time period.

Bed level was increased to the 115 inch level for a sorbent utilization test with Harrison Mine No. 6A coal. This test was completed on January 23, 1993.

The fuel preparation system crusher throughput was limited at 44 kpph with this No. 6A coal. This prohibited conducting a sorbent utilization test at a higher bed level with this coal.

The precipitator controls were upgraded during this run.

Bed level was lowered to approximately 80 inches for a sorbent utilization test. This test was completed at 1200 hours on January 26, 1993.

Bed level was then increased to 115 inches for a second test at this level. This test was completed at 0800 hours on January 28, 1993.

One of the gas turbine LPC inlet pressure transmitters failed during this test period. It was repaired and both LPC inlet pressure transmitters were relocated to structural steel instead of the inlet duct to reduce vibration on the instruments.

Appendix I - Operations Narrative of Runs

During this test period, a leak developed on the gas turbine HPT test plug. This leak was temporarily repaired by pumping a high pressure sealant into the test plug.

Following the 115 inch bed level test on No. 6A coal, the fuel was switched to Pittsburgh No. 8. This test was completed at 0800 hours on January 29, 1993.

Throughput on the fuel preparation system crusher was much improved on the No. 8 coal (65 kpph was achieved).

Unit conditions were held steady in anticipation of increasing to full load following the weekend.

At 1540 hours on January 31, 1993, a combustor trip was suffered when the Network 90 system detected a communications fault with the safety node.

The steam turbine tripped at 1544 hours.

Inadvertent switching of reserve power resulted in a temporary loss of auxiliary power. Loss of AC power caused the preheater bypass damper to close, activating the boiler protection system rupture disc.

At 1629 hours, the gas turbine tripped on high fictive disc temperature.

The bed material was cooled and removed. The combustor was further cooled and released for maintenance outage work.

Startup TD-SU-93-02-01 - February 5 - February 6, 1993

The combustor was released by the Maintenance Department at 2028 hours on February 5, 1993.

Air warming was accomplished and the gas turbine rolled at 1333 hours, paralleled at 1347 hours, and air flow established through the combustor at 1400 hours on February 6, 1993.

A successful oil fire was not achieved. Problems developed with sticking needle valves on the preheater.

The gas turbine was removed from service at 2239 hours on February 6, 1993 for maintenance work on the bed preheater.

Startup TD-SU-93-03-01 - February 8 - February 9, 1993

Following the repairs to the bed preheater, the gas turbine was rolled at 0842 hours and paralleled at 0858 hours on February 8, 1993.

A successful oil fire was accomplished on the first attempt at 1111 hours.

Four of the six secondary cyclones (Nos. 22, 25, 26, and 27) were plugged when oil fire was established.

The steam turbine was rolled and paralleled at 1357 hours on February 8, 1993.

Appendix I - Operations Narrative of Runs

A coal fire was established at 1640 hours. The No. 25 secondary cyclone unplugged when air flow was increased.

As bed level was increased, once-through boiler operation was achieved at 2108 hours.

Bed level was maintained at approximately 85 inches, while the bed material matured and the sand was being purged from the bed.

As air flow was increased above 600 kpph, the No. 22 and No. 26 secondary cyclones unplugged.

While maintaining these conditions for the bed to mature, a gas turbine trip occurred at 1429 hours on February 9, 1993. High vibration was experienced on all bearings of the LP shaft. Surge conditions on the LPC initiated the trip.

The bed was inerted and cooled with gas circulation. The bed material was removed and the combustor further cooled for maintenance outage work.

Startup TD-SU-93-04-01 - June 26 - July 3, 1993

The purpose of the start-up was to obtain strain gauge data from the new LPT blades.

The combustor was released by the Maintenance Department at 1518 hours on June 25, 1993. Water circulation was started for boiler circuit warming.

The gas turbine was released to Operations at 2003 hours on June 26, 1993. Gas recirculation warming was started at 2330 hours.

Testing at Cardinal Unit No. 1 prevented rolling of the gas turbine until 0227 hours on June 28, 1993 at which time a "window" in Cardinal testing allowed for a roll-up to check for vibration. The gas turbine generator was paralleled at 0239 hours, and valves opened to combustor at 0251 hours. The combustor was pressurized and checked for external leaks, etc., then the gas turbine was tripped at 0657 hours for cool down down to install balance weight due to vibration on No. 3/4 bearing and to allow Cardinal to complete their testing.

After the cool down on the HPT, a balance weight was installed. After the testing at Cardinal Unit No. 1 was completed for the day, the gas turbine was rolled at 0202 hours on June 29, 1993 to check vibration. The gas turbine generator was paralleled at 0218 hours. vibration levels were acceptable and the gas turbine was tripped at 0226 hours. The unit was ready to proceed with the start-up when Cardinal Unit No. 1 testing was complete. Cardinal released the stack for Tidd start up at 2000 hours on June 29, 1993. The gas turbine was rolled at 2059 hours, paralleled at 2110 hours, and the valves opened and air flow established through the combustor and APF at 2119 hours.

The bed preheater was lit at 0908 hours on June 30, 1993.

The steam turbine was rolled at 1240 hours. After testing the overspeed trip with oil and rerolling the steam turbine, a combustor trip was suffered at 1329 hours due to low boiler circulating flow. The trip was reset and the bed preheater initiated at 1353 hours. The steam turbine was rolled at 1459 hours and paralleled at 1553 hours.

Appendix I - Operations Narrative of Runs

At 1727 hours a coal fire was established.

While increasing air flow, higher than normal vibration was noticed at the gas turbine No. 5 bearing. LPT speed was held at approximately 4400 RPM until enough inlet guide vane position was available to make the ramp to 4650 RPM.

Bed level was increased to approximately 45 inches and maintained there to build bed material inventory. After accomplishing this, the bed level was increased and biler once through operation achieved at 0855 hours on July 1, 1993.

The gas turbine intercooler ran out of cooling capacity on the evening of July 1, 1993 at a bed height of 108 inches (maximum attainable bed height).

The unit load and air flow was then manipulated for the LPT strain gauge testing.

While the bed height was being held at 50 inches for more LPT testin the next day, the steam turbine was removed from service at 2231 hours on July 1, 1993 and the scheduled overspeed tests accomplished.

Following the overspeed tests, the steam turbine generator was paralleled at 0301 hours on July 2, 1993.

Testing continued on the LPT vibration analysis. Bed level and air flow was manipulated to get the required conditions for the various phases of the testing.

Bed level was raised on the evening of July 2, 1993 until the intercooler again ran out of cooling capacity with the following conditions:

Bed Level	116 inches
Bed Temp.	1540 degrees
Air Flow	640 kpph
LPT Speed	5397 RPM
Ambient Temp.	80 F

Bed level was reduced to complete the last of the LPT vibration analysis tests.

Following this last test, bed level was lowered to 80 inches and the combustor tripped at 0505 hours on July 3, 1993.

The bed level was continued to be lowered to 0 inches and the gas turbine removed from service at 0948 hours for the cool down period to change the telemetering batteries and change the strain gauge wiring.

Startup TD-SU-93-05-01 - July 4 - July 5, 1993

The purpose of the run was to obtain additional strain gauge data from the gas turbine LPT blades.

The combustor gas side had been bottled up and temperatures were maintained well above dew point while the wiring and batteries were changed on the gas turbine strain gauge telemetering.

Appendix I - Operations Narrative of Runs

The gas turbine was rolled at 1710 hours, paralleled at 1734 hours, and the valves opened and air flow established through the combustor and APF at 1742 hours on July 4.

An oil fire was established at 1939 hours, the steam turbine was rolled at 2148 hours, and paralleled at 2234 hours, and at 0035 hours on July 5, a coal fire was established.

Air flow was increased to meet conditions for the first set of LPT blade strain gauge testing. Following the first set of tests, the bed level was increased to match inlet guide vane conditions for more testing of the LPT blades.

Once through boiler operation was accomplished at 0756 hours.

Several series of strain gauge tests were accomplished at varying air flows and inlet guide vane positions.

Following the completion of all of the planned LPT blade strain gauge testing, bed level was reduced using the bed ash removal system and the combustor was tripped at 1717 hours on July 5. (This outage was to replace the temporary strain gauge blades with permanent blades.) The combustor and APF were cooled with gas turbine air flow and the gas turbine removed from service at 2216 hours. Cooling of combustor and APF continued with the combustor cooling fan in preparation for maintenance outage work.

Startup TD-SU-93-06-01 - July 17 - August 5, 1993

The unit was released by the maintenance department at 1625 hours on July 16.

The purpose of the run was to conduct sorbent utilization tests at various bed levels and sulfur retention values.

Gas recirculation was started at 2330 hours. Warming of the APF was accomplished by flowing dry air up through the screw cooler into and through the filter vessel.

When starting the HGCU backpulse compressor, the fourth stage would not load. The backup compressors were used while the backpulse compressor was repaired.

The gas turbine was rolled at 1701 hours on July 17. The gas turbine was removed from service because of a problem with leaks on the heads of the splitting air compressor.

The gas turbine was rolled again at 2325 hours and paralleled at 2349 hours. The valves were opened and air flow established through the combustor and APF at 0001 hours on July 18. The warming of the combustor was accomplished while using sorbent booster compressor air for splitting air while the splitting air compressor was being repaired.

The splitting air compressor was returned to service at 0805 hours.

An oil fire was established at 1053 hours.

The backpulse compressor was returned to service at 1231 hours.

Appendix I - Operations Narrative of Runs

The steam turbine was rolled at 1439 hours and paralleled at 1528 hours and at 1820 hours, a coal fire was established.

All the secondary cyclone ash outlet pickup pots were plugged and required blowing back through the external blow-back piping from the sorbent air system. All opened up and remained open for the remainder of the run.

Bed level was raised to 45 inches and maintained there to build bed material inventory. After accomplishing this, the bed level was increased and once through boiler operation achieved at 0825 hours on July 19.

Load was increased to approximately 110-inch bed level. The gas turbine No. 5 bearing vertical vibration increased into alarm as load was increased on the gas turbine generator. The alarm point was raised to 350 mils/second, and unit operation was limited in order not to exceed this point for the rest of the run (bed level was eventually lowered to 80 inches to avoid alarm conditions). Several operating adjustments were made to try to determine the cause of the vibration.

Sorbent utilization tests were done at 95-inch bed level with 90% sulfur retention, 80-inch bed level with 90% sulfur retention, and 80-inch bed level with 95% sulfur retention.

A sorbent utilization test at 90-inch bed level with 85% sulfur retention was completed on August 4.

A manual trip of the combustor was initiated at 1222 hours on August 5 because of a high level of ash in the APF, after all efforts to remove the ash and clear the alarm were unsuccessful. The gas turbine was removed from service at 1533 hours.

Startup TD-SU-93-07-01 - August 8 - August 9, 1993

The unit was released by the Maintenance Department at 1637 hours on August 8.

The purpose of the run was to continue to conduct sorbent utilization tests at various bed levels and sulfur retention values.

The gas turbine was rolled at 2058 hours, paralleled at 2107 hours, and the gas turbine valves opened at 2124 hours.

During gas turbine air heating, the LPC No. 1 vertical vibration became erratic. Connections were checked and tightened. This seemed to stabilize the indication. The LPC was cleaned using Carboblast during the air heating period.

The bed preheater was lit at 0343 hours on August 9. The steam turbine was rolled at 0555 hours and the steam turbine generator was paralleled at 0649 hours.

A coal fire was attempted at 0823 hours but was ordered back off when No. 1 and No. 3 paste pumps did not start. The pumps were put in recirculation and a successful coal fire established at 1018 hours.

Sorbent injection was initiated at 1110 hours.

Appendix I - Operations Narrative of Runs

While increasing air flow, the No. 5 HPC bearing vertical vibration increased as it had on the previous run.

At 1138 hours on August 9, the gas turbine tripped when the No. 1 LPC bearing vibration spiked high while the No. 5 HPC vertical vibration was in high alarm.

The gas turbine was cooled on barring and prepared for a balance shot.

Startup TD-SU-93-08-01 - August 10 - August 14, 1993

The gas turbine was released by the Maintenance Department at 1321 hours on August 10.

The purpose of the run was to continue sorbent utilization tests at various bed levels and sulfur retention values and evaluate the gas turbine balance shot.

The gas turbine was rolled at 1521 hours, paralleled at 1536 hours, and the gas turbine valves opened at 1553 hours.

The bed preheater was lit at 1623 hours.

The steam turbine was rolled at 1850 hours, but problems were experienced when trying to parallel.

A coal fire was established at 2229 hours.

A loose connection was found on the yard running potential for the steam turbine generator synchronizing circuit and the generator was paralleled at 2301 hours.

Sorbent injection was initiated at 2314 hours.

Once through operation of the boiler was achieved at 0814 hours on August 11.

During the evening of August 12, bed level was raised to approximately 125 inches with air flow of 680 kpph. The air flow was limited at this time by the capacity of the gas turbine intercooler. At this air flow and bed level, the vibration indication was approximately 200 mil/second. The balance shot had helped significantly.

Bed level was reduced to 115 inches and the unit operated with sorbent injection overfeed to accumulate sulfur retention credits for the upcoming 85% sulfur retention test.

A combustor trip was experienced at 0527 hours on August 14 when the No. 5 paste pump controls caused the pump to go to a very high pumping rate while flow feedback to the NET 90 system failed low.

The bed level was reduced to start bed level and a hot restart was attempted. Attempts at lighting the bed preheater were unsuccessful for unknown reasons.

The gas turbine was removed from service at 1211 hours to permit working on the bed preheater and on the No. 5 paste nozzle which was plugged.

Appendix I - Operations Narrative of Runs

Startup TD-SU-93-09-01 - August 14 - August 15, 1993

Following the checks on the bed preheater (which did not reveal any problems) and the unplugging No. 5 fuel nozzle, the combustor was released at 2000 hours on August 14.

The gas turbine was rolled at 2205 hours, paralleled at 2222 hours, and the gas turbine valves opened at 2234 hours.

The bed preheater was lit at 2318 hours.

Following oil fire, No. 13, No. 14, and No. 15 primary cyclones appeared to be plugged. Air flow was raised as much as possible in an attempt to blow out the plug. No. 13 and No. 14 unplugged but No. 15 did not. When No. 25 showed signs of carrying over from the primary, the combustor was tripped at 0214 hours on August 15.

The combustor was cooled, bed material removed from the north reinjection vessel, and the gas turbine tripped at 0349 hours.

Startup TD-SU-93-10-01 - August 18 - August 24, 1993

The combustor was released at 1545 hours on August 18.

The unit was started for the purpose of testing sorbent utilization using limestone for sorbent.

The gas turbine was rolled at 0258 hours, paralleled at 0315 hours, and the gas turbine valves opened at 0325 hours on August 18.

The bed preheater was lit at 1134 hours.

A coal fire was initiated at 1748 hours and sorbent injection started at 1852 hours.

The south bed ash reinjection vessel outlet plugged and no material could be injected into the bed from it.

Bed level was increased and once-through operation achieved at 2254 hours.

A sorbent utilization test was conducted on August 21 at 115-inch bed level with 95% sulfur retention.

On August 23, the coal paste water content was raised for a test.

Limestone, as sorbent, was started into the preparation system and this absorbent entered the bed at approximately 2200 hours on August 23. At approximately 0500 hours on August 24, the bed density showed signs of sintering in the bed. By 0800 hours, the bed temperatures also indicated the presence of sinters. Limestone sorbent injection was aborted. The sorbent fines admission system was started as absorbent and bed ash reinjection was used to try to displace the sintered bed, but high temperatures in the evaporator section of the boiler could not be controlled. The combustor was manually tripped at 1328 hours.

Appendix I - Operations Narrative of Runs

The combustor was cooled and all bed material was removed. (Neither of the bed ash reinjection vessels could be emptied due to plugged "L" valves.)

Startup TD-SU-93-11-01 - August 29 - September 23, 1993

The combustor was released at 1915 hours on August 28.

The unit was started for the purpose of performance testing with various dolomites as absorbent.

The gas turbine was rolled at 0922 hours, paralleled at 0941 hours, and the gas turbine valves opened at 0947 hours on August 29.

The bed preheater was lit at 1806 hours.

Fuel injection was attempted at 2210 hours but the No. 3 pump did not start. The pumps were reversed, lines clean blown and wetted, and a successful coal fire was attained at 2331 hours on August 29 (No. 3 pump again did not start, but was placed in service at 0049 hours on August 30). Sorbent injection started at 1852 hours on August 30.

Bed level was increased and once-through operation achieved at 0504 hours.

Bed level was maintained at 100 inches while the bed matured and the remaining sand was removed from the bed ash reinjection system.

During this time, the sorbent prep system crusher speed was increased to test the effect on the product size distribution.

Following the maturing period, the bed was raised to 115 inches and the sorbent fines admission system was placed in service with a ratio of 14 kpph sorbent to 60 kpph coal. While using this system, the rotary feeder at the 500 ton storage vessel bound up several times until temporary seal air from the dry air system was used.

Two performance tests were conducted while using the fines in the paste, one at 115-inch bed level with 90% sulfur retention and the other at 80-inch bed level with 90% sulfur retention.

The APF manway vibrator stopped operating and later failed with a leak in the internal hoses and required isolation.

The east sorbent injection velocity transmitter showed considerably less flow than the orifice flowmeter and all attempts to correct the problem failed. The flow control valve was limited to 83% opening to reduce the high velocity through this line for the remainder of the run.

Both "L" valves in the bed ash removal system were restricted in flow. Inspection of the valves showed a sparge duct tile in each valve. Removal of these tiles allowed the bed ash removal system to function normally for the remainder of the run.

Appendix I - Operations Narrative of Runs

On September 9, bed level was reduced to 45 inches to clean up the APF (differential pressure had increased to 250 inches of water). Following the clean up, the differential was 100 inches of water.

Unit load was increased to 115-inch bed level and a performance test conducted at 85% sulfur retention with Peebles dolomite as the absorbent. Tests were also done with Peebles dolomite at 80-inch bed level with 90% sulfur retention and at 80-inch bed level with 95% retention.

On September 13, ash leakage was detected at the backup cyclone indicating broken candles. Problems were also encountered with getting ash out of the APF and the APF ash removal system (candles were blocking the piping). High ash level alarms in the APF were in and out for the remainder of the run. Various tactics were used to remove the ash from the APF during this time.

During the night of September 13, the sorbent injection system developed a leak in the piping upstream of the boiler isolation valves. After much effort, the piping was isolated sufficiently to allow repairs. Sorbent injection was out of service for approximately seven hours. During this time, the sorbent fines admission system was started into the paste to reduce sulfur emissions. The bed showed signs of sintering during and following this period of time. After returning sorbent injection to service, the bed stabilized. National Lime and Stone Carey dolomite was then introduced to the system.

Two performance tests were run on National Lime Carey dolomite. The first was at 80-inch bed level with 95% sulfur retention, and the second was at 80-inch bed level with 90% sulfur retention.

Battelle Research was on site September 16 to collect ash samples from the APF inlet gas stream. Problems were encountered with the sampler. The seal leakage on the sampler was excessive, the sample valve manual operator broke with the valve stuck half open, and the sampler probe stuck. Attempts to close or open the valve were unsuccessful and Leak Repair, Inc. was called to seal the probe leak and abandon it in place until the next outage.

The No. 11 primary cyclone spoiling air system was tested on September 17. Spoiling flow was increased to its maximum of 5700 PPH with the expected results of the suction nozzle and dip leg nozzle temperature decreases. No sign of a dip leg fire was seen.

After the Carey dolomite was purged through the preparation system, the drying mill sheave was changed again to increase the speed of the crusher.

On September 20, unit load was decreased to 45-inch bed level to do a clean up on the APF candles (differential pressure had increased to 240 inches of water). This attempt to reduce the differential pressure was not as successful as the last time and the filter differential pressure was only lowered to 140 inches of water.

The APF high level was in and out several times and remained in for about twenty-four hours following the clean up of the candles. The backup cyclone ash line also plugged and required blowing out with low pressure nitrogen. Several pieces of broken candle were removed from the APF lockhopper ash removal system when they plugged the transport line.

Appendix I - Operations Narrative of Runs

On September 21, unit load was increased to 116-inch bed level and the No. 11 primary cyclone spoiling air system initiated. The No. 2 HPT disc cooling air temperature increased to 860 degrees and the adjustable V6 orifice was opened and the disc cooling temperature lowered below alarm.

On the morning of September 22, shorted contacts on the raise/lower relays for the steam turbine load motor burned the supply voltage leads to the load motor control circuit. The turbine bypass valve was used to control throttle pressure while repairs were made to the load motor controls.

On September 22, unit load was raised to 128-inch bed level for a performance test at 90% sulfur retention with Greenfield dolomite.

APF ash production tests were done both with the No. 11 primary cyclone spoiling in service and out of service.

On the evening of September 23, the APF ash removal system plugged at the APF bottom. A high level alarm in the APF was received at 1941 hours.

A leak developed on the sorbent injection piping downstream of HCV-B850 and the combustor was tripped at 2012 hours.

The gas turbine was removed from service at 0058 hours on September 24.

The combustor and APF were cooled and released to maintenance for outage activities at 0153 hours on September 25.

Startup TD-SU-93-12-01 - October 9 - October 10, 1993

The combustor was released to operations at 1500 hours on October 9, 1993.

The unit was started for the purpose of testing the effects of multipoint (tees on existing two nozzles) sorbent injection into the bed.

The gas turbine was rolled at 0615 hours, paralleled at 0629 hours and the gas turbine valves opened at 0636 hours on October 10.

When the sorbent booster compressor was placed in service, leaks were discovered on the sorbent injection piping flange gaskets near the boiler isolation valves.

The gas turbine was removed from service at 0659 hours so repairs could be made to the piping on the sorbent injection lines.

While the repairs were made to the sorbent piping, boiler circulation was stopped and LCV-U200 was stroked and the bench set adjusted. (The valve had been leaking through.)

Appendix I - Operations Narrative of Runs

Startup TD-SU-93-12-02 - October 10 - October 11, 1993

The combustor was released to operations at 1420 hours on October 10 following the repairs to the sorbent injection piping.

The unit was started for the purpose of testing the effects of multipoint (tees on existing two nozzles) sorbent injection into the bed.

The gas turbine was rolled at 1619 hours, paralleled at 1635 hours and the gas turbine valves opened at 1649 hours on October 10.

Oil fire was established at 2136 hours and bed level was increased toward coal start bed of 26 inches.

All secondary cyclone dip legs except for No. 27 seemed to be plugged while warming on oil fire. (No. 23, 24, and 26 eventually opened as pressure vessel was pressure increased.)

The steam turbine was rolled at 0031 hours and was paralleled at 0121 hours on October 11.

Coal fire was initiated at 0343 hours. Air flow was increased, freeboard mixing steam was placed in service, and sorbent injection was started with the east line at 0441 hours.

Started to increase bed level at 0520 hours but stopped the increase at 1549 hours when No. 14 primary cyclone suction nozzle temperature started dropping, indicating that the dip leg was probably plugging.

The sorbent injection was removed from service at 0604 hours and air flow increased to try to blow out the dip leg on No. 14 cyclone. The attempt was unsuccessful.

The combustor was tripped at 0617 hours when No. 14 dip leg temperature started decreasing confirming that the dip leg was plugged.

All bed material was taken up into the bed ash reinjection vessel to be used for start-up bed material and the gas turbine was removed from service at 1033 hours on October 11.

The combustor was continued to be cooled and then released to maintenance to work on cleaning out the cyclones.

Startup TD-SU-93-13-01 - October 13 - October 14, 1993

The combustor was released to operations at 1650 hours on October 13.

The unit was started for the purpose of testing the effects of multipoint (tees on existing two nozzles) sorbent injection into the bed.

The gas turbine was rolled at 0515 hours, paralleled at 0532 hours and the gas turbine valves opened at 0539 hours on October 14 and oil fire was established at 1128 hours.

Appendix I - Operations Narrative of Runs

While all other cyclones showed signs of temperature increase following oil fire No. 14 cyclone did not, indicating that it was plugged. Air flow was increased to the speed/ guide vane limit in an attempt to blow it clean. This attempt was unsuccessful.

The combustor was tripped at 1344 hours. Following combustor cooling, the gas turbine was removed from service at 1430 hours. The combustor was continued to be cooled and then released to maintenance for cyclone cleaning.

Startup TD-SU-93-14-01 - October 16 - November 6, 1993

The combustor clearance was released by maintenance at 1550 hours on October 16.

The unit was started for the purpose of testing the effects of multipoint (tees on existing two nozzles) sorbent injection into the bed.

The gas turbine was rolled at 0116 hours, paralleled at 0137 hours and the gas turbine valves opened at 0141 hours on October 17.

Conservative measures were used to reduce the possibility of plugging cyclones. Process air to the bed bottom was not placed in service until coal fire and the purge air flow for sorbent injection was reduced until sorbent injection was required.

Oil fire was established at 0838 hours, the steam turbine was rolled at 1211 hours, and was paralleled at 1327 hours on October 17.

Coal fire was initiated at 1439 hours. Air flow was increased, freeboard mixing steam was placed in service and then sorbent injection was started at 1603 hours. Bed temperature was held at 1480 F until the bed matured to evaluate sintering.

Bed level was increased and once through boiler operation was achieved at 0041 hours on October 18.

Coal preparation system crusher skewing problems were encountered. It was determined that these problems were caused by a combination of moving the recycle screw discharge and machining of the crusher rolls. The recycle screw discharge was moved back to the original location and this improved the crusher performance to a condition that could sustain full load operation.

The gas turbine No. 2 horizontal vibration increased to approximately 190 mil/sec. as air flow was increased. The LPC was cleaned using Carboblast in an attempt to reduce the vibration. The cleaning did not help the vibration and it remained higher than normal.

On October 21, conditions were established for a sorbent utilization test at 115-inch bed level, 1540 F bed temperature, 90% sulfur retention with Plum Run sorbent and the four point sorbent injection header.

On October 22, following the completion of the 90% sulfur retention test, conditions were established for another sorbent utilization test at the same conditions with 95% sulfur retention. These conditions could not be met

Appendix I - Operations Narrative of Runs

because of excessively high sorbent injection flow requirements and bed ash removal not being able to remove enough bed ash to control bed level. This test was cancelled.

The sorbent fines admission system was test run on October 24 and placed in service with the paste system on October 25. A ratio of approximately 15% sorbent to coal was prepared. This ratio was maintained through 1200 hours on October 29.

On October 26, the middle paste pumps fuel flow was biased up while the end paste pumps were biased down for bed temperatures and O₂ distribution. Sorbent utilization appeared to improve greatly. Bed level was increased to 141 inches on October 27. This was to evaluate the gas turbine LPC bearing vibration as well as to evaluate sorbent utilization.

The LPC vibration actually decreased during this activity.

On October 28, the fuel prep system crusher developed a problem with skewing again. The problem was encountered mostly when starting the system up. Bed level was reduced until the fuel prep crusher problems were overcome. By maneuvering the individual accumulator isolation valves, the crusher could be manipulated through the start-up sequence. After recycle was established, the isolation valve could be reopened.

On the evening of October 28, the sorbent preparation system cyclone separator plugged causing very hot air to pass through the bag house. The bags failed and required replacement.

Unit load was reduced to conserve sorbent until the bags could be replaced. Bed level was held at 120 inches while an inventory of sorbent could be prepared.

A sorbent utilization test was conducted at this bed level with 90% sulfur retention using 100% dry sorbent injection feed.

On November 1, bed level was increased to 142 inches for a 90% sulfur retention test. Bed level was held at 142 inches to let conditions stabilize.

The bed exhibited signs of sintering during the early morning hours of November 3. The test was aborted, bed temperature was reduced to 1500 F, the paste slump was increased (more water), sorbent feed was increased, and splitting air flow was increased. Bed material was also recirculated via the bed ash reinjection system to help break up the sinters.

By 0800 hours on November 4, the bed conditions appeared to have recovered.

Conditions were then set for a 95% sulfur retention test at 142 inches on November 4, but the test was aborted Friday morning when the outlet duct opacity could not be maintained below 20% at the sorbent feed rate and low SO₂ level in the outlet gas stream. (The resistivity of the ash at low SO₂ levels makes it more difficult to collect.)

At approximately noon on Friday, November 5, prepared sorbent was started in with the paste at a 15% ratio of sorbent to coal.

Appendix I - Operations Narrative of Runs

At approximately 1500 hours, the bed showed signs of sintering again. Bed temperature was decreased to 1500 F, the paste slump increased, dry sorbent feed rate increased, and prepared sorbent feed into the paste cut in half. Bed conditions leveled but did not drastically improve. At 2030 hours, opacity increased to 20% because of the higher dry sorbent feed rate. Dry sorbent feed was decreased to maintain .35 to .40 lb/MBtu SO₂. Bed conditions seemed to deteriorate further after this. Several evaporator tubes were in high temperature alarm and zone zero thermocouples still indicated the presence of sinters.

On the morning of Saturday, November 6, bed level was reduced to 115 inches in an attempt to stabilize the evaporator high and low temperatures (several tubes were below saturation temperature). Several bed parameters were maneuvered to try to raise the low evaporator tube temperatures. No improvement could be seen.

It was decided to remove the unit from service Saturday evening and inspect/clean the tube bundle.

The Sands Hill test coal was crushed before shutdown with no visible ill effects.

The combustor was tripped at 2209 hours on Saturday, November 6. The LPC was cleaned using Carboblast during the combustor cool down period and the gas turbine was removed from service at 0229 hours on November 7.

Startup TD-SU-93-15-01 - November 25 - December 6, 1993

The combustor clearance was released by maintenance at 1953 hours on November 24.

The unit was started for the purpose of testing the effects of the new four point sorbent injection into the bed through the front wall and to perform full bed height tests (the tee arrangement inside the combustor instead of in the boiler proper).

The gas turbine was rolled at 0050 hours, paralleled at 0118 hours and the gas turbine valves opened at 0133 hours on November 26. Carboblasting of the LPC was completed during the air warming time period.

Oil fire was established at 1319 hours. The new purge air supply to the bed preheater needle valves from the splitting air precooler discharge was used for the first time. The purge worked well and the logic functioned as expected allowing the needle valves to remain open and purging during the run.

The steam turbine was rolled at 1629 hours and was paralleled at 1709 hours on November 26.

During the low air flow period before coal fire No. 24, 25, and 27 secondary cyclones were plugged but when air flow was increased after coal fire, they opened.

Coal fire was initiated at 1800 hours. Air flow was increased, freeboard mixing steam was placed in service, and then sorbent injection was started at 1912 hours.

Bed level was increased and once through boiler operation was achieved at 0159 hours on November 27.

Appendix I - Operations Narrative of Runs

Bed level was raised to 115 inches and maintained there for the bed to mature. Following this, a performance test was conducted at 90% sulfur retention with only dry sorbent injection (Plum Run No. 57) and Pittsburgh No. 8 coal. This test began at 2000 hours on November 28 and lasted through 0800 hours on November 29.

Problems were experienced with low splitting air flow on No. 1, 4, 5, and 6 paste lines. These were blown out with nitrogen and all were improved (No. 6 remained slightly lower for the remainder of the run).

Bed level was then increased to 142 inches with 1540 F bed temperature, 95% sulfur retention with Plum Run No. 57 sorbent, Pittsburgh No. 8 coal and sorbent fines with a ratio of approximately 15% sorbent to coal. These conditions were set for a performance test.

On November 29, a leak developed in the No. 24 secondary ash line long radius bend where it exits the building. The line was removed from service, a pipe plug installed in the outer piping, and the line returned to service.

On November 30, the bed had again reached a sintered state (bed temperatures in zone zero were dropping and unstable, several evaporator tubes were in high temperature alarm, and the bed density was decreasing). The test was aborted, bed level decreased to 115 inches, bed temperature dropped to 1500 F, and the sorbent fines system removed from service to purge the sintered bed.

On December 1, Peabody Anker coal was introduced into the fuel prep system. The finer size distribution of the incoming coal, combined with the moisture absorbed while it was stored in the coal pile, caused the throughput of the crusher to be limited to approximately 38 kpph. Because of this limitation, the switch was made back to Pittsburgh No. 8 coal.

Bed level was increased to 142 inches with bed temperature at 1480 F, 95% sulfur retention, Plum Run No. 57 dry sorbent feed and a 15% ratio of sorbent fines to coal as the paste.

A performance test was conducted at these conditions from 2000 hours on December 2 to 1000 hours on December 3. (The sorbent fines system transport blower shaft broke, dictating the end of the fines admission testing at this time.)

After allowing the bed conditions to stabilize from removing the sorbent fines system from service, the bed temperature was increased to 1490 F at 0800 hours on December 4. After seeing no ill effects of the bed temperature increase, the bed temperature was increased to 1500 F at 2000 hours.

At 0530 hours on December 5, the bed again exhibited the classic sintering symptoms (unstable and dropping bed temperatures in zone zero, high evaporator tube temperatures, and dropping bed density). Bed temperature was lowered to 1480 F and conditions allowed to improve. At 1530 hours, the bed looked to be in a more stable condition and the bed temperature was increased to 1490 F.

By early morning of December 6, the bed again looked like sintering was occurring.

At 0500 hours, the pressure indication of the sorbent injection header containment box on the north header began increasing and the sorbent dust was seen when blowing the pressure transmitter down. A leak had developed in the internal piping.

Appendix I - Operations Narrative of Runs

Because of the sorbent header leak, the combustor was tripped at 0816 hours on December 6, 1993.

The bed material was cooled and the gas turbine removed from service at 1250 hours on December 6, 1993.

The combustor was continued to be cooled and released to the maintenance department for outage activities.

Startup TD-SU-94-01-01 - January 8 - January 11, 1994

The purpose of the run was to achieve a 500 hour run without blinding the APF. This was to be accomplished by limiting the APF temperatures to 1400 F. Spoiling of #11 primary cyclone was also planned to increase the particle size of the ash to the APF. A secondary goal was to evaluate the effects of secondary splitting air and the modifications to the primary splitting air tube on the bed dynamics.

Warming of the combustor began on January 8th. The gas turbine was rolled at 1229 hours, paralleled at 243 hours and the gas turbine valves opened and air flow established through the combustor at 1258 hours on January 9th.

Due to outside air temperature of 4 F low temperatures were experienced on the gas turbine intercooler until air flow was established through the combustor. During air preheating the primary and secondary splitting air flows were measured and adjusted.

Oil fire was established at 2310 hours on January 9th. Due to low outside air temperature the minimum speed air flow was 317 kpph.

Prior to coal fire #23 secondary ash line plugged at the economizer orifice. The orifice was rodded out and the ash line functioned well for the remainder of the run.

While bed preheating #14 primary cyclone ash line plugged. Air flow was increased and the higher differential pressure across the ash line succeeded in blowing the line clear.

The steam turbine was rolled and paralleled at 0457 hours on January 10th. A coal fire was initiated at 0641 hours on January 10th. Air flow was increased, the freeboard mixing steam system placed in service, and sorbent injection started at 0824 hours. Spoiling air to #11 primary cyclone was placed in service.

Bed level was then increased using 274 system. Once through boiler operation was achieved at 1447 hours January 10th. The bed level was then increased to 115 inches and maintained there for the start up sand to purge out through the bed drains.

At 0030 hours on January 11th, #13 primary cyclone ash line plugged. After trying unsuccessfully to unplug it by stopping the sorbent injection system and increasing pressure vessel pressure the combustor was tripped at 0136 hours. After cooling the bed the gas turbine was removed from service at 0308 hours on January 11th.

Inspection of the primary cyclones during the outage revealed sinters in the diplegs. Too much splitting air flow during start-up was determined to be the cause. Coal carryover to the cyclones due to over splitting resulted in coal concentration in the dip leg.

Appendix I - Operations Narrative of Runs

Following the removal of the bed material and cooling of the combustor the unit was released for maintenance outage work.

Startup TD-SU-94-02-01 - January 14 - January 29, 1994

The purpose of the run was to reach full bed height at 1540 degrees bed temperature without causing unstable bed conditions from sinters. A continued goal was to stabilize the differential pressure across the APF by limiting the temperature of the gas to the APF and by increasing the mean ash particle size by spoiling #11 primary cyclone.

In anticipation of extreme cold outside air temperatures, the condensate system was circulated and warmed to 90 F and the circulating water inlet valves were set to minimize flow prior to the combustor release. Because of this prewarming of the condensate, the air warming of the combustor progressed quickly and the gas turbine intercooler temperatures were significantly higher during the gas turbine rolling than on the last start up even though the outside air temperature was -4 F.

The gas turbine was rolled at 1215 hours, paralleled at 1231 hours and the gas turbine valves opened at 1241 hours on January 15th.

During the air preheating time the primary and secondary splitting air flows were checked and balanced.

Following an oil fire at 1912 hours the steam turbine was rolled and paralleled at 2304 hours on January 15th.

Coal fire was initiated at 2342 hours on January 15th. Air flow was increased, freeboard mixing steam was placed in service and sorbent injection started at 0055 hours on January 16th. Spoiling air was placed in service to #11 primary cyclone after the air flow had been increased.

Bed level was increased and once through boiler operation was achieved at 0535 hours on January 16th. Bed level was then increased to 115 inches and maintained there while the start up sand was purged from the bed. After the bed had matured a performance test was conducted at 115 inch bed level, 1540 F bed temperature and 90% sulfur retention from January 17th through 19th.

On January 20th size distribution and dust loading tests were conducted on the APF inlet and outlet gas streams.

Bed temperature was lowered to 1500 F and another performance test conducted on January 21st.

Sinter accumulations in the bed and tube bundle continued to cause problems. By January 24th erratic and localized high bed temperatures and high evaporator tube temperatures indicated an unacceptable bed sintering situation. Attempts were made to "shake" the sinters loose and remove them from the bed. Bed level was reduced to 45 inches then increased back to 115 inches. This activity helped the symptoms but the improvements were short lived. Splitting air flow was increased from 3200 pph to 3500 pph to try to reduce sinter production.

On January 26 bed conditions had deteriorated to marginal again. The bed level was again reduced, this time to 28 inches and then raised back to 115 inches. Some improvement was seen in the bed conditions over night.

Appendix I - Operations Narrative of Runs

At 1020 hours on January 27th bed level was increased to 140 inches with bed temperature at 1510 F. The tempering air for the APF was placed in service at 13.6 kpph flow. At 1251 hours on January 28th bed temperature was raised to 1540 F and the APF tempering air flow increased to 20 kpph to maintain the APF temperature below 1400 F.

Once again sintering became a problem. On January 28th bed level was decreased to 120 inches and bed temperature lowered to 1520 F. These conditions were held to try to clean up the bed.

A tube leak developed in the boiler and the combustor was manually tripped at 2031 hours on January 29th. Outage inspection found one water wall tube leak and two evaporator tube leaks caused by the water wall leak.

The gas turbine tripped at 2035 hours on January 29th due to high fictive disc temperature. The combustor was cooled, bed material removed and the combustor released to maintenance for outage work.

Startup TD-SU-94-03-01 - February 15 - February 18, 1994

The objectives of the run were to operate at full bed height with bed temperature of 1540 F without sintering by adjusting total and secondary splitting air flow, and to test the newly installed 4 point sorbent injection system.

During the previous outage the fuel nozzle skateboards were moved eight inches toward the rear of the boiler wall to try to balance front to rear bed temperature distribution at higher splitting air flows. Also the start up bed zone liner on the north and south walls was removed and replaced with refractory because of distortion of the liner metal. The ceramic lined four point sorbent injection system was installed.

The gas turbine was rolled at 2218 hours, paralleled at 2233 hours and circulation through the combustor established at 2247 hours on February 16. The first step of the curing of the start up bed zone refractory was completed.

The bed preheater was ignited at 0725 hours on February 17th. Slow step changes were made in the windbox temperature increase for the start up bed zone refractory curing plan.

The steam turbine was rolled and paralleled at 1258 hours on February 17th. Coal fire was achieved at 1458 hours. Air flow was increased, freeboard mixing steam initiated, and sorbent injection started and #11 cyclone was spoiled.

Bed level was increased and once through boiler operation was achieved at 2043 hours on February 17th.

A leak was found on the sample line to the HGCU gas analysis cabinet. Plans were made to repair the leak with the unit in service. Bed level was held at 102 inches to allow the start up sand to be purged.

After further evaluating the leak on the HGCU sample line and the available means to repair the leak it was decided to shut the unit down, make the required repairs, and then start the unit back up.

The combustor was tripped manually at 1414 hours on February 18th. The bed ash reinjection vessels were filled with material from the bed in preparation for a hot restart.

Appendix I - Operations Narrative of Runs

The gas turbine was removed from service at 1544 hours on February 18th and a maintenance clearance placed on the combustor for repair of the HGCU sample line leak.

Startup TD-SU-94-03-02 - February 18 - February 25, 1994

Following the repairs to the HGCU sample line the gas turbine was rolled at 2100 hours, paralleled at 2110 hours and valves opened to the combustor at 2114 hours on February 18th.

Problems were experienced when trying to light the bed preheater until the light off oil pressure was increased. Oil fire was achieved at 2348 hours on February 18th. The steam turbine was rolled and paralleled at 0329 hours on February 19th. The north coal paste tank agitator motor bearing failed and the motor was replaced. After this motor replacement coal fire was established at 0612 hours on February 19th. Spoiling air was placed in service on #11 primary cyclone. Sorbent injection was placed in service at 0648 hours.

Once through boiler operation was achieved at 0846 hours. Bed level was increased, but stopped and held at 106 inches because of high temperatures on the APF outlet pipe metal. On February 21st Fiberfrax insulation was pumped into the hot spot areas. This insulation reduced the temperatures to acceptable levels.

At 2253 hours on February 22nd bed level was increased to 142 inches at 1540 F bed temperature and 90% sulfur retention. Tempering air was used to limit APF temperatures to 1400 F. Splitting air was increased in steps to 6000 pph and the secondary needle valves opened to 5.5 turns open (approximately 30% of the total flow). Later in the day #11 primary cyclone dip leg experienced secondary combustion. The temperatures were not extremely high because of the spoiling air. This secondary combustion could not be controlled by changing air flow as has been the case previously.

On February 23rd bed temperature was lowered to 1520 F due to high cyclone inlet temperature on #16 primary cyclone and because of sintering in the bed.

While holding at the reduced bed temperature #4 paste pump tripped due to pluggage in the strainer. Bed level and temperature were lowered to stabilize bed conditions. The pump strainer was cleaned and the pump returned to service. Bed level was then lowered to 100 inches because of the evidence of sintering. While at this lower boiler flow condition the vertical separator bypass valve was closed to try to reduce the high tube temperatures in the evaporator section of the boiler.

On February 24th the vertical separator bypass was opened about 20% so that load could be increased without over pressurizing the vertical separator. Main steam temperature was lowered to 900 F and the main steam attemperator was biased to force more feedwater through the evaporator and help reduce high temperatures in the evaporator tubes.

Bed level was then increased to 150 inches and bed temperature increased to 1520 F (High cyclone inlet temperatures prohibited a higher bed temperature set point). Splitting air flow was decreased from 1000 pph to 750 pph on #1 and #6 fuel nozzles to lower the cyclone inlet temperatures on #12 and #16 primary cyclones. This change also helped bed temperature distribution somewhat but also increased sintering.

Appendix I - Operations Narrative of Runs

Early morning of February 25th #16 primary cyclone dipleg experienced secondary combustion. By raising air flow and lowering #1 fuel nozzle splitting air flow to 650 pph from 750 pph this secondary combustion was reduced.

At 1305 hours on February 25th the sorbent booster surged and tripped. The combustor was manually tripped by the operator at 1309 hours.

The bed material was cooled using the gas turbine and then the gas turbine was removed from service at 1425 hours on February 25th. The bed material was removed from the boiler, the combustor cooled and then released to maintenance for outage work.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Appendix II - Tidd Operations/ Testing/ Outage/ Overview Log

This appendix presents a log of the major events that occurred during each operational period. This log does not go into detail and assumes the reader has a detailed knowledge of the plant layout, systems and nomenclature. The intent of this log is a quick operational reference document.

10/13/90 to 10/22/90 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a
TD-SU-90-01-01
Run number:
G.T. Ops.: 10/19/90 @ 4:48 till 10/20/90 @ 6:54; 26.10 hours G.T. operation.
10/20/90 @ 12:26 till 10/21/90 @ 18:19; 29.88 hours G.T. operation.
Coal fire: Coal fire was not attempted.
Run Objective: First operating experience with bed material in bed.
First time that the steam turbine could be operated.
Major Observations: See below.
Major Accomplish/Tests: Bed reinjection system used extensively to move bed material into and out of bed.
Operations Problems: Concerns were raised over the actual bed density vs. the expected bed density.
Due to feedwater not reading zero, boiler injection did not start.
Shutdown reason: Simulating loss of feedwater trip by closing FCV-F100.
Major Outage Worksopce: Routine inspections.

10/27/90 to 11/1/90 Maximum Gross Unit Load Achieved: n/a
Gross Capacity Factor @ 60 MWG = n/a
TD-SU-90-02-01
Run number:
G.T. Ops.: 10/29/90 @ 20:41 till 10/30/90 @ 22:11; 25.50 hours G.T. operation.
Coal fire: Coal fire was not attempted.
Run Objective: Test of steam turbine parallel.
Major Observations: See below.
Major Accomplish/Tests: Used bed reinjection system to raise and lower bed level.
Rolled steam turbine to speed and paralleled.
Operations Problems: Could not conduct turbine overspeed tests due to inability to properly warm turbine.
Completed run by closing FCV-F100 to initiate boiler injection.
Two valves, HCV-U221 and HCV-U260 were in manual and could not respond, thus aborting test.
Shutdown reason: Simulation of lose of feedwater flow test.
Major Outage Worksopce: Routine inspections.

11/4/90 to 11/7/90 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a
TD-SU-90-03-01
Run number:
G.T. Ops.: 11/5/90 @ 7:49 till 11/6/90 @ 2:08; 18.32 hours G.T. operation.
Coal fire: Coal fire was not attempted.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Run Objective: Test boiler injection system.
Major Observations: Boiler injection test was successful.
Major Accomplish/ Tests: Bed reinjection system was operated to raise and lower bed level.
Sorbent injection system operated to inject sand into the bed.
Fuel injection nozzle wetting procedure tested and verified.
Boiler feed pump placed in service with no problem.
Operations Problems: No major problems found.
Shutdown reason: GT trip initiated by closing FCV-F100 manually and automatically causing a boiler injection trip.
Major Outage Workscope: Routine inspections.

11/7/90 to 11/11/90

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

Run number:

TD-SU-90-03-02

G.T. Ops.:

11/8/90 @ 20:19 till 11/9/90 @ 22:57; 26.63 hours G.T. operation.

Coal fire:

11/9/90 @ 11:24 till 11/9/90 @ 21:22; 9.97 hours coal fire.

Run Objective:

Test coal injection system.

Major Observations:

All systems ran well.

Major Accomplish/ Tests:

Achieve approximately 10 hours of coal fire.

Maintain minimum firing and 1540F bed temp for 10 hours.

Performance began tuning combustion controls.

Operations Problems:
valves and control logics.

Sorbent injection system injected sand into the bed; problems incurred with Cooper

Shutdown reason:

Automatic combustor trip by simulating high bed temp.

Major Outage Workscope:

Routine inspections.

11/13/90 to 11/17/90

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

Run number:

TD-SU-90-04-01

G.T. Ops.:

11/15/90 @ 12:28 till 11/15/90 @ 23:59; 11.52 hours G.T. operation.

Coal fire:

Coal fire was not achieved.

Run Objective:

Confirm sparge duct relaxation procedure.

Major Observations:

Post trip inspections revealed procedure worked.

Major Accomplish/ Tests:

Relieved sparge duct stress bowing.

Operations Problems:

None, ducts were preheated to 1470F and held for one hour.

Shutdown reason:

Manual combustor trip at end of procedure.

Major Outage Workscope:

Post trip inspections revealed procedure worked.

11/26/90 to 12/2/90

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 12.00%

Run number:

TD-SU-90-05-01

G.T. Ops.:

11/28/90 @ 16:01 till 11/30/90 @ 1:48; 33.78 hours G.T. operation.

Coal fire:

11/29/90 @ 11:03 till 11/30/90 @ 1:48; 14.75 hours coal fire.

Run Objective:

Testing fuel injection system.

Evaluating impact of Gas Turbine trip from coal fire.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Major Observations: Testing sorbent injection system.
See below.

Major Accomplish/ Tests: Achieved positive generation out of gas turbine.
Tuned the bed temperature and air flow controls and placed them on automatic.

Operations Problems: Fuel injection system operated well with few problems.
Sorbent injection system continued to have problems with the system control logic and equipment reliability.

Shutdown reason: Manual gas turbine trip.

Major Outage Workslope: Post trip inspections revealed no problems.

12/2/90 to 12/5/90

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 15.67%

Run number: **TD-SU-90-05-02**

G.T. Ops.: 12/4/90 @ 11:40 till 12/5/90 @ 11:44; 24.07 hours G.T. operation.

Coal fire: 12/5/90 @ 5:40 till 12/5/90 @ 11:44; 6.07 hours coal fire.

Run Objective: Initiate coal injection.
Initiate sorbent injection.
Achieve 60" bed level.

Major Observations: All appeared well.

Major Accomplish/ Tests: Achieved 6 hours of coal fire.

Operations Problems: After 6 hours of coal fire, a GT trip occurred due to a loose vibration probe wire.

Shutdown reason: Automatic GT trip.

Major Outage Workslope: Repaired GT vibration probe.

12/6/90 to 12/8/90

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 15.73%

Run number: **TD-SU-90-05-03**

G.T. Ops.: 12/6/90 @ 2:59 till 12/7/90 @ 15:09; 36.17 hours G.T. operation.

Coal fire: 12/6/90 @ 23:41 till 12/7/90 @ 12:26; 12.75 hours coal fire.

Run Objective: Unit operations up to 40" bed level.
Gain experience with sorbent injection system.
Gain experience with fuel injection system.

Major Observations: See below.

Major Accomplish/ Tests: Achieved 44" bed level.

Operations Problems: Steam turbine trip occurred @ 44" bed level when VS bypass valve opened prematurely.
This premature opening caused a steam turbine trip and a VS pressure spike.
The high pressure VS spike caused a combustor trip.

Shutdown reason: Automatic combustor trip due to VS pressure swing.

Major Outage Workslope: General outage related items and inspections.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

12/15/90 to 12/23/90 **Maximum Gross Unit Load Achieved: n/a MWHR.**
Gross Capacity Factor @ 60 MWG = 11.37%

Run number: **TD-SU-90-06-01**
G.T. Ops.: 12/18/90 @ 3:48 till 12/19/90 @ 8:14; 28.43 hours G.T. operation.
 12/19/90 @ 11:40 till 12/21/90 @ 2:19; 38.65 hours G.T. operation.
Coal fire: 12/19/90 @ 7:48 till 12/19/90 @ 8:01; 0.22 hours coal fire.
 12/19/90 @ 21:41 till 12/19/90 @ 21:49; 0.13 hours coal fire.
 12/20/90 @ 2:30 till 12/20/90 @ 9:16; 6.77 hours coal fire.
 12/20/90 @ 14:33 till 12/21/90 @ 00:48; 10.25 hours coal fire.
Run Objective: Unit operations up to 40" bed level.
 Gain experience with sorbent injection system.
 Gain experience with fuel injection system.
Major Observations: Fire occurred in P16 primary cyclone that plugged primary and overflowed into
 sec cyclone.
Major Accomplish/ Tests: See below.
Operations Problems: Several combustor trips due to VS level swings.
 After one of the trips, the #5 paste pump continued to run due to the "HCM"
 valve not stroking full travel.
 Continued to experience fires in cyclones.
 Fire caused sinter plug in P16 cyclone.
 Increased ash loading to S26 plugged cyclone.
 Ran extended time with both P16 & S26 plugged without complete indication
 of pluggage.
 #1 & #4 splitting air lines was found plugged at startup and had to be blown
 clean.
 Problems were experienced with the sorbent prep and injection systems.
Shutdown reason: Manual combustor trip due to plugged cyclone.
Major Outage Worksopce: Removed sinter plug in P16 cyclone.
 Cleaned out S26 cyclone.

12/31/90 to 1/3/91 **Maximum Gross Unit Load Achieved: n/a MWHR.**
Gross Capacity Factor @ 60 MWG = n/a

Run number: **TD-SU-90-07-01**
G.T. Ops.: 1/2/91 @ 8:05 till 1/2/91 @ 19:51; 11.77 hours G.T. operation.
Coal fire: Coal fire was not achieved.
Run Objective: Relax sparge ducts prior to installation of sparge duct hold down straps.
Major Observations: None.
Major Accomplish/ Tests: Relaxed sparge ducts.
Operations Problems: None.
Shutdown-reason: Combustor trip after sparge ducts were relaxed.
Major Outage Worksopce: Installation of sparge duct holddown straps.

Appendix II - Tidd Operations/Testing/Outage Overview Log

1/5/91 to 1/9/91 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

Run number: **TD-SU-91-01-01**
G.T. Ops.: 1/7/91 @ 23:32 till 1/8/91 @ 16:28; 16.93 hours G.T. operation.
Coal fire: Coal fire was not achieved.
Run Objective: Testing unit operations up to 40" bed level.
 Testing sorbent injection system.
 Testing cyclone ash removal system.

Major Observations: After bed preheater was I/S, primary cyclone temps on #1 and #6 were very low.
 Later inspections revealed air inleakage in the bellows box caused low temps.

Major Accomplish/ Tests: None, run was aborted.
Operations Problems: Due to air inleakage into primary cyclones, run was aborted.
Shutdown reason: Manual combustor trip for inspection of primary cyclones.
Major Outage Workslope: Replaced bellows box gasket on all primary bellows boxes.
 Tightened flanges on all 14 bellows boxes.

1/10/91 to 1/13/91 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 11.32%

Run number: **TD-SU-91-02-01**
G.T. Ops.: 1/11/91 @ 10:14 till 1/12/91 @ 22:46; 36.53 hours G.T. operation.
Coal fire: 1/12/91 @ 15:17 till 1/12/91 @ 22:46; 7.48 hours coal fire.
Run Objective: Testing sorbent injection system
 Testing cyclone ash removal system.

Major Observations: During startup, it was observed that the #6 primary cyclone temperature was lower than the rest.
 This was thought to be caused by pluggage in the cyclone.

Major Accomplish/ Tests: None.
Operations Problems: As bed level increased to 40", it appeared that there was a fire in the #6 primary cyclone.
 GT trip occurred as a result of an air flow controller failure.

Shutdown reason: Automatic GT trip due to air flow controller failure.
Major Outage Workslope: Repaired LPT inlet guide vane controller.

1/13/91 to 1/14/91 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 3.79%

Run number: **TD-SU-91-02-02**
G.T. Ops.: 1/13/91 @ 8:38 till 1/14/91 @ 8:54; 24.27 hours G.T. operation.
Coal fire: 1/13/91 @ 21:41 till 1/14/91 @ 5:01; 7.33 hours coal fire.
Run Objective: Testing unit operations up through 60" bed level.
 Testing cyclone operation.
 Testing cyclone ash removal operations.
 Testing of sorbent injection system.

Major Observations: After coal fire, bed level was increased in steps to 60"; indications were of several plugged sec. cyclones.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Major Accomplish/ Tests: Testing of sorbent injection system logics.
Operations Problems: Combustor was tripped during preheating due to high temp on #26 cyclone cooling air line.
Stm turb tripped at 04:51 on 1/14 due tpo failure of stm turb stop valve to open during partial arc transfer.
Combustor trip occurred due to a fire on the splitting air compressor belt.
That fire tripped compressor which resulted in low N2 buffer tank pressure and caused trip.

Shutdown reason: Combustor trip due to low N2 buffer tank pressure.
Major Outage Workscope: Repaired splitting air compressor drive belt.
Installed purge air nozzles on secondary ash lines in bellows boxes.

1/19/91 to 1/22/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 13.19%

TD-SU-91-03-01
1/20/91 @ 19:01 till 1/22/91 @ 03:45; 32.73 hours G.T. operation.
1/21/91 @ 17:18 till 1/22/91 @ 2:51; 9.55 hours coal fire.

Run number: Testing unit operations up through 60" bed level.
G.T. Ops.: Testing cyclone operation.
Coal fire: Testing cyclone ash removal operations.
Run Objective: Testing of sorbent injection system.

Major Observations: See below.
Major Accomplish/ Tests: Continued sorbent system testing.
Operations Problems: Bed preheater initially tripped when performance was testing T/C's.
Preheater tripped second time on loss of flame but was returned to service with manual flame observations.
When bed level reached 47", a leak was discovered in the sorbent transport system.
Bed level was reduced to 30" to facilitate repairs when pluggage of S21 cyclone was indicated.

Shutdown reason: Manual combustor trip due to plugged secondary cyclone.
Major Outage Workscope: Bypassed external secondary ash cooler.

1/26/91 to 1/29/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 21.14%

TD-SU-91-04-01
1/27/91 @ 17:39 till 1/29/91 @ 17:27; 48.36 hours G.T. operation.
1/28/91 @ 12:36 till 1/28/91 @ 21:46; 9.17 hours coal fire.
1/29/91 @ 1:58 till 1/29/91 @ 11:49; 9.85 hours coal fire.

Run number: Testing unit operations up through 60" bed level.
G.T. Ops.: Testing cyclone operation.
Coal fire: Testing cyclone ash removal operations.
Run Objective: Bed level was initially increased to 57" and following was accomplished:
Cyclone monitoring for fires or pluggage.
Biasing paste pump flow to levelize bed temperatures.

Major Observations:

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Verifying operation of equipment and logics in sorbent injection system.
2nd coal fire bed level was increased to 65" and following was accomplished:
Cyclone monitoring for fires or pluggage.
Biasing paste pump flow to levelize bed temperatures.
Verifying operation of equipment and logics in sorbent injection system.
Indications of ash pluggage in S21 and S27 were seen.

Major Accomplish/ Tests: See above.

Operations Problems: On initial GT roll, frequency converter tripped for no apparant reason.
At 21:43 on 1/28, boiler circ pump stopped automatically, caused VS swing which tripped steam turbine and combustor.
During second coal fire run, indications of a cyclone plug were seen on S21 and S27.

Shutdown reason: At 11:49 on 1/29, the primary ash sampler connection began to leak ash.
1st trip: Automatic combustor trip due to VS level swing and high SSH temps.
2nd trip: Manual combustor trip due to primary ash sampler leak and plugged cyclones.

Major Outage Workscope: Extended sorbent injection nozzles into bed to be even with fuel nozzles.
Cleaned out plugged cyclones.

2/3/91 to 2/5/91

Maximum Gross Unit Load Achieved: 21 MWHR.
Gross Capacity Factor @ 60 MWG = 16.85%

Run number: **TD-SU-91-05-01**

G.T. Ops.: 2/4/91 @ 7:08 till 2/5/91 @ 14:03; 30.92 hours G.T. operation.

Coal fire: 2/5/91 @ 00:34 till 2/5/91 @ 9:00; 8.43 hours coal fire.

Run Objective: Testing the unit through once through operation
Testing modifications completed to sorbent injection system.

Major Observations: Sorbent injection was begun about 2:20 hours after coal fire.
After coal fire, @ 55", biased #1 and #6 paste pumps back to levelize bed temps.

Major Accomplish/ Tests: None

Operations Problems: At 6:58, lost sorbent flow due to premature opening of injection vessel vent valves.
After this, due to a series of equipment of logic malfunctions, the sorbent line began to plug.
Air flow through the sorbent system was increased and the plug blew into the bed.
Shortly thereafter, indications were that S21 cyclone ash removal was plugged.
While attempts were made to restart the sorbent injection system, a backflow of bed material came into the sorbent line.
Temp. on the north line reached 656F and the unit was manually tripped from service.

Shutdown reason: Manual combustor trip due to sorbent system problems.

Major Outage Workscope: Bypassed a portion of the internal secondary ash cooler.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

2/8/91 to 2/10/91

Maximum Gross Unit Load Achieved: 13 MWHR.
Gross Capacity Factor @ 60 MWG = 13.78%
TD-SU-91-06-01
Run number: 2/9/91 @ 3:36 till 3/10/91 @ 3:04; 23.47 hours G.T. operation.
G.T. Ops.: 2/9/91 @ 21:22 till 2/10/91 @ 00:59; 3.63 hours coal fire.
Coal fire: Testing modifications to secondary ash removal system.
Run Objective: Testing startup problems with sorbent injection system.
Major Observations: Sorbent injection was started 1 hours and 38 minutes after coal fire.
Major Accomplish/ Tests: Within 30 minutes of sorbent injection, S26 indicated pluggage,
Operations Problems: None, run was aborted.
Shutdown reason: Within 30 minutes of sorbent injection, S26 indicated pluggage,
Manual combustor trip to clean out cyclones.
Major Outage Workscope: Plugged secondary ash line purge air connections.
Separated primary ash removal from secondary ash removal system.
Routed secondary ash line from combustor directly to econ. inlet duct and installed 26mm orifice at pipe outlet.
Installed extended sparge duct nozzles under #4 fuel nozzle.

2/18/91 to 2/19/91

Maximum Gross Unit Load Achieved: n/a
Gross Capacity Factor @ 60 MWG = n/a
TD-SU-91-07-01
Run number: 2/18/91 @ 20:56 till 2/19/91 @ 8:56; 12.0 hours G.T. operation.
G.T. Ops.: Coal fire was not achieved.
Coal fire: Test the ash removal system modifications.
Run Objective: Test effects of longer sparge nozzles under #4 fuel nozzle.
Major Observations: None, run was aborted.
Major Accomplish/ Tests: None, run was aborted.
Operations Problems: After bed preheater was placed in service, PCV-B200 was found in the closed position and in manual.
The valve was put in the opened position and the manual jack screw was opened, but the valve than pulsed open and cause a VS swing.
The VS swing caused a GT trip.
Shutdown reason: Automatic GT trip due to VS swing.
Major Outage Workscope: None, unit was prepared for a hot restart.

2/19/91 to 2/22/91

Maximum Gross Unit Load Achieved: 27.5 MWHR.
Gross Capacity Factor @ 60 MWG = 22.49%
TD-SU-91-07-02
Run number: 2/19/91 @ 12:06 till 2/21/91 @ 20:15; 56.15 hours G.T. operation.
G.T. Ops.: 2/20/91 @ 00:23 till 2/20/91 @ 6:01; 5.63 hours coal fire.
Coal fire: 2/21/91 @ 03:09 till 2/21/91 @ 16:00; 12.85 hours coal fire.
Run Objective: Test the ash removal system modifications.
Test effects of longer sparge nozzles under #4 fuel nozzle.
Major Observations: Sorbent injection was begun almost 2 hours after coal injection was started.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Major Accomplish/Tests: Completed one hour sparge duct relaxation procedure.
Operations Problems: During first coal fire period, problems were encountered in the fuel prep system.
Due to trips with the coal crusher, the paste mixer water block valve was ordered shut and did not open when the crusher restarted.
As a result large amounts of dry coal got into the paste tanks and tripped out the #1 agitator motor.
Later, the #5 & #6 paste pumps tripped due to high line differential and 3 minutes later the combustor tripped due to temp upset.
During secondary coal fire run, S24 ash line indicated low temps due to possible pluggage.
An hour after going once thru on 2nd run, combustor tripped due to excessive VS level swings.
Shutdown reason: 1st trip: Manual combustor trip due to bed temperature imbalance.
Major Outage Workslope: Removed 26mm orifice from secondary ash removal system at economizer.

2/26/91 to 2/28/91

Maximum Gross Unit Load Achieved: 4.5 MWHR.
Gross Capacity Factor @ 60 MWG = 3.71%
Run number: TD-SU-91-08-01
G.T. Ops.: 2/27/91 @ 17:10 till 2/28/91 @ 7:33; 14.38 hours G.T. operation.
Coal fire: 2/28/91 @ 3:18 till 2/28/91 @ 4:15; 0.95 hours coal fire.
Run Objective: Test secondary ash removal system.
Major Observations: None.
Major Accomplish/Tests: Implemented new procedures for warming the cyclones and the secondary ash removal system.
Operations Problems: 4 minutes after coal injection was started, #3 fuel nozzle plugged.
Next hour spent trying to unplug nozzle before decision was made to shut the unit down.
Shutdown reason: Manual combustor trip to clean fuel nozzles.
Major Outage Workslope: Clean the fuel nozzles.

2/28/91 to 3/1/91

Maximum Gross Unit Load Achieved: 21 MWHR.
Gross Capacity Factor @ 60 MWG = 19.08%
Run number: TD-SU-91-09-01
G.T. Ops.: 2/28/91 @ 11:53 till 3/1/91 @ 01:27; 13.57 hours G.T. operation.
Coal fire: 2/28/91 @ 17:42 till 2/28/91 @ 22:21; 4.65 hours coal fire.
Run Objective: Test secondary ash removal system.
Major Observations: As load was increased up to 73" bed level, pluggage was indicated on secondary ash lines S25 & S27.
Major Accomplish/Tests: None.
Operations Problems: As once thru operation was achieved, the VS saw a sudden raise in level, PCV-B200 was reduced to min setting.
This condition caused a boiler upset and the boiler circ pump auto stopped.
At this time PSH and SSH tube temps were observed to be rapidly increasing.
A combustor trip than occurred when TJRC-B220 went HI HI.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Shutdown reason: Automatic combustor trip due to high temps.
Major Outage Workscope: Reinstalled sec ash line purge air with hot box arrangement.
Bypassed secondary external ash cooler and installed larger separate ash line for sec. ash from combustor to econ. inlet.
Disconnected sec. cyclone dip leg cooling air piping.

3/7/91 to 3/9/91

Maximum Gross Unit Load Achieved: n/a
Gross Capacity Factor @ 60 MWG = n/a
Run number: **TD-SU-91-10-01**
G.T. Ops.: 3/8/91 @ 16:53 till 3/8/91 @ 18:03; 1.17 hours G.T. operation.
Coal fire: Coal fire was not achieved.
Run Objective: Testing of secondary ash removal system.
Major Observations: During combustor warming, water was observed coming from the boiler belly drain.
Combustor warming was stopped and a boiler hydro was conducted. Boiler was tight and water loss via the drain was reduced.
When GT was rolled, water was observed blowing out of the secondary ash lines at the economizer inlet.
Major Accomplish/ Tests: None, run was aborted.
Operations Problems: Water was found to back up in the boiler O2 system and drain into the cyclone's during boiler warming via the O2 sample line.
Shutdown reason: Manual combustor trip to inspect for water source.
Major Outage Workscope: Cleaned out cyclones.
Sandblasted ash lines to remove water deposits.

3/10/91 to 3/12/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a
Run number: **TD-SU-91-11-01**
G.T. Ops.: 3/11/91 @ 16:58 till 3/12/91 @ 2:12; 9.23 hours G.T. operation.
Coal fire: Coal fire was not achieved.
Run Objective: Testing of the secondary ash removal system.
Major Observations: During startup activities, boiler wall differential pressure did not appear correct, it was low.
Major Accomplish/ Tests: Warming of the ash system during this run was accomplished by pulling a vacuum on the sec. ash line external of the combustor.
After some time, the vacuum was removed and hot dry air from the external sec ash cooler was blown up the line into the combustor.
Operations Problems: When preheater was placed in service, it immediately tripped due to high burner temperatures.
After some further testing, it was decided to remove the unit from service for inspection of the low wall differential.
Shutdown reason: Manual GT trip for combustor inspection.
Major Outage Workscope: Found boiler access door had opened

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

3/12/91 to 3/13/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 4.17%

Run number: TD-SU-91-12-01
G.T. Ops.: 3/12/91 @ 23:16 till 3/13/91 @ 13:28; 15.17 hours G.T. operation.
Coal fire: 3/13/91 @ 12:51 till 3/13/91 @ 13:28; 0.62 hours coal fire.
Run Objective: Testing of secondary ash removal system
Major Observations: Sorbent injection was started 6 minutes prior to coal fire.
Major Accomplish/ Tests: None
Operations Problems: Steam turbine trip occurred when generator field ACB was closed, no problems were found.
Gas turbine trip occurred due to surge of the HPC.
Investigation revealed trip occurred due to control card failure on HCV-T103.
Shutdown reason: Automatic GT trip due to HPC surge.
Major Outage Workslope: None, hot restart.

3/13/91 to 3/16/91

Maximum Gross Unit Load Achieved: 35 MWHR.
Gross Capacity Factor @ 60 MWG = 39.62%

Run number: TD-SU-91-12-02
G.T. Ops.: 3/13/91 @ 21:36 till 3/15/91 @ 14:31; 40.92 hours G.T. operation.
Coal fire: 3/14/91 @ 4:53 till 3/15/91 @ 14:07; 33.23 hours coal fire.
Run Objective: Testing of the gas cleaning cyclones.
Testing of the cyclone ash removal systems.
Major Observations: Sorbent injection was started 6 minutes prior to coal fire.
High temperatures were indicated on #11 and #17 cyclones.
Major Accomplish/ Tests: At 70", main steam temperature control was placed in automatic.
Operations Problems: West sorbent feeder tripped 4 times evening of 3/14, due to binding in the feeder.
On 3/14, the rupture disk on the primary ash removal system orifice, V102, blew.
Shutdown reason: Automatic combustor trip due to high bed temperature incurred during load decrease prior to shutdown.
Major Outage Workslope: Replaced rupture disk on V102.
Inspected bags on primary ash system baghouse.
Installed additional instrumentation on primary ash baghouse.
Installed fuel nozzle skateboards
Added sparge duct nozzles below fuel nozzles.
Revised O2 analyzer sampling system.
Installed new Ametek O2 analyzer.
Replaced splitting air transmitters.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

4/1/91 to 4/4/91

Maximum Gross Unit Load Achieved: 50 MWHR.

Gross Capacity Factor @ 60 MWG = 33.35%

Run number:

TD-SU-91-13-01

G.T. Ops.:

4/1/91 @ 13:31 till 4/4/91 @ 2:59; 61.64 hours G.T. operation.

Coal fire:

4/2/91 @ 10:28 till 4/3/91 @ 3:13; 16.75 hours coal fire.

4/3/91 @ 12:05 till 4/4/91 @ 02:59; 14.90 hours coal fire.

Run Objective:

Achieve unit operations up to 106" bed level.

Major Observations:

Sorbent injection was started 14 minutes prior to second coal injection.

On 4/3, bed level was increased to 97" at which time it appeared that S23 had plugged.

On 4/4 @ 1:15, S23 cyclone appeared to begin transporting ash again.

Major Accomplish/ Tests:

A one hour sparge duct relaxation procedure was completed at startup.

On 4/3 @ 97" bed, the VS bypass valve was opened but this resulted in a boiler pressure upset and the valve was closed again.

On 4/4, a slow increase in bed level was begun to find upper operating limit.

As bed level increased, the HPT inlet temperature limit was approached.

In order to reduce HPT temps., bed temp was reduced to 1515F.

At 2:58 on 4/4, 106" bed level was achieved and bed level was started down again to reduce GT temps.

Operations Problems:

At initial coal injection, only pumps 1 and 6 started due to a logic problem based on newly revised splitting air control scheme.

When other pumps did not start, they required increased splitting air flow to purge nozzles.

Splitting air compressor was in manual and could not supply demand thus tripping combustor.

Unit was readied for restart.

As unit reached 91" bed level, combustor tripped due to level swings in vertical separator.

Unit was readied for restart.

At 7:16 on 4/3, coal injection was attempted but aborted when all six fuel lines indicated high differentials.

At 10:37 on 4/3, coal injection was attempted but aborted when #2 paste pump indicated high hydraulic pressure.

At 11:46 on 4/3, coal injection was attempted but aborted when #1, 2, 4 & 6 pumps indicated high line differential.

At 12:06 on 4/3, coal injection was initiated after water was added to the paste to reduce line differentials.

At 2:59 on 4/4, a GT trip occurred due to high LPT inlet temps.

Shutdown reason:

1st trip: Automatic combustor trip due to VS level swings.

2nd trip: GT trip due to high LPT inlet temps.

Major Outage Workscope:

Removed and inspected primary ash sampler and repaired.

Cleaned & inspected sorbent injection feeders and calibrated variable speed drives.

Installed test sootblower in economizer.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Removed some tube shields from secondary SH.
Worked on installation of freeboard O2 analyzer sample lines.
Added additional level transmitter in VS and modified control logic.

4/17/91 to 4/19/91

Run number:
G.T. Ops.:
Coal fire:
Run Objective:

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

TD-SU-91-14-01

4/18/91 @ 23:13 till 4/19/91 @ 8:00; 8.78 hours G.T. operation.

Coal fire was not achieved.

Explore the upper limits of operation.

Perform steam turbine overspeed procedure.

Test boiler injection system at elevated bed level.

Major Observations:
Major Accomplish/ Tests:
Operations Problems:

None.

None.

Gas Turbine tripped on high fictive disk temperature 1 minute after preheater was placed in service.

Shutdown reason:

Automatic GT trip due to high fictive disc temperature.

Major Outage Workslope:

None, hot restart.

4/19/91 to 4/19/91

Run number:
G.T. Ops.:
Coal fire:
Run Objective:
Major Observations:
Major Accomplish/ Tests:
Operations Problems:

Maximum Gross Unit Load Achieved: n/a MWHR.

Gross Capacity Factor @ 60 MWG = n/a

TD-SU-91-14-02

4/19/91 @ 11:16 till 4/19/91 @ 12:10; 9 hours G.T. operation.

Coal fire was not achieved.

To achieve full bed height.

None

None, run was aborted.

After gas turbine was rolled, a leak was discovered on the primary ash removal line at the ash sampler.

Shutdown reason:

Manual GT trip to repair ash line leak.

Major Outage Workslope:

Primary ash sampler leak was repaired in the ash line.

4/19/91 to 4/19/91

Run number:
G.T. Ops.:
Coal fire:
Run Objective:
Major Observations:
Major Accomplish/ Tests:
Operations Problems:

Maximum Gross Unit Load Achieved: n/a MWHR.

Gross Capacity Factor @ 60 MWG = n/a

TD-SU-91-15-01

4/19/91 @ 15:14 till 4/19/91 @ 15:58; .73 hours G.T. operation.

Coal fire was not achieved.

To achieve full bed height.

None

None, run was aborted.

After gas turbine was rolled, a leak was discovered on the primary ash removal line at the ash sampler.

Shutdown reason:

Manual GT trip to repair ash line leak.

Major Outage Workslope:

Primary ash sampler was removed from the ash line.

Appendix II - Tidd Operations/Testing/Outage Overview Log

4/19/91 to 4/22/91

Maximum Gross Unit Load Achieved: 53 MWHR.
Gross Capacity Factor @ 60 MWG = 35.57%

Run number: TD-SU-91-16-01
G.T. Ops.: 4/19/91 @ 19:11 till 4/22/91 @ 1:05; 53.9 hours G.T. operation.
Coal fire: 4/20/91 @ 4:05 till 4/21/91 @ 21:28; 41.38 hours coal fire.
Run Objective: Operation to full bed height.
Major Observations: Sorbent injection was begun 10 minutes prior to coal fire.
In order to reduce cyclone temps, paste moisture was reduced from 29% to 26.5% and improvement in cyclone temps was seen.

Major Accomplish/ Tests: Testing splitting air by reducing flow to .3 of original curve.
Operated economizer test sootblower and took data.
Biased paste pumps to try and achieve optimum bed temps.
Obtained operating data at 105" bed level.
Further testing of splitting air by reducing flow to .25 of curve.
On 4/21, a bed level of 126" @ 1560F was achieved but had to be dropped to 1527F due to high GT inlet temps.

Operations Problems: Leak occurred on the west side bottom of 200 ton prepared sorbent hopper.
After achieving 105" bed level, bed level was dropped to 100" due to high temps in S22 and S23 cyclones.
Late on 4/21, bed level was dropped to 65". A combustor trip than occurred due to low bed temps.

Shutdown reason: Automatic combustor trip due to low bed temps.
Major Outage Workscope: Repaired pumpability test loop.
Removed strainer on #5 coal paste line.

4/25/91 to 5/3/91

Maximum Gross Unit Load Achieved: 48 MWHR.
Gross Capacity Factor @ 60 MWG = 34.82%

Run number: TD-SU-91-17-01
G.T. Ops.: 5/1/91 @ 08:23 till 5/3/91 @ 00:04; 41.05 hours G.T. operation.
Coal fire: 5/1/91 @ 21:37 till 5/3/91 @ 00:04; 26.45 hours coal fire.
Run Objective: Test boiler injection system
Test steam turbine overspeeds.

Major Observations: Sorbent injection started 6 minutes prior to coal fire.
Major Accomplish/ Tests: On 5/2 bed level was raised to 75" and held for 8 hours to warm steam turbine prior to overspeeds.
Steam turbine high & low speed stops checked.
Steam turbine overspeeds checked: Test 1 @ 1911 RPM, Test 2 @ 1908 RPM, Test 3 @ 1907 RPM.
Late on 5/2 bed level increased to 123" and held for 8 hours prior to boiler injection tests.
Boiler injection test begun by closing feedwater control valve FCV-F100.
After that following trips occurred in this order, Combustor, Stm Turb., Gas Turbine.
As such, injection was not occurring. Also, it was observed that FW flow was still indicating 11 kpph.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

The feedpump was tripped. The boiler vent valve had opened to relieve pressure but was closing too slowly.
Due to swings in VS level, the boiler circ pump kept starting and stopping.
At this point, the test was aborted and feedwater flow was reestablished manually to protect the boiler.

Operations Problems: Initial time GT was readied for rollup, hissing sound hear in VCB 1C2 breaker. Investigations revealed no problem(4 day delay)
From 4/29 to 5/1 GT tripped on rollup 4 times due to high vibration on #1 bearing. No problems found.
While establishing air flow through combustor, problems encountered with HCV-T120 excessive travel and limit switches had to be jumpered.
First time preheater placed in service, tripped on loss of flame.
Investigations revealed faulty flame detector which was than replaced.

Shutdown reason: Manual stoppage of feedwater flow to start boiler injection test.

Major Outage Workscope: Made Net-90 logic changes to improve boiler injection system.
Revised sorbent injection vessel fluidizing nozzles.
Inspected gas turbine intercooler and flushed.
Added fluidizing nozzles to sorbent injection Everlasting valve.
Installed additional vertical separator level transmitter at boiler circ pump.
Inspected sorbent piping and found extreme wear at "T" bends.

5/15/91 to 5/16/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 9.26%

Run number: **TD-SU-91-18-01**
G.T. Ops.: 5/16/91 @ 8:26 till 5/16/91 @ 23:59; 15.55 hours G.T. operation.
Coal fire: 5/16/91 @ 19:42 till 5/16/91 @ 23:59; 4.28 hours coal fire.
Run Objective: Test the boiler injection system.
Major Observations: Sorbent injection was started 5 minutes prior to coal fire.
Major Accomplish/ Tests: None, run was aborted.
Operations Problems: At 65" bed level, GT tripped due to high vibration on Epicyclic gear housing. Investigation revealed it was a false trip.
Unit was readied for a hot restart.

Shutdown reason: Automatic GT trip due to high vibration.
Major Outage Workscope: None, hot restart.

5/17/91 to 5/17/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

Run number: **TD-SU-91-18-02**
G.T. Ops.: 5/17/91 @ 7:43 till 5/17/91 @ 19:04; 11.35 hours G.T. operation.
Coal fire: 5/17/91 @ 16:14 till 5/17/91 @ 17:54; 1.67 hours coal fire.
Run Objective: Test the boiler injection system.
Major Observations: Initially, the fuel nozzles indicated 5 of 6 lines plugged but were than blown clean.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Major Accomplish/ Tests: Sorbent injection was started 3 minutes before coal fire.
None.
Operations Problems: At coal fire, pump #5 tripped due to high line differential.
After 1 1/2 hours of trying, line could not be cleaned and decision was made to remove unit from service.
Shutdown reason: Manual combustor trip in order to clean fuel nozzles.
Major Outage Workslope: Clean fuel nozzles.

5/17/91 to 5/19/91

Maximum Gross Unit Load Achieved: 42 MWHR.
Gross Capacity Factor @ 60 MWG = 39.91%
TD-SU-91-19-01
Run number: 5/17/91 @ 23:25 till 5/18/91 @ 16:34; 18.87 hours G.T. operation.
G.T. Ops.: 5/18/91 @ 5:53 till 5/18/91 @ 16:34; 10.68 hours coal fire.
Coal fire: Testing of the boiler injection system.
Run Objective: Sorbent injection was started 8 minutes before coal fire.
Major Observations: When FW control valve closed, gas turbine tripped and boiler injection started.
Major Accomplish/ Tests: Bed level was ramped up to 70" within first 3 hours of coal fire.
Boiler injection test initiated by manually closing feedwater control valve FCV-F100.
Operations Problems: GT tripped on initial rollup due to high vibration on the #1 LPC bearing rear horizontal pickup.
As bed level was increasing several trips occurred in fuel prep system and paste tank level dropped to 1".
Shutdown reason: Test of boiler injection system.
Major Outage Workslope:

5/19/91 to 5/20/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a
TD-SU-91-19-02
Run number: 5/20/91 @ 1:12 till 5/20/91 @ 13:18; 12.10 hours G.T. operation.
G.T. Ops.: Coal fire was not achieved.
Coal fire: Sorbent injection was started 7 minutes before coal injection.
Run Objective: None.
Major Observations: None.
Major Accomplish/ Tests: None.
Operations Problems: At initial coal injection, #1 & 6 paste pumps tripped the function group off due to overpressurization.
While investigating overpressurization problem, both #1 & 6 fuel nozzles indicated low splitting air and combustor tripped.
Investigations showed both fuel nozzles were plugged so unit shut down to clean fuel nozzles.
Shutdown reason: Automatic combustor trip due to low splitting air on 2 fuel nozzles.
Major Outage Workslope: Cleaned fuel nozzles.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

5/20/91 to 5/24/91

Maximum Gross Unit Load Achieved: 42 MWHR.
Gross Capacity Factor @ 60 MWG = 54.12%

Run number: TD-SU-91-20-01
G.T. Ops.: 5/20/91 @ 20:12 till 5/23/91 @ 20:12; 72.00 hours G.T. operation.
Coal fire: 5/21/91 @ 4:06 till 5/23/91 @ 17:16; 61.17 hours coal fire.
Run Objective:
Major Observations: Sorbent injection was started 2 minutes before coal fire.
Major Accomplish/ Tests: Bed level was increased to 90" and held there for 40 hours.
Tuning combustion controls.
Tuning attemperation controls for optimize evaporator performance.
Worked on sorbent injection to achieve 90% removal.
Worked on coal prep to improve paste quality.
Worked on sorbent system to improve capacity.
Worked on tuning bed level controls.
Varied splitting air flows to see impact on combustion.
Tuning VS bypass contols.
Increased load to 100".
Operations Problems: At initial coal injection, #5 paste pump went out on overpressurization and system was tripped.
Leak developed on sorbent transport piping in south line tee in goal post top.
Shut down unit to fix sorbent leak.
Shutdown reason: Manual combustor trip due to sorbent transport piping leak.
Major Outage Worksopce: Revised sorbent transport piping tee's and added outer refractory jacket.
Radiographed 1" couplings on system 225 test lines due to leaks.
Cleaned LPC blades.
Changed coal crusher drive sheaves to 8".
Installed in bed sorbent injection distribution tee's.
Added back flush connections on GT generator air coolers.
Enlarged fuel distribution plates on skateboards.
Completed installation of GT sound enclosure vent fan.
Removed all strainers in coal injection lines.

6/2/91 to 6/4/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

Run number: TD-SU-91-21-01
G.T. Ops.: 6/3/91 @00:55 till 6/4/91 @ 2:08; 25.22 hours G.T. operation.
Coal fire: 6/3/91 @ 18:21 till 6/3/91 @ 19:07; 0.77 hours coal fire.
-6/3/91 @ 23:20 till 6/4/91 @ 00:51; 1.52 hours coal fire.
Run Objective:
Major Observations: GT LPC was cleaned with carboblast twice at startup, 1st time had no impact on operation.
At second coal fire, sorbent injection was placed in service 1 minute before coal injection.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Unit was hot restarted after 1st combustor trip.
Major Accomplish/Tests: Prior to coal fire, tested single line operation of sorbent injection.
Operations Problems: Bed preheater tripped at startup due to loss of flame indication.
At initial coal fire, pump #2 plugged and coal injection was aborted until pump was cleaned out.
At second coal fire attempt, #1 pump did not start and combustor tripped and 46 minutes later combustor tripped.
One bed T/C exceeded 1700F.
On second coal fire, as unit reached 45", combustor was tripped due to plugged #11 primary cyclone.
Shutdown reason: 1st trip: Automatic combustor trip with one bed T/C exceeding 1700F.
2nd trip: Manual combustor trip due to plugged primary cyclone.
Major Outage Workscope: Cleaned out primary #11 cyclone and ash line.
Cut off tee's on sorbent injection system

6/6/91 to 6/7/91

Maximum Gross Unit Load Achieved: 24 MWHR.
Gross Capacity Factor @ 60 MWG = 14.33%
Run number: **TD-SU-91-22-01**
G.T. Ops.: 6/6/91 @ 12:02 till 6/7/91 @ 11:32; 30.42 hours G.T. operation.
Coal fire: 6/7/91 @ 4:19 till 6/7/91 @ 11:28; 7.15 hours coal fire.
Run Objective:
Major Observations: At initial coal injection, injection was aborted due to plugged #2 fuel nozzle.
Sorbent injection was begun after coal fire.
Major Accomplish/Tests: A low velocity test was conducted on the sorbent transport piping.
Transport velocity was slowly dropped from 26 ft/sec to 12 ft/sec when it appeared the line plugged.
This velocity is in the 6" line upstream of the pickup pot.
Operations Problems: At 9:55 on 6/7, it appeared that the #25 sec. cyclone plugged.
At 11:23 on the 7th, the #3 paste pump tripped and combustor tripped 5 minutes later.
After combustor trip, the gas turbine tripped on LPC surge.
After GT trip, the GT lube oil system had to be removed from service to repair a leak.
Shutdown reason: Automatic combustor trip when loss of paste pump caused unstable conditions.
Major Outage Workscope: Repaired lube oil lines at star gear.

6/12/91 to 6/15/91

Maximum Gross Unit Load Achieved: 39 MWHR.
Gross Capacity Factor @ 60 MWG = 47.82%
Run number: **TD-SU-91-23-01**
G.T. Ops.: 6/12/91 @ 17:36 till 6/15/91 @ 4:34; 62.57 hours G.T. operation.
Coal fire: 6/13/91 @ 2:43 till 6/15/91 @ 4:27; 49.73 hours coal fire.
Run Objective:
Major Observations: Sorbent injection was placed in service after coal fire.
Sec. cyclones #24 & 26 indicated being partially plugged.
Major Accomplish/Tests: None

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Operations Problems: GT LPT inlet guide vane positioner amplifier failed at startup and delayed unit startup.
As load was increased, problems were encountered with paste pumps #3 & 5 tripping due to low splitting air flow.
Automatic combustor trip due to loss of communications between gas cleaning system and safety node in Net-90.
During cool down period, GT tripped due to surge on LPC. GT valve HCV-T120 stuck at 1" open on trip.

Shutdown reason: Automatic combustor trip due to loss of communications between gas cleaning system and safety node in Net-90.

Major Outage Worksopce: Repaired two water side leaks in economizer.
Cleaned economizer with water washing.
Cleaned guide bushings on the gas turbine bypass valves.
Installed test T/C's and strain gauges on economizer.

6/24/91 to 6/27/91

Maximum Gross Unit Load Achieved: 50 MWHR.

Gross Capacity Factor @ 60 MWG = 3.79%

Run number:

TD-SU-91-24-01

G.T. Ops.:

6/24/91 @ 3:35 till 6/27/91 @ 7:27; 75.87 hours G.T. operation.

Coal fire:

6/24/91 @ 13:07 till 6/26/91 @ 8:26; 43.32 hours coal fire.

6/26/91 @ 18:36 till 6/27/91 @ 7:24; 12.47 hours coal fire.

Run Objective:

Perform stack monitoring testing.

Conduct dust loading testing before and after the economizer.

Conduct boiler tube surface evaluation for B&W.

Major Observations:

Sorbent injection was initiated prior to coal fire.

While initially increasing bed level to 126", high secondary cyclone temps were experienced on S22 and S23.

Major Accomplish/ Tests:

Performed 126" bed level test on 6/25 for B&W boiler and sorbent evaluation.

Operations Problems:

At initial coal fire the #2 paste pump injection line required clean blowing and was not placed in service for 30 minutes.

After coal fire, pluggage in the sorbent injection line occurred.

On 6/26, #2 coal injection line plugged, causing bed temp upset & high temps on P12, S22 & S23 with resulant comb. trip.

A hot restart was attempted and sorbent injection was placed in service.

At coal inj. restart, lines #2, 4, 5, & 6 plugged and had to be cleaned out.

5 hours after coal restart, #2 coal nozzle plugged and resulted in unstable bed temperatures.

After comb. trip, the gas turbine tripped 10 minutes latter due to a LPC pressure ratio trip.

GT trip required bed to be cooled with nitrogen and gas circulation.

Shutdown reason:

Manual combustor trip due to unstable bed temps with #2 coal nozzle plugged.

Major Outage Worksopce:

Cleaned fuel nozzles and paste tanks.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

6/28/91 to 7/1/91

Maximum Gross Unit Load Achieved: 50 MWHR.
Gross Capacity Factor @ 60 MWG = 3.92%

Run number: TD-SU-91-24-02
G.T. Ops.: 6/28/91 @ 4:11 till 7/2/91 @ 10:20; 102.15 hours G.T. operation.
Coal fire: 6/28/91 @ 11:20 till 7/2/91 @ 22:23; 83.05 hours coal fire.
Run Objective: Perform stack monitoring testing.
Conduct dust loading testing before and after the economizer.
Conduct boiler tube surface evaluation for B&W.

Major Observations: Unit was restarted after mechanical cleaning of the fuel nozzles.
Sorbent was placed in service prior to coal fire.

Major Accomplish/ Tests: At startup, sec. cyclones 22 & 23 were operating at high temperatures.
With stable 126" bed level conditions and 1520F bed temp, stack monitoring testing was begun on 6/30.
For rest of day bed level was maintained @ 126" and bed temp controlled to maintain 1060F LPT inlet temp.
On 7/1, three 2 hour precip particle sizing tests were conducted.
At same time, data was also collected for B&W bed evaluation.

Operations Problems: After startup, due to high sec. cyclone temps, bed temp was decreased from 1540F to 1535F.
Early on 6/29, coal prep problems with skewing caused crusher to trip, resulting in bed level cut to 90".
At noon on 6/29, the #3 paste pump tripped due to low splitting air flow.
Pump tripped again at 16:00 due to low splitting air flow impacted by sootblower blowing.
As load was increased, the HPT inlet & LPT inlet temps. were approaching their high limit so bed temp was lowered.
Bed level was increased to 126".
At 20:32 on 7/1, bed temp was lowered to 1509F due to high temp on #12 pri. cyclone.
At 22:00 on 7/1, #3 paste pump tripped on low splitting air.
At 22:23 on 7/1, combustor tripped due to high temp on #12 pri. cyclone.
During restart on 7/2, Net-90 module issued a combustor trip.
Gas turbine was tripped in order to clean fuel nozzles.
While cleaning fuel nozzles, an inspection of the paste mixer revealed severe corrosion so longer outage was begun.
On Gas Turbine trip, HCV-T121 stuck 3/4" open.

Shutdown reason: Automatic combustor trip due to high primary cyclone temps.
Major Outage Workscope: Shortened dip leg on sec. cyclone 24.
Inspected GT bypass valves and machined bushings 2 mm larger.
Changed secondary cyclone fluidizing air orifice from 6.5mm to 5.0mm on all but #21 cyclone.
Machined flats on gas turbine star gear vibration probes.
Replaced sorbent prep system sizer screen.
Rebuilt coal paste mixer.
Relocated some of the vertical separator level taps to try to stabilize the level indications.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

7/21/91 to 7/23/91

Maximum Gross Unit Load Achieved: 20 MWHR.
Gross Capacity Factor @ 60 MWG = 4.65%
TD-SU-91-25-01
Run number: 7/21/91 @ 23:38 till 7/23/91 @ 4:04; 28.43 hours G.T. operation.
G.T. Ops.: 7/21/91 @ 17:07 till 7/23/91 @ 3:06; 9.98 hours coal fire.
Coal fire:
Run Objective:
Major Observations: Sorbent injection was initiated before coal injection.
As bed level was increased for once through operation, VS level became unstable and bed level was dropped.
Once through operation was finally achieved almost 8 hours after coal fire.
Major Accomplish/ Tests: None.
Operations Problems: On initial coal injection, pumps #1 & #4 were not pumping.
Logic problem was found that limited the signal to the paste pumps.
Shortly after coal fire, #3 tripped due to low splitting air flow, was O/S for 2 1/2 hrs.
Sorbent injection system tripped twice, the second time the east feeder had to be repacked.
Just after once through operation, P16 cyclone appeared plugged.
After combustor trip, started on decreasing steam flow but tripped off three times.
After combustor trip, the GT tripped because of high fictive disk temperature.
Shutdown reason: Manual combustor trip due to plugged P16 cyclone.
Major Outage Worksopce: Installed new screen in sorbent sizer. The old one was broken loose on outer edge.
Rebuilt boiler circulation pump.
Cleaned out #16 and #26 cyclones and #26 ash piping through the internal ash cooler.

7/28/91 to 8/1/91

Maximum Gross Unit Load Achieved: 33 MWHR.
Gross Capacity Factor @ 60 MWG = 5.14%
TD-SU-91-26-01
Run number: 7/28/91 @ 22:06 till 8/1/91 @ 12:00; 85.9 hours G.T. operation.
G.T. Ops.: 7/29/91 @ 11:35 till 8/1/91 @ 5:15; 65.67 hours coal fire.
Coal fire:
Run Objective:
Major Observations: In order to warm the secondary ash system above dew point at startup, a vacuum was pulled on the system at startup.
Sorbent injection was begun prior to coal fire.
On 5 pump operation adjustments were made to bias paste pumps to improve bed temperatures to no avail.
Bed temperatures could not be stabilized on 5 pump operation.
Major Accomplish/ Tests: 26 hours of operation on 5 paste pump operation.
During the run adjustments were made to coal crusher in attempt to find optimum operating point.
Operations Problems: Bed preheater did not light first time for no apparent reason.
On 7/30 @ 3:07, #4 coal nozzle plugged at the nozzle.
Splitting air and paste flow both stopped and could not be unplugged.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Splitting air flow transmitter also failed during this period and could not be replaced.

Decided to keep fuel nozzle out of service for rest of the run.

During early morning of 7/30, the S24 ash line plugged up and never unplugged for the rest of the run.

On 7/30, the #2 O₂ analyzer vent line plugged and overpressurized the pump and other components.

On 7/31, the motor for crusher #2 in station #3 failed.

On 7/31, the deluge system for the coal prep conveyors actuated falsely due to a failed Protecto wire.

Shutdown reason:

Manual combustor trip due to inability to stabilize bed temps on 5 pump operation.

Major Outage Workscope:

Inspected all cyclones, top and bottom.

Found ash buildup in secondary ash line collection header around #S24 and S25.

Balanced sorbent preparation system fan.

8/7/91 to 8/8/91

Maximum Gross Unit Load Achieved: n/a MWHR.

Gross Capacity Factor @ 60 MWG = n/a

Run number:

TD-SU-91-27-01

G.T. Ops.:

8/8/91 @ 9:32 till 8/8/91 @ 11:22; 1.83 hours G.T. operation.

Coal fire:

Coal fire was not achieved.

Run Objective:

Major Observations:

Unit warming procedure included pulling a vacuum on the secondary ash lines and thus the cyclones.

Major Accomplish/ Tests:

None, run was aborted.

Operations Problems:

After the GT was rolled, air flow and LPT inlet guide vane position appeared abnormal.

Shutdown reason:

Gas turbine was tripped due to problems with the LPT guide vane positioner.

Major Outage Workscope:

Replaced the gas turbine LPT inlet guide vane positioner.

8/8/91 to 8/13/91

Maximum Gross Unit Load Achieved: 36 MWHR.

Gross Capacity Factor @ 60 MWG = 4.85%

Run number:

TD-SU-91-28-01

G.T. Ops.:

8/8/91 @ 17:03 till 8/13/91 @ 16:47; 119.73 hours G.T. operation.

Coal fire:

8/9/91 @ 2:55 till 8/13/91 @ 16:39; 109.73 hours coal fire.

Run Objective:

Following repairs to the LPT inlet guide vane position indicator, unit was restarted.

Conduct boiler and sorbent testing for B&W.

Major Observations:

At time of economizer leak, main steam flow dropped instantaneously.

Boiler circ pump started but shut back down due to low vertical separator level.

Gas turbine was manually tripped when it was discovered water was accumulating in GT outlet duct.

Drain valves were opened and pumps were used to pump out econ. inlet duct.

Vertical separator and thus boiler circ flow could not be established since all water was leaking out in the econ.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Boiler evap. and SSH tube metal temps did not indicate high temps in the boiler due to their location in the boiler.
Two hours after event, tube metal temps finally started to go up probably due to heat conduction in tubes.
After large drain hole was cut in side of econ duct, feedwater flowrate was increased to 260kpph and VS level was established.

Major Accomplish/ Tests: Completed B&W boiler and sorbent testing @ 75".
Willis & Paul reps were on site to make adjustments to the sorbent prep. crusher.
Relative accuracy tests were conducted on the stack monitoring equipment on 8/13.

Operations Problems: During an inspection, it was found that the interior components of the paste mixer had corroded away.
Repairs were made continuously for the rest of the run whenever the mixer was out of service.
After B&W tests were completed, #4 paste pump tripped because of water in the control cabinet.
As bed level was stabilized @ 90", a cyclone fire developed in P17.
Bed temperature was lowered to reduce dip leg temperatures.
On 8/12, sorbent prep system was removed from service in order to repair a hole in the cyclone separator.
Tube leak ruptured in the economizer @ 16:39 on 8/13 resulting in a combustor trip.

Shutdown reason: Automatic combustor trip due to tube leak in the economizer.
Major Outage Workscope: Repaired three leaks in the economizer.
Installed loop seal in the economizer inlet duct for drainage considerations.
Repaired one leak in the furnace and conducted boiler hydro at 1500 psig.
Changed out piston in #4 paste pump.

8/22/91 to 8/24/91 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a
TD-SU-91-29-01
8/23/91 @ 15:31 till 8/24/91 @ 3:09; 11.63 hours G.T. operation.
Coal fire: Coal fire was not achieved.

Run number:
G.T. Ops.:
Coal fire:
Run Objective:
Major Observations: None.
Major Accomplish/ Tests: Completed steam turbine overspeed oil trip testing.
Operations Problems: Shortly after gas turbine roll, combustor tripped due to low splitting air flows on #2 & #5 nozzles.
While rolling steam turbine after overspeed tests, steam flow was increased to fast.
Result was a drop in vertical separator level and feedwater flow could not maintain VS level.
Boiler circulation pump had tripped on low NPSH to pump.
Combustor and GT tripped due to low boiler circulation flow.

Shutdown reason: Automatic combustor/GT trip due to low boiler circ. flow.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Major Outage Workslope: No outage work, unit was hot restarted.

8/24/91 to 8/26/91

Maximum Gross Unit Load Achieved: 38 MWHR.

Gross Capacity Factor @ 60 MWG = 5.49%

Run number:

TD-SU-91-30-01

G.T. Ops.:

8/24/91 @ 8:21 till 8/25/91 @ 20:03; 35.7 hours G.T. operation.

Coal fire:

8/24/91 @ 14:56 till 8/25/91 @ 15:43; 24.78 hours coal fire.

Run Objective:

Major Observations:

As soon as coal fire was initiated, P17 cyclone temperatures were low and ash cooler temps were below ambient air temps.

As bed level increased, apparent air leak on P17 cyclone disappeared.

Major Accomplish/ Tests:

None, run was aborted due to plugged cyclones.

Operations Problems:

At 5:49, while lowering bed level, north reinj. valve stuck open and bed level increased to 71".

As this occurred, fires were apparrent in several cyclones.

As conditions stabilized, all fires were brought under control.

At 12:00, P13 cyclone appeared to plug and could not be unplugged.

Shortly thereafter, S23 cyclone plugged after indications of heavy ash loadings.

Shutdown reason:

Manual combustor trip due to plugged P13 and S23 cyclones.

Major Outage Workslope:

Installed new shaft bushings in HCV-J230 and HCV-J235.

Changed ceramic cones in #1 and #4 fuel nozzles.

Installed fluidizing air system in primary cyclone bellows boxes.

Adjusted "S" tubes on #1, #3, and #5 paste pumps.

Cleaned rotary ash unloader and adjusted clearances.

Found and repaired leaks in primary ash line flanges and in internal ash coolers.

Cleaned out cyclone and ash lines on P13 and S23 cyclone trains.

9/3/91 to 9/5/91

Maximum Gross Unit Load Achieved: n/a MWHR.

Gross Capacity Factor @ 60 MWG = n/a

Run number:

TD-SU-91-31-01

G.T. Ops.:

9/4/91 @ 14:52 till 9/5/91 @ 1:49; 10.95 hours G.T. operation.

Coal fire:

Coal fire was not achieved.

Run Objective:

Major Observations:

None

Major Accomplish/ Tests:

None, run was aborted due to trip.

Operations Problems:

During bed preheating, PCV-U001 was not controlling pressure and was placed on manual.

When the pressure was caught, the VS level decreased rapidly causing a low NPSH on boiler circ pump.

Boiler circ pump could not run thus causing a combustor/gas turbine trips due to low boiler circ. flow.

Suspected that LCV-U200A was cause of low VS level.

Shutdown reason:

Automatic combustor/GT trips due to low boiler circ. flow.

Major Outage Workslope:

None, unit was hot restarted.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

9/5/91 to 9/8/91

Maximum Gross Unit Load Achieved: 39 MWHR.
Gross Capacity Factor @ 60 MWG = 5.40%
Run number: TD-SU-91-32-01
G.T. Ops.: 9/5/91 @ 5:20 till 9/8/91 @ 16:18; 82.96 hours G.T. operation.
Coal fire: 9/5/91 @ 20:01 till 9/6/91 @ 23:28; 3.45 hours coal fire.
9/6/91 @ 5:11 till 9/8/91 @ 12:05; 54.90 hours coal fire.
Run Objective:
Later, the speed control card on the #6 pump failed and had to be replaced.
Leak occurred on sorbent transport line exterior of combustor vessel.
Shutdown reason: Manual combustor trip to repair leak in sorbent transport line.
Major Outage Workscope: Found water in #6 paste pump hydraulic fluid which probably caused control problem during last run.
Patched sorbent transport piping at 1st cross after sorbent injection vessel.
Repaired LCV-U200A.

9/11/91 to 9/12/91

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a
Run number: TD-SU-91-33-01
G.T. Ops.: 9/11/91 @ 17:52 till 9/12/91 @ 7:30; 13.63 hours G.T. operation.
Coal fire: No coal fire was attempted.
Run Objective:
Major Observations: After bed preheating was begun, problems were noticed with the paste injection pumps.
After further investigation it was found that the chrome lining was coming off the paste pump cylinders.
Major Accomplish/ Tests: None, run was aborted.
Operations Problems: At startup, bed tap #1 was plugged and was later valved together with tap #2.
Paste pumps could not be run due to chrome lining coming off their cylinders.
Shutdown reason: Manual combustor trip in order to inspect paste pumps.
Major Outage Workscope: <<< Start of the Major Bed Surface Addition Outage >>>
Note: due to condition of paste pumps, it was decided to begin the bed surface addition outage.
Added additional heating surface to the in bed tube bundle.
Added 4 rows of evaporator surface and two rows of SSH surface to top of tube bundle.
Top of tube bundle is now expected to be 142" for max. steaming rate.
Removed shielding in lower bundle.
Replaced stainless steel startup zone liners with ceramic tile liners over most of the area.
Rebuilt coal paste pumps with stainless sections instead of chrome plated parts.
GT Bypass and Intercept valves were rebuilt to reduce leakage.
Installed new GT LPT guide vane bushing modifications and installed redundant guide vane position transmitter.
Replaced the GT HPT inlet temp. T/C with a new design.
Modified GT star gear lube oil piping.
Installed modified slip joint in cross over pipe (air seal) to GT.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Rebuilt sorbent prep crusher and cyclone separator.
Modified economizer supports to reduce stress caused by vibration of the tubes.
Replaced sorbent tee bends with ceramic lined tee bends.
Install Ametec O₂ analyzers on all seven cyclones. (Increased O₂ measurement from 4 to 7 cyclones).
Installed freeboard mixing system.
Added two additional sootblowers to economizer, bringing total to 4 blowers.
Modified fuel nozzles with new end plate design, eliminating secondary splitting air and modifying primary.
Added 50 kw heater to GT intercooler waterside loop for preheating intercooler.
Totally modified secondary ash system, replaced all tee bends and cooler chambers with welded pipe design; eliminated 128 bolted flanges.
Installed a new routing for the secondary ash removal line between the combustor and econ. outlet duct.
Modified sparge ducts with new expansion joint design.
Installed larger motors on coal crusher drives.
Rebuilt boiler circulation pump was rebuilt using a new style of carbon bearings.
Replaced trim on feedwater flow control valve to provide more stable flow at low loads.
Rebuilt the primary ash coolers with machining hex flange faces at return chambers and installed new bolts & gaskets.
Rebuilt primary ash tee bends with inspection and repair to castings (38% had sand holes), installed new design gaskets.
Cut off the bottom 20 feet of secondary cyclone dip legs on remaining 6 cyclones.
Inspected and repaired all cyclone ash removal collection header castings at internal coolers.
Modified internal primary ash cooler from 27 passes to 25 passes.

12/7/91 to 12/10/91

Run number:
G.T. Ops.:
Coal fire:
Run Objective:

Maximum Gross Unit Load Achieved: 0 MWHR.

Gross Capacity Factor @ 60 MWG = 0.0%

TD-SU-91-34-01

12/8/91 @ 13:20 till 12/10/91 @ 4:11; 38.85 hours G.T. operation.

Coal fire was not attempted during this run.

Initial startup after bed surface outage.

Evaluate bed surface addition.

- 1) Evaluate ability to prewarm cycle with dry compressed air on GT and new intercooler heater.
- 2) Evaluate GT gear vibration instrumentation.
- 3) Test splitting air flow control.
- 4) Test operate new econ. sootblowers and their impact on sorbent air capacity.
- 5) Evaluate impact on cyclones of removing secondary dip legs.
- 6) Evaluate new Ametek O₂ analyzers on all 7 cyclones.
- 7) Retune feedwater, vert. separator, bed temp., & main steam temp. controls.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

	8) Evaluate V-6 GT orifice adjustments on GT seal air system.
	9) Evaluate preparation and absorption characteristics of Plum Run #57 sorbent.
	10) Evaluate new effective full bed height on unit operations.
Major Observations:	While running splitting air compressor @ low load, system heated up which required a bypass to be installed.
Major Accomplish/ Tests:	Cured the new bed zone refractory. Sparge ducts were relaxed.
Operations Problems:	Problems encountered with initial lighting of bed preheater. Combustor tripped twice just after preheater start due to high & low swings in vertical separator level. During preheating, all but S23 cyclone appeared to be plugged (later inspection revealed ash peeling pluggage). Speed indication on initial steam turbine rollup was faulty and device had to be replaced.
Shutdown reason:	Manual combustor trip in order to inspect and clean out secondary cyclones.
Major Outage Workscope:	Inspected all secondary cyclones, all except S23 plugged with ash peelings/ ash fall. Sandblasted rest of the secondary cyclones.
12/12/91 to 12/13/91	Maximum Gross Unit Load Achieved: 0 MWHR. Gross Capacity Factor @ 60 MWG = 0.0% TD-SU-91-35-01 12/12/91 @ 13:21 till 12/13/91 @ 1:03; 11.7 hours G.T. operation. Coal fire was not attempted due to plugged cyclones. Same as run 91-34-01, see above. Combustor tripped 3 times shortly after lighting the preheater on high vertical level. Shortly after stable preheating was established, cyclones P14, S24 & S25 all appeared plugged. Cyclone pluggage occurred during bed building when unusual high levels of ash blew over from bed reinjection discharge. Outage inspection revealed high concentration of fines in startup bed material.
Run number:	
G.T. Ops.:	
Coal fire:	
Run Objective:	
Major Observations:	
Major Accomplish/ Tests:	None.
Operations Problems:	See Major Observations.
Shutdown reason:	Manual combustor trip due to plugged primary & secondary cyclones.
Major Outage Workscope:	Excessive fines were found in the bed reinjection vessels, cause unknown. Plugged ash lines were found plugged due to excessive fines. Removed old bed material from bed and reinjection vessels, reloaded with 25 tons of sand.
12/15/91 to 12/19/91	Maximum Gross Unit Load Achieved: 41 MWHR. Gross Capacity Factor @ 60 MWG = 41.11% TD-SU-91-36-01 12/16/91 @ 16:17 till 12/19/91 @ 4:45; 60.47 hours G.T. operation. 12/17/91 @ 5:03 till 12/17/91 @ 19:09; 14.10 hours coal fire.
Run number:	
G.T. Ops.:	
Coal fire:	

Appendix II - Tidd Operations/Testing/Outage Overview Log

12/ 18/91 @ 2:40 till 12/ 19/91 @ 3:00; 24.33 hours coal fire.

Run Objective: Same as run 91-34-01, see above.

Major Observations: GT seal air valves did not automatically switch from LPC to HPC supply and had to be manually switched.
Cause may have been bad LPT inlet guide vanes feedback.
As unit load approached 70" to 80", cyclone fires started to appear.
During cyclone fires, secondary suction nozzle T/C's indicated ash falls in secondary dip legs.

Major Accomplish/Tests: No formal tests were accomplished, however highest load since outage of 80" was achieved.

Operations Problems: After startup, @ 80" bed level, combustor was accidentally tripped while manual tuning of Net-90 cyclone trip points.
On hot restart, problems occurred with preheater needle valves sticking.
On restart, bed material was flowing out of reinjection vessel, especially south vessel, without pulsing "L" valves.
With cyclone fire in P13 cyclone, S23 cyclone ash line suddenly plugs.

Shutdown reason: Manual combustor trip due to plugged secondary and frequent cyclone fires.

Major Outage Worksopce: Inspection revealed 2 to 4 ft. in bottom of every secondary dip leg.
Some sec. cyclones had rat holes down through the ash to the suction nozzle.
Other secondary cyclones showed no evidence of being in service at time of unit shutdown, i.e. piles of ash & no rat hole.
Based on sec. inspection, decided to install manual sec dip leg stirring air system.
System consisted of 3 swirl air passive nozzles backed up by a sorbent pressure manual system.
S23 ash cooler and dip leg plugged.
Added tube shields to 2 bottom evaporator rows, platens 2, 3, 4, 53, 54 & 55.
GT seal air valves were removed, disassembled and cleaned.

1/8/92 to 1/11/92

Run number: TD-SU-92-01-01

G.T. Ops.: 1/9/92 @ 11:20 till 1/11/92 @ 00:53; 37.55 hours G.T. operation.

Coal fire: 1/10/92 @ 00:34 till 1/10/92 @ 23:30; 22.93 hours coal fire.

Run Objective: Achieve full load operation.
Evaluate new secondary cyclone stirring air system.
Commission freeboard injection system.
Evaluate GT gear vibration instrumentation.
Evaluate V-6 GT orifice adjustments on GT seal air system.
Evaluate preparation and absorption characteristics of Plum Run #57 sorbent.
Evaluate new effective full bed height on unit operations.

Major Observations: Shortly after preheating, S24 showed signs of pluggage.
S24 unplugged as combustor pressure was raised, later showed signs of plugging - S24 then unplugged once again as pressure was increased.

Major Accomplish/Tests: Commissioned freeboard injection system for first time on 1/9/92.
Freeboard mixing most effective above 600 psig set point.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Operations Problems: S24 swing back and forth, plugged and than unplugged.
Net-90 logic causes combustor trip when two bed T/C's failed in service.
GT tripped after combustor when HPT outlet T/C failed going high.
Shutdown reason: Combustor trip due to Net-90 logic trip for two failed bed T/C's.
Major Outage Workscope: Hot unit restart due to GT trip.

1/11/92 to 1/11/92

Maximum Gross Unit Load Achieved: 8 MWHR.
Gross Capacity Factor @ 60 MWG = 5.95%
Run number: **TD-SU-92-01-02**
G.T. Ops.: 1/11/92 @ 4:15 till 1/11/92 @ 21:43; 17.47 hours G.T. operation.
Coal fire: 1/11/92 @ 9:44 till 1/11/92 @ 12:31; 2.78 hours coal fire.
Run Objective: Same as run 92-01-01, see above.
Major Observations: At startup, cyclones S21, S24, & S27 appeared to be plugged.
S21 & 27 unplugged after stirring air and blowdown valve opened, S24 did not respond as well.
Major Accomplish/ Tests: Learned how to unplugged secondary ash lines with blowdown valve.
Operations Problems: #6 fuel pump tripped and caused bed temps to go high, which tripped combustor.
#2 fuel nozzle could not be blown clean and had to be manually cleaned after GT trip.
Shutdown reason: Manual GT trip in order to clear fuel nozzles.
Major Outage Workscope: Manually clean fuel nozzles.
Installed secondary ash blowdown line under combustor vessel.

1/12/92 to 1/12/92

Maximum Gross Unit Load Achieved: 2 MWHR.
Gross Capacity Factor @ 60 MWG = 1.8%
Run number: **TD-SU-92-02-01**
G.T. Ops.: 1/12/92 @ 11:38 till 1/12/92 @ 21:29; 9.85 hours G.T. operation.
Coal fire: 1/12/92 @ 21:08 till 1/12/92 @ 21:29; 0.35 hours coal fire.
Run Objective: Same as run 92-01-01, see above.
Major Observations: GT trip due to lack of breaker status feedback to Net-90.
Major Accomplish/ Tests: None
Operations Problems: GT trip due to lack of breaker status feedback on feedpump to Net-90.
Trip occurred shortly after coal fire.
Shutdown reason: GT trip due to lack of breaker status feedback to Net-90.
Major Outage Workscope: None - Hot unit restart.

1/13/92 to 1/16/92

Maximum Gross Unit Load Achieved: 71 MWHR.
Gross Capacity Factor @ 60 MWG = 29.66%
Run number: **TD-SU-92-02-02**
G.T. Ops.: 1/13/92 @ 8:14 till 1/16/92 @ 4:29; 68.25 hours G.T. operation.
Coal fire: 1/13/92 @ 21:00 till 1/14/92 @ 6:38; 9.63 hours coal fire.
1/15/92 @ 2:58 till 1/16/92 @ 00:59; 22.02 hours coal fire.
Run Objective: Same as run 92-01-01, see above.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Major Observations: Sec cyclones #23, 24 & 27 had low temps shortly after coal fire, within 3 hours 23 & 24 came back.
With sand bed, data @ 115", 690 kpph air flow, bed 1560F, 408 kpph steam flow, & 63 MWs.

Major Accomplish/ Tests: With sand bed, data @ 115", 690 kpph air flow, bed 1560F, 408 kpph steam flow, & 63 MWs.
Max. bed level for run was 121"

Operations Problems: #4 paste pump did not start at first coal fire attempt.
9 hours after coal fire, paste pump 6 stopped pumping. Fuel line was backblown with N2 which locally reduced bed temps.
Local low bed temps from N2 injection resulted in combustor trip.
On second coal fire, sec cyc. # 23, 24, 25, & 27 appeared plugged. Wiithin 4 hrs. all but 27 recovered.
As load was increased, cyclone fires began in all cyclones, hampering unit operation.
30 minutes before combustor trip, sorbent system tripped for unknown reasons and could not be restarted.
20 minutes before combustor trip, #6 paste pump tripped due to high hydraulic pressure.
Combustor tripped due to high dip leg temps in P15 cyclone with sorbent & #6 paste pump out of service.

Shutdown reason: Combustor tripped due to high dip leg temps in P15 cyclone with sorbent & #6 paste pump out of service.

Major Outage Worksopce: Inspection of cyclones indicated sintered ash in all primary cyclone dip legs.
Primary cyclones 15 & 16 had hard, black sinters in bellows boxes.
Revised external secondary ash line routing, removing all 90 deg. tee bends and replacing with long radius bends to reduce line dP.
#5 fuel nozzle was found plugged and was cleaned.
Inspection of paste tanks revealed a hard coal deposit in the bottom of the tank.
Reinstalled upper paste tank agitator blades.
Inspection of bed liner revealed a general failure of the upper row of bed zone tiles.
Installed modified paste strainers in #4 and #6 paste lines.
Disassembled and cleaned #6 paste nozzle.
Inspected GT HP 3rd and 4th stages.

1/21/92 to 1/25/92 Maximum Gross Unit Load Achieved: 69 MWHR.
Gross Capacity Factor @ 60 MWG = 81.97%

Run number: TD-SU-92-03-01

G.T. Ops.: 1/21/92 @ 8:22 till 1/25/92 @ 14:07; 101.75 hours G.T. operation.

Coal fire: 1/21/92 @ 18:52 till 1/25/92 @ 14:07; 91.25 hours coal fire.

Run Objective: Establish effective full bed height while maintaining a minimum of 3% O2.
Evaluate prep & absorption characteristics of Plum Run #57 sorbent.

Major Observations: At startup, as bed level was increased from 70" to 110", cyclone fires were prevalent.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

After startup, @ 132", 710 kpph air flow, 60 kpph fuel flow, 408 kpph stm. flow, unit load was 66 MW.
During night of 1/22, bed density, fuel flow, unit load, freebrd & cyclone temps were all decreasing due to possible sinters.
Splitting air flow curve was reduced early in run to .65 of the original curve.
On night of 1/23, appears north paste tank amps are lower than south and 4, 5, & 6 paste dP's are lower than 1, 2, & 3.
It appears there is wetter paste in north tank. Cyclones 5, 6, & 7 temps are much hotter.
Sinters are observed in bed ash evening of 1/23.
GT air intake doors blow-in on 1/24 during snow squall.

Major Accomplish/Tests: After startup, @ 132", 710 kpph air flow, 60 kpph fuel flow, 408 kpph stm. flow, unit load was 66 MW.

Operations Problems: Shortly after coal fire, problems were experienced with the coal crusher. Coal would not pass through the crusher.
#6 paste pump was out of service for 1 hour
On 1/23, S25 cyclone appeared to plug in service.
Load is drastically reduced on 1/24 when coal crusher problems return - coal won't go thru crusher. Paste tank goes to 0" lvl.

Shutdown reason: Combustor trip while starting feedpump due to a BDD operation(Transformer 1A differential protection)
GT trip shortly after when voltage drop causes intercept/bypass valve to come off it's limit switch.

Major Outage Workscope: Inspected interior welds on secondary ash lines, found erosion and interior and repaired 13 welds.
Reversed rotation of coal paste tank agitators.
Installed diverter plate between paste tanks to improve "communication" flow between tanks.
Added deflector plate to bottom of coal water mixer outlet chute in order to achieve better paste tank distribution.
Repaired failed boiler enclosure north rupture disk.
Retorqued all accessible primary ash line flange bolts.

2/2/92 to 2/10/92

Run number: **TD-SU-92-04-01**

G.T. Ops.: 2/3/92 @ 9:39 till 2/10/92 @ 14:58; 173.32 hours G.T. operation.

Coal fire: 2/4/92 @ 00:52 till 2/10/92 @ 10:59; 154.12 hours coal fire.

Run Objective: Achieve sustainable operation of the unit throughout the load range.
Evaluate coal crusher in 'gap' control mode.

Major Observations: Building startup bed took longer due to finer material than usual in bed reinjection vessels.
Paste tank mixing appeared to be much improved based on paste line differentials.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

30 kpph mismatch on main stm/feedwater flow when pressure line blows out on econ. pressure gauge.

Major Accomplish/ Tests: Unit was brought up to almost 140" @ 1525F to check on impact on higher cyclone inlet temps.
Stack testing was performed on 2/7/92.

Operations Problems: North reinjection vent valves were leaking through.
Superheater vent valve was found to be leaking through slightly.
Bed ash removal long aerobelt tripped several times succeeding in burying the bucket elevator.
East sorbent injection feeder packing blew and had to be changed.
#5 paste pump tripped out of service for a short period of time on 2/8/92.

Shutdown reason: Manual combustor trip when operator thought there was a tube leak when 30 kpph flow imbalance occurred.

Major Outage Worksopce: Installed "T's" and skateboards on end of sorbent nozzle to divert sorbent into adjacent fuel skate boards.
Replaced all bearings on both sorbent rotary feeders.
Rodded out sorbent inbed deposit (clinker) above #3 coal paste nozzle.

2/15/92 to 2/16/92

Maximum Gross Unit Load Achieved: N/A MWHR.
Gross Capacity Factor @ 60 MWG = N/A%

Run number: **TD-SU-92-05-01**
G.T. Ops.: 2/16/92 @ 16:50 till 2/16/92 @ 22:43; 5.88 hours G.T. operation.
Coal fire: Coal fire was not achieved during this startup.
Run Objective: During initial load increase conduct testing on sorbent flow, splitting air, and freeboard mixing to determine best high load settings.
Evaluate effect of sorbent skateboards.
Determine limitations of coal crusher/coal prep system without jeopardizing unit operations.

Major Observations: None
Major Accomplish/ Tests: None due to aborted startup.
Operations Problems: Problems were incurred with initial lighting of the bed preheater.
About 30 minutes after successful oil fire, GT trip due to Net-90 logic problem.
Shutdown reason: Automatic GT trip due to Net-90 logic fault.
Major Outage Worksopce: None - hot restart.

2/16/92 to 2/21/92

Maximum Gross Unit Load Achieved: 68 MWHR.
Gross Capacity Factor @ 60 MWG = 40.50%

Run number: **TD-SU-92-05-02**
G.T. Ops.: 2/17/92 @ 3:12 till 2/21/92 @ 9:43; 102.52 hours G.T. operation.
Coal fire: 2/17/92 @ 19:02 till 2/21/92 @ 3:45; 80.72 hours coal fire.
Run Objective: See run #TD-SU-92-05-01 above.
Major Observations: After startup, only S22 & 26 cyclones were not plugged, later all but S23 returned to service. S23 eventually unplugged.
No obvious effects of the sorbent T's or skateboards were immediately apparant.

Appendix II - Tidd Operations/Testing/Outage Overview Log

On 2/19, bed level dropped 10" very quickly, unknown reason.
On 2/20 @ 911, when 125" bed level was reached, evaporator tube temperatures indicated presence of sorbent clinker.

Major Accomplish/Tests: Freeboard mixing testing found that 650 psig to 750 psig was best steam flow pressure.
On 2/18, splitting air tests indicate that 1.5 times original curve is best at 50" bed level.
50" bed level tests began @ 09:30 on 2/19/92.
On 2/20, pump bias was changed to nearly 1.0 on all pumps to check impact.
On 2/20 bed level was increased to 142", very little post bed combustion, dry paste with lots of fines.
Bed temps. increased in steps from 1540F to 1575F. @ 2/21 generation peaked @ 70 MW w/ 429 kpph stm flow.

Operations Problems: At initial coal fire, problems were encountered with both the #4 & #6 paste pumps.
On 2/18 @ 00:12, #5 paste pump stopped pumping, was reversed, clean blown and placed back in service.
On 2/18 @ 02:30, #3 paste pump "S" tube proximity switch had to be replaced.
On 2/18 @ 07:08, #6 paste pump tripped on over hydraulics, had to be extensively cleaned and was then placed back in service.
On 2/18 @ 17:16, #5 paste pump tripped on extreme low splitting air flow, was extensively cleaned and placed back in service.
On 2/18 @ 18:13, #6 paste pump tripped on extreme low splitting air flow, was extensively cleaned and placed back in service.
On 2/19 @ 04:50, #6 paste pump tripped due to erratic operation was cleaned and placed back in service.
On 2/19 @ 13:57, #6 paste pump tripped, was extensively cleaned and placed back in service.

Shutdown reason: Manual combustor trip in order to inspect sorbent in bed clinker.
Major Outage Worksopce: Disassembled and cleaned #5 & #6 coal paste nozzles.
Repaired worn sorbent prep. system fan blades and balance fan.
Machined additional grooves in coal preparation system crusher rolls.
Inspected boiler injection tank and removed faulty heater.
Repaired bed zone liner tile.

2/28/92 to 3/5/92 Maximum Gross Unit Load Achieved: 66 MWHR.
Gross Capacity Factor @ 60 MWG = 80.11%

Run number: TD-SU-92-06-01
G.T. Ops.: 2/28/92 @ 15:32 till 3/5/92 @ 2:04; 130.53 hours G.T. operation.
Coal fire: 2/29/92 @ 6:08 till 3/4/92 @ 17:53; 107.75 hours coal fire.
Run Objective: Avoid tube bundle deposits.
Evaluate cut off sorbent injection nozzles.
Evaluate coal crusher operation in gap control with restriction plates above rolls and more grooves in rolls.
Evaluate effect of new splitting air bypass valve on reversing with bed material above nozzles.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Major Observations: Conduct additional parametric testing to optimize unit operation.
Evaluate the effect of dry air on the gas turbine seals.
Stable operating conditions was achieved on crusher with 5 to 8 kwh/ton energy input.

Major Accomplish/Tests: Higher paste fines was not seen however with higher crusher energy input.
On 3/1, evaporator temps 4, 8, & 9 indicated low.
Tests showed that increased sorbent velocities may have stopped sorbent inbed clinker from growing.

Operations Problems: The north reinjection vessel would not feed out any bed ash after startup.
Drying out the paste may have led to paste pump problems.
#6 pump was out of service for 4 hours on 2/29 due to pluggage.
On 3/2, sorbent velocities were increased to 30.5 ft/sec when sorbent clinker was believed to be building in bed.
On 3/3 @ 0029 #5 paste pump tripped out and was not returned to service for 15 hours while attempts were made to return it to service.
An hour after #5 was returned to service, #4 tripped out and could not be put back into service.
An 1 1/2 later #5 paste pump tripped out and the combustor was tripped 4 minutes later by the operator due to low temps.
At shutdown, the south reinjection vessel also plugged up.

Shutdown reason: Manual combustor trip due to unstable firing conditions with two paste pumps O/S.

Major Outage Worksopce: Replaced lower screen on coal prep system sizer to smaller mesh (1/4").
Installed a new bypass (recirc) chute from coal preparation sizer back to crusher.
Machined additional grooves in coal preparation system crusher rolls.
Removed sinters from bed ash reinjection vessel outlets.
Disassembled and cleaned #4, 5, & 6 coal paste nozzles.
Metalized surface on sorbent preparation system fan and balanced.
Installed modified strainers on #1, 2, 3, and 5 coal paste lines.
Enlarged seal air orifice for gas turbine HP turbine.

3/15/92 to 3/16/92 Maximum Gross Unit Load Achieved: N/A MWHR.
Gross Capacity Factor @ 60 MWG = N/A

Run number: TD-SU-92-07-01

G.T. Ops.: 3/15/92 @ 13:47 till 3/16/92 @ 11:43; 21.93 hours G.T. operation.

Coal fire: Coal fire was not achieved during this startup.

Run Objective: Avoid tube bundle deposits.
Evaluate effect of nitrogen blanking on bed material entering the coal nozzles when reversing.
Evaluate effect of modifications to coal crusher operation.
Conduct additional parametric testing to optimize unit operation.
Evaluate the effect of dry air on the gas turbine seals.

Major Observations: During startup bed building, high amount of fines were observed in the material injected out of the reinjection vessels.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Major Accomplish/ Tests: .. Sec. cyclones #23, 24, & 25 showed signs of pluggage at startup along with high GT opacity.
Operations Problems: None - startup was aborted.
Sec. cyclones #23, 24, & 25 showed signs of pluggage at startup along with high GT opacity.
Acceptable coal paste could not be produced due to severe skewing in the coal crusher.
Coal was much drier than last week's test coal and would not go into the crusher.
Shutdown reason: Manual combustor trip while awaiting installation of coal wetting nozzles above crusher.
Major Outage Workslope: Install coal wetting nozzles above coal crusher in order to wet down dry coal going into crusher.

3/17/92 to 3/17/92

Maximum Gross Unit Load Achieved: N/A MWHR.
Gross Capacity Factor @ 60 MWG = N/A
TD-SU-92-07-02
Run number: 3/17/92 @ 5:19 till 3/17/92 @ 16:52; 11.55 hours G.T. operation.
G.T. Ops.: Coal fire was not achieved during this startup.
Coal fire: Same as TD-SU-92-07-01, see above.
Run Objective: Coal prep wetting system worked very well and good paste was made.
Major Observations: Bed preheater could not be lite off due to damage to swirl nozzles.
Major Accomplish/ Tests: None due to aborted startup.
Operations Problems: Bed preheater could not be lite off due to damage to swirl nozzles.
Based on previous photo's taken of GT, ABBC detected cracks on LPT blades.
Shutdown reason: Manual combustor trip due to inability to light preheater.
Major Outage Workslope: <<< Beginning of significant GT overhaul outage. >>>
Inspected bed preheater and found damaged vanes in the burner bottles, replaced vane assemblies.
Inspected GT LPT blades and found nine root cracks.
Rechromed all 12 coal paste pump hydraulic piston rods due to corrosion and pitting.
Rebuilt sorbent preparation system drying mill.
Replaced worn lower section of sorbent prep. system cyclone separator.
Modified bypass chute inlet to sorbent prep. system drying mill.
Replaced four thrust bearing T/C's on steam turbine.
Installed coal wetting for Polysius coal crusher.
Removed insulation from primary cyclone dip legs and installed heat shield.
Cut 12 grooves in Polysius coal crusher rolls.
Changed seal on gas turbine LPC inlet shutoff damper.
Chromed GT LP compressor coupling fit.
Replaced GT LPT blades.
Cleaned GT HPC blades and replaced damaged blades.
Install GT test equipment for ABBC on gas turbine.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

5/20/92 to 5/23/92

Maximum Gross Unit Load Achieved: 66 MWHR
TD-SU-92-08-01
Run number: 5/21/92 @ 20:26 till 5/23/92 @ 07:41; 35.25 hours coal fire.
Coal fire: Initial operation with HGCU Bypass cyclone inservice
Run Objective: Obtain LPT blade strain gauge data.
Evaluate recycle modifications to the coal prep 262 crusher.
Evaluate effect of N2 blanking on preventing bed material entering nozzles on reversing.
Major Observations: G.T. LPT blade strain gauge data was obtained.
S24 unplugged @ 17:15, 5/22 by pulsing stirring air.
43% G.T. inlet guide vane tests run on 5/23.
Piping & expansion joints in HGCU ran high in temps.
GT air leakage data was obtained.
Coal crusher produced acceptable paste fines.
Bed ash elutriation rates were high even with sieved bed ash in 274 vessels.
Achieved 140" bed level @ 1535F and 700K air flow.
Operations Problems: Plugged HPC outlet pres. taps caused G.T. to be rolled up several times before finally paralleled.
Duct opacity was running high at startup & excessive bed elutriation.
#4 expansion joint in HGCU failed and vented into plant at 7:41 on 5/23.
Shutdown reason: Combustor & G.T. tripped manually when #4 HGCU expansion joint blew.
Major Outage Workscope: Bypassed the P11 cyclone and HGCU system.
Switched to 6 cyclone string operation.
GT LPC liquid cleaned/carboblasted & hand wiped LPC inlet blades.
10" split in #4 HGCU exp. jt. & small pin holes in #7 exp. jt.
All HGCU exp. jts. removed and 321SS bellows material replaced with C-22 Hastelloy.
2' to 3' of ash found in all sec cyclones except #22.
Installed temp. screw feeder to dump paste into north paste tank.

6/8/92 to 7/10/92

Maximum Gross Unit Load Achieved: 68 MWHR.
TD-SU-92-09-01
Run number: 6/08/92 @ 18:05 till 6/9/92 @ 02:11; 8.10 hours coal fire.
Coal fire: 6/09/92 @ 18:00 till 7/10/92 @ 14:00; 740.00 hours coal fire.
Run Objective: Conduct PFBC Island acceptance tests.
Evaluate recycle modifications to the coal prep 262 crusher.
Evaluate effect of N2 blanking on preventing bed material entering nozzles on reversing.
Perform additional GT blade stress analysis.
Major Observations: Evaluate GT internal air leakage.
Completed PFBC Island acceptance tests.
Completed 31 day continuous run.
G.T. LPT blade strain gauge testing was conducted @ 40, 50, 70, 80, 90, & 100" bed levels.
Full load acceptance tests were conducted on June 12, 13, & 14.
Bed ash production test was conducted on 6/16 (9.2 k#/hr @ 131").

Appendix II - Tidd Operations/Testing/Outage Overview Log

Econ/GT dust loading & bed ash prod. tests were run 6/23/92.
Stm turb. was brought off line @ 55" to replace CT and then placed back in service.
Tuned the bed mass controller and the combustion master during run.
At shutdown on 7/10 removed frbd. mix. for test., #2 cyc. O2 dropped, #4 & 7 O2's increased.
Performed 1st sec. ash into Vac. truck, no change seen in opacity.
Placed SJAP into service 1st time ever, only for 5 minutes.
GT air leakage data was obtained.
S24 remained plugged throughout run.
Econ draft loss high, 3 of 4 new sootblowers installed, blow freq. increased from 3 to 6 times/shift.

Operations Problems:

Start bed was sand.
After 1 day, several incidents at once resulted in combustor trip @ 2:11 on 6/9.
These incidents included act bed level lower than indicated, high M.S. temps, etc.
S24 cyclone unplugged for 1st run, plugged at 2nd startup & remained plugged for 30 days.
G.T. #1 vert., #3 & #4 vert & horz. brgs. were in & out of alarm several times during run.
Stm Gen phase 2 CT failed on 6/16 and was replaced on 6/27.
Sorb. prep deteriorated to point that sorb. fines (-60 mesh) was as high as 60%.
Both sorb. prep 200 ton storage hopper exp. jts. failed in service.
One of the LPT speed pickups failed in service.
Precip opacity remained high through run and #2 TR shorted to ground due to broken wire.
Intercept valve inlet temp. T/C's in Net90 failed, switched to alternate test T/C's.

Shutdown reason:

Major Outage Worksopce:

Leaks developed on sorbent prep cyclone, classifier & crusher.
Controlled shutdown for inspection.
Installed new fuel nozzles made of 330 stainless, old nozzles wore out, worse nozzle 1.75" dia, 2 times design dia.
Hard refractory chunk found in S24 suction nozzle.
S24 dip leg bottom changed out to be like all the others.
Coal paste mixer was relocated to center of paste tanks.
Primary ash coolers and tee bends leaking, gaskets being replaced.
Coal crusher screw feeder badly worn, screw removed from housing.
S23 purge air was reconnected to hot box.
Modified paste tank agitators for lower power requirements.
Completed econ. sootblower installation.
Installed 200 ton sorbent hopper to paste mixer screw feeder.
Installed sorbent & Primary ash samplers.
Installed modified intercept valve inlet thermowells.
GT borescope inspection.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Large hard deposits found in primary bellows boxes.
Sec S23, S24, S26 & S27 had ash buildup in dip legs.
Sorbent inj. line erosion found after HCV-B840 & 850.

7/26/92 to 7/27/92

Run number:
Coal fire:
Run Objective:

Maximum Gross Unit Load Achieved: N/A MWHR.
TD-SU-92-10-01
7/27/92 @ 12:47 till 7/27/92 @ 13:00; 0.22 hours coal fire.
Continue to evaluate GT and X-over pipe air leakage.
Test putting sorbent fines in the paste.
Minimize length of time GT is at critical speed w/guide vanes < 40%.
Collect engineering data for splitting air compressor modifications.
Collect secondary ash sample in MPW vacuum truck.
Tune combustion controls.

Major Observations:
Operations Problems:

Duct opacity was high entire time while building start bed.
Several attempts were required to lite preheater due to unstable flame problems caused by C.V.
S24 indicated it was plugged as soon as preheater was lite.
South 274 L valve plugged when raising startup bed, never unplugged.
Operator error of leaving bed temp master in manual w/zero output resulted in unstable bed temps @ coal fire.

Shutdown reason:

Combustor tripped due to low bed temps & with plugged 274 bed could not be raised.

Major Outage Workscope:

Small accumulation of soft ash was found in S24 & S26 dip legs.
Sintered ash was found in outlet of south reinjection vessel.
Diverter plate between paste tanks was removed to prevent backup into mixer chute.
12mm additional orifices installed at primary purge air pipe inlets.
Continue to evaluate GT and X-over pipe air leakage 8/1/92 to 8/2/92 ~~Maximum~~

Gross Unit Load Achieved: N/A MWHR.

Run number:
Coal fire:
Run Objective:

TD-SU-92-11-01
8/2/92 @ 19:54 but ordered off due to plugged #4 fuel nozzle.
Continue to evaluate GT and X-over pipe air leakage.
Test putting sorbent fines in the paste.
Minimize length of time GT is at critical speed w/guide vanes < 40%.
Collect engineering data for splitting air compressor modifications.
Collect secondary ash sample in MPW vacuum truck.

Major Observations:
Operations Problems:

Preheater had to be fired at higher oil pressure to achieve stable flame.
Flame-out problems again w/preheater.
S24 showed no signs of ash flowing.
Opacity high throughout run.
#4 fuel nozzle plugged at initial coal fire.

Shutdown reason:

Manual shutdown to mech. clean #4 nozzle (#1 also cleaned)

Major Outage Workscope:

Mechanically cleaned #1 & #4 fuel nozzles.

Appendix II - Tidd Operations/Testing/Outage Overview Log

8/3/92 to 8/4/92

Maximum Gross Unit Load Achieved: 13 MWHR.
Run number: TD-SU-92-11-02
Coal fire: 8/3/92 @ 12:31 till 8/4/90 @ 08:21; 16.07 hours coal fire.
Run Objective: Same as run 92-11-01 above.
Major Observations: Restart after manual cleaning of fuel nozzles.
Paste nozzle 4 plugged on 1st coal fire attempt @ 12:31, 8/3.
Water observed coming out of combustor belly drain.
Opacity at startup exceeded 70% and never went below 40%.
Operations Problems: Trouble achieving coal fire due to plugged coal nozzles.
S24 ash line appeared plugged must of the run.
Stack opacity high while increasing bed level, opacity never went below 45% entire run.
Attempts were made to optimize TR sets entire run to no avail.
Coal fire achieved @ 16:17 with only 5 pumps.
Shutdown reason: Manual combustor trip due to suspected boiler leak inside combustor.
Major Outage Workscope: Rattle 1st reported in LPT shaft when speed is below barring gear speed.
Boiler bottom leak in 90 deg. socket drain in boiler bottom outlet header drain.
Paste tank agitators extended with 2 ft., 1" x 4" SS extensions.
Flow test conducted on S24 ash line up to south collection header, no adverse findings.

8/8/92 to 8/27/92

Maximum Gross Unit Load Achieved: 56 MWHR.
Run number: TD-SU-92-12-01
Coal fire: 8/9/92 @ 13:49 till 8/27/92 @ 03:41; 419.46 hours coal fire.
Run Objective: Conduct sorbent in the paste tests at 50% in paste and 100% in paste.
Same as run 92-11-01 above.
Major Observations: From 8/10 thru 8/11 ran baseline test with 100% -4 mesh dry sorbent feed.
From 8/17 thru 8/19 ran with approx. 60% of -4 mesh sorbent in paste, Ca/S > baseline.
Added test on 8/19 thru 8/21 to run w/100% of -4 mesh sorb. in paste, Ca/S > baseline
From 8/24 thru 8/26 ran w/approx. 45% of -60 mesh sorb. fines in paste, Ca/S slightly < baseline.
Note: no paste pumpability problems encountered with 28 KPPH sorbent in the coal paste.
Coal was not sticking in crusher roller grooves due to screw feeder being removed.
Operations Problems: S24 ash line plugged entire run. S24 suction nozzle blowdown valve used 1st time, no improvement.
Stack opacity was unusually high from the time bed material was injected into the bed.
ESS ran 7 precip inlet dust loading tests.
From 8/9 thru 8/14 paste fines was poor, skewing was occurring and recycle rate was low.
Paste pumps 4,5, & 6 kept tripping due to poor paste. Ok after screws were reinstalled.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

On 8/14 crusher screw feeders were reinstalled and paste quality improved. Sorbent line leaks occurred in both pickup pots & pipe before HCV-B840. LPC outlet press. transmitter erratic, replaced in service.

Shutdown reason: Manual combustor trip for inspections.

Major Outage Workscope: 2 of 3 stirring air nozzles broke off S24 dip leg. S24 purge air flex hose was ruptured. Very bright red ash was found in S24 dip leg, very fluid ash. S24 entire ash line was borescoped, hard deposit found in south collection header between S24 & S22. S23 eroded hole in Sec ash cooler, S23 cooler routed to old S21 package. South sec ash collection hdr. rearranged from S24, S22, S23, & out, to S23, S22, S24 & out. Repaired leaking above bed CO/O2 probe's piping esp. @ ext. of comb. Replaced sorbent transport pipe from last cross thru C.V. wall into boiler w/ carburized pipe. Primary tee bends required approx. 36 gaskets to be replaced. Primary return chambers required approx. 32 end cap gaskets to be replaced. V102 primary orifice had new throat & new design diffuser installed. Sorbent injection vessel weights checked - within 1% accuracy. Sorbent pickup pots were weld repaired. LPC was liquid cleaned over weekend of 9/12. GT borescope inspection.

9/13/92 to 9/15/92

Run number: Maximum Gross Unit Load Achieved: N/A MWHR.
Coal fire: **TD-SU-92-13-01**
Run Objective: Not Achieved
Test effects of using National limestone #57 as sorbent.
Feed 100% prepared limestone sorbent into paste.
Conduct tests to develop excess air operating curve.
Test crushability of M M #6A seam coal (1000 tons).
Minimize length of time GT is at critical speed w/ guide vanes < 40%.

Major Observations: Secondary cyc. 23, 25, 26, & 27 plugged by ash fall as soon as GT rolled.
Operations Problems: Problems encountered again w/preheater, repairs & adjustments made to ignition system, flame scanner, oil pres., & swirl air. S24 plugged at second bed preheating fire. Coal fired manually tripped first time when #3 pump failed to start. Corrected by jumping failed relay. Combination of high pumping rate, residual coal in lines, & delayed transfer to auto resulted in comb. trip at 2nd coal fire. Bed preheating restarted, coal fire tried again. #3 paste pump did not start. At next coal fire attempt, all pumps except #5 go out on over hydraulics. Further attempts to unplug fuel nozzles and restablize fuel injection failed.

Shutdown reason: Manual shutdown to clean fuel nozzles.
Major Outage Workscope: Clean fuel nozzles
Inspected and cleaned out deposits in north sec ash cooler collection header.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

.Cleaned out secondary dip legs from ash fall & sandblasted cyclones.
All secondaries except #22 were plugged.
All sec ash lines were sandblasted and air tested.
Sand was put in south injection vessel & bed ash in the north vessel.

9/19/92 to 9/21/92

Run number:

Maximum Gross Unit Load Achieved: N/A MWHR.

TD-SU-92-14-01

Note: Run TD-SU-92-14-02 was attempted but aborted when HCV-B711 (Pump #1) was not seating properly.

Coal fire:

9/20/92 @ 01:21 till 9/21/92 @ 01:28; 0.12 hours coal fire.

Run Objective:

Same as run 92-13-01 above.

Major Observations:

None.

Operations Problems:

LPC was carbo-blasted 4 times shortly after GT rolled.

Right after coal fire, bed temps went higher than normal, fuel was cut but 2 T/c's reached 1670 & comb. tripped.

4 nozzles were cleaned following extensive efforts but #2 & #3 could not be cleaned

During attempts to clean fuel nozzles, the gas turbine tripped due to fictive disc temps.

Shutdown reason:

GT shut down for fuel nozzle cleaning.

Major Outage Workslope:

Cleaned all 6 fuel nozzles.

9/22/92 to 9/24/92

Run number:

Maximum Gross Unit Load Achieved: 59 MWHR.

TD-SU-92-14-03

Coal fire:

9/22/92 @ 19:44 till 9/24/92 @ 05:10; 33.43 hours coal fire.

Run Objective:

Same as run 92-13-01 above.

Major Observations:

At coal fire, lower than normal fuel master setting was used & temps still overshot.

Switched from Plum Run to National lime Columbus & Delaware limestone @ 22:00 on 9/23.

Paste samples showed -325 fines was as high as 30%.

Bed conditions began to deteriorate 4 hours after limestone was injected.

Hot and cool spots observed in bed, and sinters were formed with limestone.

Operations Problems:

Bed temperatures increased rapidly again at lit-off but fuel master was cut sufficiently to prevent trip.

Wet material plugged west sorbent injection vessel 1st time west side was used.

Splitting air flow was increased to reduce sinter production but to no avail.

Large quantities of sinters in the bed resulted in poor bed dynamics and low bed temp. combustor trip.

Shutdown reason:

.Combustor trip due to 3 bed temps < 1200F.

Major Outage Workslope:

Inspection to find cause of sinters, none found.

#3 & #5 paste pumps recalibrated, both found running fast which contributed to recent excess. fuel feed @ startup.

Sand loaded into one reinjection vessel.

Appendix II - Tidd Operations/Testing/Outage Overview Log

9/28/92 to 10/1/92

Maximum Gross Unit Load Achieved: 54 MWHR.

Run number:

TD-SU-92-15-01

Coal fire:

9/29/92 @ 22:22 till 10/1/92 @ 01:01; 26.65 hours coal fire.

Run Objective:

Test Limestone injection without sinters.

Same as run 92-13-01 above.

Major Observations:

Water spray nozzles were tested @ precip inlet to improve resist. & collection eff.

Unusual vibration & noise detected in LPC housing during air preheating period.

Egg sinters formed in the bed even with high splitting air flow, max bed ash removal & good coal paste fines.

Started up on 25 tons of sand.

Operations Problems:

Bed test O₂ probe piping was found to be corroded and leaking outside Comb. vessel.

#3 paste pump was pumping < than others, biased up to 1.5. Bed temps increased slower than previous startups @ coal fire.

GT vibration on #1 & #2 bearings increased until air flow reached 375K.

Splitting air was biased up at .05% at a time to 1.55 @ 45" bed level. Flow was than 3875#/hr.

Water was found in econ drain casing, most likely from the precip. water injection.

With high splitting air pressure, compressor safety valves were relieving. Valve settings later increased.

GT air flow decreased @ 11:43 on 9/30 due to #1 bearing vibration.

Splitting air flow bias was increased to 1.58 (3950#/hr) to reduce sinter production but to no avail.

Large quantities of sinters in the bed resulted in poor bed dynamics and low bed temp.

Shutdown reason:

Combustor manually tripped due to poor bed dynamics.

Major Outage Workscope:

Inspection to find cause of sinters, none found.

Tied HGCU back into the combustor.

Placed primary cyclone P11 into service.

Remove limestone from sorbent storage hoppers.

Found electrical hand angle grinder in vertical separator vortex eliminator.

Flow tests conducted on the splitting air system.

Rebuilt sec ash cooler packages with new piping and different design return chambers.

Replaced S23 ash line tee bends T1, T2, T4, T5, & T6 with long radius bends.

Replaced S24 ash line tee bend T4 with long radius bend.

Replaced S25 ash line tee bends T1, T2, T4, T5, T6, & T7 with long radius bends.

Switched S24 ash line from south collection header to north, & switched S27 from north to south.

Loaded 100,000# of sand into reinjection vessels.

Installed new paddles into coal paste mixer.

Sandblasted cyclones.

Appendix II - Tidd Operations/Testing/Outage Overview Log

G. T. borescope inspection.
Inspected LPC coupling and chrome plated coupling bore.
Inspected and cleaned LPT blade seal.
Replaced # 3/4 bearing vibration accelerometers.
O2 analyzers vented to 741 filter.

10/26/92 to 11/2/92

Maximum Gross Unit Load Achieved: 60 MWHR.

Run number:

TD-SU-92-16-01

Coal fire:

10/28/92 @ 18:10 till 11/1/92 @ 23:32; 101.37 hours coal fire.

Run Objective:

Evaluate G.T. vibration.

Startup & verify operation of the HGCU system.

Closely observe the unit operation to ensure the bed is not sintering.

Test crush Harrison 6A seam coal.

Major Observations:

No sinters produced while burning dolomite.

Coal crusher fines maintained at 20% fines.

Splitting air maintained at 1.25.

Major Accomplishments:

Commissioned HGCU system.

APF worked successfully without any indications of binding of the candles or broken filters.

Operations Problems:

Hot spots occurred on the backup cyclone, APF head, & instrument spool pieces.

Due to hot spots, load was decreased from 112" to 90" on 10/30 (35MW) & held there throughout rest of run.

Chronic pluggage of the APF ash removal system was a problem during the run.

Ash pluggage of HCV-J926 finally resulted in unit shutdown on 11/1.

The pressure sensing lines on the APF & ash removal systems constantly plugged with ash.

Coal crusher %fines was low because of screw feeder torque limitation.

Sec #23 ash line plugged for approx. 11 hrs., could not be manually unplugged, finally unplugged by itself.

Shutdown reason:

Manual combustor trip due to ash pluggage of HCV-J926.

Major Outage Workscope:

Revised insulation on APF dome & outlet spool piece to eliminate gas flow behind shroud.

Inspected, patched & recurred refractory in the backup cyclone.

Revised piping around APF lockhoppers to provide dry purge air to vent lines, 4" lockhopper valves, & pres. sensing lines.

Provided constant air purge connections to the APF pressure sensing lines.

Revise backup cyclone supports by adding springs to eliminate stress on APF outlet nozzle & exp. jts.

Revise plugs on instrument spool pieces to eliminate any gaps in insulation.

Revised flights on crusher screw to eliminate torque limitation problem.

Borecope inspected 1st & 2nd stage LPC guide vanes, found cracks in guide vane to stator ring brazing on 15 vanes.

Appendix II - Tidd Operations/Testing/Outage Overview Log

11/14/92 to 11/17/92 . Maximum Gross Unit Load Achieved: N/A MWHR.

Run number: **TD-SU-92-17-01**

Coal fire: 11/17/92 @ 9:33 till 11/17/92 @ 10:50; 1.28 hours coal fire.

Run Objective: Continue to observe the G.T. vibration equipment for reliability.
HGCU operation without significant hot spots.
Continue to observe bed dynamics
Test crushability of M&M - Harrison mine #6A seam coal.

Major Observations: 1st time bed ash was injected to start bed from sorbent injection system.
Bed level dropped about 5" within 15 minutes of coal fire.
Primary cyclones 13, 14, & 15 plug shortly after coal fire, 15 eventually unplugs as pressure increases.
V102 pressure and flowrate are in alarm majority of time start bed is being built.
Revised coal nozzle reversing scheme w/full N@ pressure purge cleaned nozzles much better.

Major Accomplishments: Run was aborted at coal fire.

Operations Problems: High bed ash elutriation rates while building start bed.
3 primary cyclones plug, P13, P14, & P15.

Shutdown reason: Manual combustor trip as S23 & S24 cyclones show signs of overloading and plugging.

Major Outage Worksopce: P13 & P14 dip legs plugged with ash and are vacuumed out.
P13 & P14 ash lines plugged with ash from suction nozzle to internal ash cooler.
Primary ash lines pressure tested.
Secondary ash lines sand blasted.
Internal inspection of backup cyclone revealed peeling of the skin coat.
Skin coat is cracked at the previous crack joints but caulking is still intact.
Bed ash reinjection vessels were filled with sand.
Borescope inspection of Gas Turbine HPT.

11/20/92 to 11/25/92 Maximum Gross Unit Load Achieved: 64 MWHR.

Run number: **TD-SU-92-18-01**

Coal fire: 11/21/92 @ 18:41 till 11/24/92 @ 22:50; 76.15 hours coal fire.

Run Objective: Same as run TD-SU-92-17-01.

Major Observations: As bed matured, load dropped from 63 MW to 49MW @ 115" bed level.
Sand was used from reinjection vsl. to build start bed.
Hot spots observed @ top of HGCU vsl. dome & on backup cyclone inlet.
Bed level increased to 138".

Major Accomplish/ Tests: No testing was accomplished due to combustor trip.

Operations Problems: APF- backpulse compressor 4th stage piston rings failed due to inadequate lubrication.
Compressor manuf. revised 4th stage lube system while compressor was returned to service with new set of piston rings.
While compressor was out, backpulsing was accomplished with H.P. nitrogen.
N2 did not sufficiently clean APF filter, so dP was allowed to increase to 200"with uniform cake coating candles.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

At 200", with 1200 psi N2 backpulse, an immediate ash fall plugged discharge pipe of APF bottom.
Wet coal plugged coal prep and sizer resulting in low paste tank levels, & pumps lost suction.
Shutdown reason: Manual combustor trip when paste pumps lost suction.
Major Outage Workslope: Fuel nozzles successfully clean-blown
Wet coal purged from fuel prep system.
Ash cleared from APF unit.
G. T. only off line short time, hot restart of unit.

11/25/92 to 12/7/92

Run number: Maximum Gross Unit Load Achieved: 56 MWHR.
Coal fire: **TD-SU-92-18-02**
11/25/92 @ 12:11 till 12/7/92 @ 9:56; 285.75 hours coal fire.
Run Objective: Same as run TD-SU-92-17-01.
Major Observations: No excessive ash blow off from startup bed using fresh bed ash.
Fire developed in P11 at startup while increasing bed level, normal @ higher bed lvl, air flow, & reduced paste H2O.
Bed level held @ 103" to stabilize APF operation.
APF surface temperatures reached 600F.
Bed density decreased, bed dynamics unstable due to sinters.
Sinters finally purged by 12/1, by raising splitting air flow, raising paste H2O, & lowering bed temps.
Bed level dropped from 87" to 45" in 90 minutes, .3%/min., on 12/1 in attempt to clean APF.
Bed level returned to 115"-120", bed temp @ 1545F, and paste H2O back to normal w/no signs of sinters on 12/1.
Ash observed in APF backup cyclone on 12/2.
APF & backup cyclones surface temps. continue to run hotter than expected.
60 tons of #6A Harrison mine coal was crushed with no problems.
Major Accomplish/ Tests: Completed quarterly precip outlet and G.T. outlet dust loading tests on 12/2.
Operations Problems: APF backpulse compressor tripped on 11/27 on high vibration.
APF not backpulsed for 16 hours until N2 system was brought in, dP increased to 249".
APF dP dropped to 183" when backpulsing began, but baseline cleanliness could not be achieved with N2.
Ash not free flowing out of APF bottom.
Hot spot developed on APF #7 expansion joint and pressure eventually increased to combustor vessel pressure.
Sec cyclones S23 & S24 were plugging and unplugging every few hours & days, even at high P. V. pressures.
Sec ash line S26 shut down for 5.5 hours on 11/30.
Sec ash line S24 finally plugged totally and suction nozzle T/C failed.
Shutdown reason: Combustor manual tripped on 12/7 when APF #7 expansion joint pressure is verified to be combustor vessel pressure.
Major Outage Workslope: Switched over to 6 cyclone operation.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Switched inlet pipes on sec ash coolers, switched 22 & 23, and 24 & 26 so that 23 & 24 aren't on header inlets.
Found S24 ash line broken in half at suction nozzle flange.
Found S24 purge air line broken off and S24 filled with bright red ash, also spilled into combustor.
Found P14 ash line plugged during outage, no indication of trouble during run.
Sandblasted cyclones.
Replaced coal prep recycle chute and screw feeder with larger screw and redesigned chute.
Completed major patching of sorbent prep cyclone.
Baffle installed in SFC-3 discharge chute to provide uniform size dist. in sorbent vsl.
Loaded sand into reinjection vessels.

12/12/92 to 12/17/92 Maximum Gross Unit Load Achieved: 61 MWHR.

Run number: **TD-SU-92-19-01**
Coal fire: 12/14/92 @ 3:02 till 12/17/92 @ 9:51; 78.82 hours coal fire.
Run Objective: Continue to observe the G. T. vib. equipment for reliability.
 Continue to observe the bed dynamics.
 Test the effects of MM #6A coal on unit operation and coal crusher.
 Run tests @ 142", 112", & 70" to obtain data to develop operating air curve.

Major Observations: Carbo blasted LPC on startup.
 Built startup bed on sand.
 Sec. ash lines #S22 & S26 plugged on startup due to collection header deposit.
 Bed stabilized on 12/16 @ 114" bed lvl., 1540F, & 620 kpph air flow while collecting test data.
 During test, freeboard combustion started when wet #6A truck coal hit coal prep & bed.
 Wet #6A truck coal created havoc in fuel prep system.
 Switched to #8 coal but poor quality in tanks resulted in pump & nozzle pluggage.
 Load decreased to conserve paste due to wet coal problems.
 At reduced load, #23 & #24 ash lines plugged.

Major Accomplish/ Tests: Began sorbent distribution test on 12/16, interrupted by wet coal.
Operations Problems: Wet coal caused unstable coal crusher problems.
 Due to poor paste, #1 paste nozzle plugged, was reversed, cleaned & returned to service.
 Later #2 paste nozzle plugged & was removed from service for cleaning.
 With #2 pump out, #5 paste nozzle plugged.

Shutdown reason: Manual combustor trip due to 2 paste pumps out of service.
Major Outage Worksopce: Replaced bellows box gasket on #15 cyclone.
 Replaced 2 leaking gaskets on #13 ash line.
 Unplugged secondary ash lines.
 Cleaned deposits out of north & south collection headers.
 Replaced all 6 fuel nozzle tips.
 Unplugged #12, 13, 16, & 17 O2 analyzer sample lines.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Weld repaired 5 cracks in the sparge ducts.
Machined coal crusher rolls.

12/27/92 to 12/28/92

Maximum Gross Unit Load Achieved: N/A MWHR.

Run number:

TD-SU-92-20-01

Coal fire:

12/28/92 @ 16:20 till 12/28/92 @ 17:30; 1:17 hours coal fire.

Run Objective:

Continue to observe the G. T. vib. equipment for reliability.
Continue to observe the bed dynamics & prevent sintering.
Test the effects of MM #6A coal on unit operation and coal crusher.
Run sorbent utilization tests.

Major Observations:

Test Delaware limestone effects on bed dynamics.

G.T. LPC was dry cleaned on startup

P13 ash line/bellows box appeared to have air leak at startup.

Major Accomplish/ Tests:

Run aborted due to oversize coal particle pluggage.

Operations Problems:

Coal prep sizer screen tore during startup & contaminated paste with large particles.

Shutdown reason:

Manual combustor trip due to large coal particles in paste injection system.

Major Outage Workslope:

Coal sizer screen replaced, appeared to be defective.

Entire coal injection system cleaned out.

12/29/92 to 12/31/92

Maximum Gross Unit Load Achieved: 61 MWHR.

Run number:

TD-SU-92-20-02

Coal fire:

12/29/92 @ 10:29 till 12/31/92 @ 7:59; 45.50 hours coal fire.

Run Objective:

Continue to observe the G. T. vib. equipment for reliability.
Continue to observe the bed dynamics & prevent sintering.
Test the effects of MM #6A coal on unit operation and coal crusher.
Run sorbent utilization tests.

Major Observations:

Test Delaware limestone effects on bed dynamics.

Ash removal system experienced high ash loadings with sand startup bed:

Primary transport flow dipped to .62 PPS @ 3 PSI.

S23 ash line plugged and unplugged throughout run.

P16 ash line temperatures reduced due to air leak.

Major Accomplish/ Tests:

Bed level maintained @ 112" for steady state operation.

Fuel prep operation was satisfactory while feeding #6A coal.

Operations Problems:

Sorbent feeder outlet to crusher plugged with dry hard material.

Control problems developed on #2 paste pump, pump removed for servo replacement.

Shutdown reason:

Manual combustor trip due to air leak in #P16 bellows box.

Major Outage Workslope:

Seal welded all primary bellows boxes flanges.

Replaced end cap gaskets on all primary return chamber end caps

Replaced all primary ash line gaskets between suction nozzle & coolers.

Sandblasted secondary collection header.

Revised stirring air piping arrangement on secondary dip legs.

Reattached dead dip leg pipe on S24 dip leg to reduce vibration.

Repaired casing leaks on freeboard to primary cyclone ducts.

Padwelded sparge ducts.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Added 12 T/C in the bed zone for better bed temp. monitoring.
Added dP measuring between primary dip leg and bed zone.
Installed G.T. air intake weather hoods.
Installed hard surfaced rotors, hammers and liners in sorbent prep crusher.
Repaired inlet discharge chute on sorbent crusher.
Extended vertical separator in sorbent prep cyclone.
Installed refractory in sorbent prep cyclone.

1/18/93 to 1/31/93

Maximum Gross Unit Load Achieved: 61 MWHR.
Gross Capacity Factor @ 60 MWG = 76.49%

Run number:

TD-SU-93-01-01

Coal fire:

1/20/93 @ 06:05 till 1/31/93 @ 15:40; 273.58 hours coal fire.

Run Objective:

Conduct Sorbent utilization tests @ 90% retention on #6A & #8 coals.

Tests: 1) 115" bed lvl., 1540F bed temp, 620 kpph air flow for 12 hrs.

2) Gtr. than 115" bed lvl., 1540F, 710 kpph air flow, & no freeboard fires.

3) 70" bed lvl, 480 kpph air flow, 4" slump, & 3200 pph splitting air flow.

Delaware limestone test @ 115", 1540F, 620 kpph air flow, 4" slump & 3200 pph slitting air.

Major Observations:

Coal crusher would not operate properly on 6A coal.

Major Accomplish/ Tests:

Completed 4 sorbent utilization tests:

1 test at 80" on 6A coal.

2 tests at 115" on 6A coal

1 test at 117" on 8 coal

Operations Problems:

Problems experienced with initial bed preheating, needle valves sticking.

S23 ash line and dip leg plugged shortly after coal fire.

Top sorbent prep feedrate achievable was 13TPH.

Sorbent prep system vibrating screen motor failed.

Coal crusher skewing on 6A coal limited bed level to 80".

LPC pressure transmitter failed due to mounting vibration.

HPT drain plug developed leak causing high #1 G.T. disc cooling.

CFC deluge system operated due to protecto wire failure.

After combustor tripped, switching error caused loss of aux. power.

When aux power was lost, HCV-P100 closed & rupture disc blew.

Shutdown reason:

Combustor trip when Net-90 detected communications fault with safety node.

Major Outage Worksopce:

G.T. V-6 orifice opening increased to improve disc cooling.

Purge air line on S23 was found broken downstream of orifice.

Sec cyclone purge air orifices moved to bottom of dip leg.

Very hard deposit found in S23 dip leg probably due to excessive purge air.

No mechanical problems found on plugged S24 ash line.

Significant hard deposits found again in sec ash collection headers.

Both boiler wall rupture discs replaced.

Passive rupture disc cutter found moved but disc not split open.

#5 bed preheater needle valve found sticking.

Sorbent prep cyclone was patched; cracks repaired in fan.

#3, 6, & 7 oxygen analyzer sample lines found plugged after shutdown.

Loaded 51,000 pounds of sand into reinj. vsl. atop 6,000 # bed material.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Sealed HPT drain plug leak.

Installed additional speed reducer on west sorbent rotary feeder for better turndown.

2/5/93 to 2/6/93

Maximum Gross Unit Load Achieved: N/A MWHR.

Run number:

TD-SU-93-02-01

Coal fire:

N/A

Run Objective:

See TD-SU-93-03-01

Major Observations:

None.

Major Accomplish/ Tests:

None.

Operations Problems:

Bed preheater needle valve #5 was found partially stuck open.

Preheater tripped on extreme high temp.

Shutdown reason:

G.T. manual tripped to facilitate preheater repairs.

Major Outage Workscope:

Removed, inspected and cleaned all 5 preheater nozzle assemblies.

2/8/93 to 2/9/93

Maximum Gross Unit Load Achieved: 60 MWHR.

Gross Capacity Factor @ 60 MWG = 63.68%

Run number:

TD-SU-93-03-01

Coal fire:

2/8/93 @ 16:40 till 2/9/93 @ 14:29; 21.82 hours coal fire.

Run Objective:

Conduct Sorbent utilization tests @ 90% retention on #6A & #8 coals.

Tests: 1) Highest bed lvl., 1540F bed temp, 710 kpph air flow, w/o freeboard fires or sinters.

2) 80" bed lvl., 1540F, 500 kpph air flow, 4" slump, & 3200 splitting air flow.

3) 115" bed lvl., 1540F bed temp, 620 kpph air flow, 4" slump, & 3200 pph splitting air flow & slowly inject Delaware limestone..

Major Observations:

None.

Major Accomplish/ Tests:

None.

Operations Problems:

Ash lines S22, S25, S26 & S27 appear plugged from startup.

Ash lines 25, 22 & 26 unplug as air flow is increased.

Gas turbine throws two L.P. blades.

Shutdown reason:

Gas turbine trip due to thrown blades.

2nd Gas Turbine Overhaul Outage

Major Outage Workscope:

Cut & inspected SSH platens #21 & 22 and evaporator platens #29 & 30.

No unusual damage found, however localized erosion noted on 1st bend of one of the SSH tubes.

Removed evaporator tube sample for internal deposits.

Minimal deposits found.

Sorbent injection valves 840/850 rebuilt for proper I.D. match.

Two 310SS test sections installed in SSH.

Completed internal inspection of primary and sec. cyclones.

Repaired freeboard liner at cyclone inlet ducts.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Installed air test flange on primary ash line just downstream of combustor penetration.
U.T. inspection on sorbent transport piping.
Installed ceramic sorbent pickup pots.
Found V102 orifice outlet cone cracked at flange, replaced with lower grade defective nozzle.
Repaired bed zone liners.
Installed sparge duct end fluidization system.
Replaced #15 O2 probe sensing line.
Modified bed preheater ring header and installed "T" header.
Installed new splitting air motor sheave and belt.
Completed NDE of coaxial pipe and preheater internal welds, all negative.
Replaced sparge ducts.
Installed six independent sec ash lines.
Tied HGCU back into cycle.
Conducted fuel nozzle testing.
Replaced corroded O2 analyzer tubing and valves.
Rebuilt sorbent rotary feeders.
Installed 36 new asbestos gaskets in the primary ash removal lines.
Inspected stack and bypass damper; repaired corrosion on main damper.
Installed new ceramic liner in sorbent prep cyclone.
Transferred 17,300 tons of 6A coal to Cardinal.
Inspected #P14 primary cyclone wall thickness above ref., no sign. erosion.
Cleaned the economizer.
Sandblaster the cyclones.
Loaded sand into the reinjection vessels.
Completed installation of sorbent injection alternate pressurization line.
Air tested primary and sec. ash removal lines.
Replaced all LPT blades and 10 LPT inlet guide vanes.
Machined damaged LPT shaft and modified LPT rotor outlet gas seal.
Weld repaired LPT guide vane ring.
Replaced all HPT blades and guide vanes.
Replaced HPT interstage seal discs.
Weld repaired LPT outlet duct.
Replaced all HPC rotating blades and 11 rows of guide vanes.
Replaced 10 HPC rotor outer spacer rings.
Replaced one LPC guide vane.
Repaired broken #3/4 bearing casing to intermediate casing welds.
Replaced all babbitted bearing parts in the #2, 3, 4, & 5 bearings.
Repaired oil seals at the #3/4 & 5 bearings.
Repaired all air and gas seals in the HPC, HPT and LPT.
Replaced LPC to LPT coupling (from fall 1992 damage).
Modified HPT shaft inlet gas seal.
Modified air bypass valves for positive seating.
Modified HPT shell seal air supply for external seal air.
Modified LPT outlet flow guide for an inspection door.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Modified LPT guide vane bolting.
Modified V6 seal/cooling air orifices.

6/26/93 to 7/3/93

Maximum Gross Unit Load Achieved: 53 MWHR.
Gross Capacity Factor @ 60 MWG = 37.66%

Run number:

TD-SU-93-04-01

Coal fire:

6/30/93 @ 17:27 till 7/3/93 @ 05:05; 59.63 hours coal fire.

Run Objective:

Conduct G.T. LPT blade strain gauge tests for ABBC.

Major Observations:

Combustor was released on 6/25/93 & the G.T. was rolled on 6/28/93 for balance shot data.

GT intercooler limited unit high load operation.

Maximum APF temperature is 1350F

Major Accomplish/ Tests:

At 50" bed level on 7/1, stm turb. was removed from service for scheduled overspeed tests.

Bed level and air flow were manipulated as required for LPT blade strain gauge tests.

Bed level increased on 7/2 again until intercooler cooling capacity was max. at following conditions:

Bed lvl: 116"; bed temp: 1540F; ambient air temp: 80F.

Air flow: 640 kpph @ 5397 rpm on LPT

Operations Problems:

Startup was delayed due to emissions testing at Cardinal.

APF preheater casing blewout at initial startup resulting in APF warmup via hot air injection.

Balance shot required in G.T. due to vibration in #3/4 bearing.

Due to reverse oil flow in preheater, initial preheating attempts failed due to high flame temperatures.

Preheater eventually started after significant reduction in oil pressure.

After steam turbine oil overspeeds, combustor tripped due to low boiler circ. flow.

While increasing air flow after initial coal fire, higher than normal vib. experienced on #5 GT brg.

Sorbent prep vib. screen motor developed ground and was replaced.

A hot spot developed on the dome of the APF and fans were installed to keep the temp. below 650F.

GT intercooler ran out of capacity on 7/1 and limited load to 108".

APF vibrator did not work.

HGCU emerg. ash removal system successfully commissioned when ash removal system tripped due to plugged bag filter atop silo.

Shutdown reason:

Combustor manually tripped to change GT telemetering batteries & change strain gauge wires.

Major Outage Workscope:

Change GT telemetering batteries.

Switch LPT blade stain gauge wires.

Swapped bed preheater individual burner inlet and outline oil lines.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

7/4/93 to 7/5/93

Maximum Gross Unit Load Achieved: 36 MWHR.

Gross Capacity Factor @ 60 MWG = 28.05%

Run number:

TD-SU-93-05-01

Coal fire:

7/5/93 @ 00:35 till 7/5/93 @ 17:17; 16.70 hours coal fire.

Run Objective:

Conduct additional G.T. LPT blade strain gauge tests for ABBC.

Major Observations:

Major Accomplish/ Tests:

Conducted several series of GT tests at various loads and air flows.

Shutdown reason:

Manual combustor trip after GT tests were completed.

Major Outage Workslope:

Replace two LPT blades that had strain gauges located on the air foil.

Disassembled #5 GT bearing attempting to locate cause of high vibration.

Misalignment found between HPC, star gear and generator.

Borescope inspection of APF hopper found no ash buildup.

Installed new design APF vibrator.

Removed 30" APF outlet pipe for repair of hot spot.

Inspection of sparge ducts found no problems.

Reversed oil flow path through preheater to correct burner temp. problems.

Load sand into the reinjection vessels and ash hoppers.

Inspected V102 discharge cone, no problems found with inferior cone.

Dye checked all LP blades on GT, no problems found.

Installed above bed test probes.

Add 70' of fins to S23 ash line to enhance cooling.

Sec. cyclone dip leg inspection found all dip legs clear.

Relocated 3 bed zone 0 T/C's higher into bed.

One reinjection vessel L valve found plugged.

Replaced cracked economizer orifice on S22 ash line.

Enlarged "L" valve nitrogen bleed orifice from 2.5 mm to 3.5 mm.

Replaced failed PV to freeboard rupture disk.

7/17/93 to 8/5/93

Maximum Gross Unit Load Achieved: 45 MWHR.

Gross Capacity Factor @ 60 MWG = 45.93%

Run number:

TD-SU-93-06-01

Coal fire:

7/18/93 @ 18:20 till 8/5/93 @ 12:22; 426.03 hours coal fire.

Run Objective:

Monitor GT #5 bearing for vibration.

Sorbent utilization tests as follows:

Test 1: 115" bed, 90% retention w/Plum Run dolomite, 2.5% O₂, 1540F bed, normal paste.

Test 2: Same as #1 except 95% retention.

Test 3: Same as #1 except 80% retention.

Test 4: Same as #1 except max bed hgt. with 2.5% O₂ minimum.

Test 5: Same as #1 except 80" bed lvl, & 515 kpph air flow.

Test 6: Same as #1 except paste is watered down to 6A quality in Jan, 93 tests.

Test 7: 115" bed, 90% retention w/fine Plum Run dolomite in paste, course in pneumatic, 2.5% O₂, 1540F bed, normal paste.

Test 8: 115" bed, 90% retention w/pneumatic feed of 6 mesh Delaware limestone, 2.5% O₂, 1540F bed, normal paste.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Major Observations: Backpulse compressor removed from service 7/29 for cylinder inspection - no problems found.
Observed 120F ash slugs on #23 ash line @ suction nozzle & penetration.
Maximum APF temperature 1250F
APF head temperature < 400F.
Work began on commissioning HGCU SO₂/SO₃ measuring system.
Shipments of MM#8 coal on 7/21 & 7/16 averaged 6.23# SO₂/MBTU
Ash built up on walls of APF hopper but fall off when combustor was tripped.

Major Accomplish/Tests: Due to GT vibration problems, all testing was restrained to below 100" bed level.
Completed 2 tests at 95" bed level, 90% sulfur retention w/ 4.5# SO₂ coal, P.R. Greenfield 57 stone (Test #17 & 18).
Completed 2 tests at 80" bed level, 90% sulfur retention w/ 4.5# SO₂ coal, P.R. Greenfield 57 stone (Test #19 & 20).
Completed 2 tests at 80" bed level, 95% sulfur retention w/ 4.5# SO₂ coal, P.R. Greenfield 57 stone (Test # 21 & 22).
Completed 1 test at 80" bed level, 95% sulfur retention w/ 6.0# SO₂ coal, P.R. Greenfield 57 stone (Test #23).
Completed 2 tests at 80" bed level, 85% sulfur retention w/ 4.5# SO₂ coal, P.R. Greenfield 57 stone (Test #24 & 25).
All six secondary ash lines plugged at startup - blown back & unplugged.

Operations Problems: GT #5 bearing vibration exceeds 400 m/s and curtails load to below 100" bed level.
Lost #4 paste pump on 8/3 for 5 hours due to possible nozzle plug.
Ash bridging occurred in APF lower hopper and approached bottom of candles.
Bed reinjection "L" valves consuming too much nitrogen during bed ash tests.
HGCU emergency ash removal line is in service constantly due to isolation valve stuck open.
Black Beauty injected into HGCU ash removal line every few hours to prevent ash buildup & pluggage.
Leaks occurred in HGCU screw cooler and surge hopper flanges.
Sorbent prep max. capacity is again identified as 13 tons/hr.
#5 paste pump went full speed with feedback going low, resulted in excessive fuel input.

Shutdown reason: Manual combustor trip to clean ash out of bottom of APF hopper.

Major Outage Workslope: Cleaned ash out of bottom of APF hopper.
Installed 68.1 gr. balance shot on G.T. shaft at HPC outlet to reduce #5 bearing vibration.
Installed new vibrator in access door on APF.
Installed additional T/C on S24 ash line penetration external of vessel.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

8/8/93 to 8/9/93 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 4.17%

Run number: **TD-SU-93-07-01**
Coal fire: 8/9/93 @ 10:18 till 8/9/93 @ 11:37; 1.32 hours coal fire.
Run Objective: Observe G.T. vibration with new balance shot
If G.T. vibration is acceptable, continue test program.
Major Observations: G.T. #5 bearing vibration had increased above previous levels.
Blew back #23 ash line in service, did not improve transport capacity.
Major Accomplish/ Tests: None.
Operations Problems: None.
Shutdown reason: Gas Turbine trip when #5 bearing was in alarm and #1 brg vib. detector failed and went high.
Major Outage Workscope: Rotate balance weight in GT HPC outlet by 70 degrees.
Replaced bad transducer on GT #1 bearing vibration.

8/10/93 to 8/14/93 Maximum Gross Unit Load Achieved: 58 MWHR.
Gross Capacity Factor @ 60 MWG = 74.31%

Run number: **TD-SU-93-08-01**
Coal fire: 8/10/93 @ 22:29 till 8/14/93 @ 5:27; 78.97 hours coal fire.
Run Objective: Monitor GT bearing #5 vibration
If vibration was acceptable, continue sorbent utilization testing.
Major Observations: GT #5 bearing vibration had reduced to 175 mils/sec @ 117" bed level.
Highest achievable bed level was 125" only at night. Max stable bed level was barely 115".
At 120" bed lvl., 70F ambient, unit load was 56MW @ 680 kpph air flow w/ max LPC speed.
At 12 MW GT load, #5 bearing vibration was 215 m/s.
With APF gas temperatures above 1400F, APF differentials were increasing.
Major Accomplish/ Tests: Ran high SO2 retention at startup in order to improve monthly SO2 retention average.
Conducted two tests, 115" bed lvl., 90% retention, Pitts #8, Greenfield, (Tests #26 & 27).
Operations Problems: #5 paste pump went high and flowrate feedback failed, therefore other 5 pumps picked up.
With all 6 pumps increasing in fuel flow, O2 went low and combustor tripped in 20 seconds.
On hot restart could not get bed preheater to lite, and lost 10" bed lvl. while attempting to fix preheater.
Shutdown reason: Automatic combustor trip due to low O2 levels.
Attempted hot restart but could not get preheater to lite and removed GT in order to clean preheater spark plugs.
Major Outage Workscope: Removed unit from service to clean preheater spark plugs.
Cleaned out the #5 fuel nozzle which had become plugged.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

8/14/93 to 8/15/93 Maximum Gross Unit Load Achieved: N/A MWHR.
Gross Capacity Factor @ 60 MWG = n/a

Run number: **TD-SU-93-09-01**
Coal fire: No coal fire, startup was aborted on preheating.
Run Objective:
Major Observations: Primary cyclones P13, P14 & P15 appeared plugged after preheating begun.
Primary cyclones P13 & P14 cleared as airflow was increased, P15 remained plugged.
Major Accomplish/ Tests: None.
Operations Problems: Aborted startup due to plugged P15 cyclone.
Shutdown reason: Tripped GT @ 3:49 on 8/15/93 in order to shut down for outage.
Major Outage Workscope: Inspect 271V102 orifice for erosion.
Visually inspect last stage blades & airfoil on LPT.
Borescope inspect LPT blade roots.
Borescope inspect HPT blades.
Sandblast as required pri/sec cyclones.
Install new Jarecki in HGCU emergency ash line.
Inspect sparge ducts & preheater.
Inspect boiler rupture disk for hole.
Inspect sec. ash line orifices, found S26 cracked.
Conduct primary ash removal system air test, test results were 5 psi/1 hr. & 2.5 psi/30 mins.

8/18/93 to 8/24/93 Maximum Gross Unit Load Achieved: 54 MWHR.
Gross Capacity Factor @ 60 MWG = 77.07%

Run number: **TD-SU-93-10-01**
G.T. Ops.: 8/19/93 @ 2:58 till 8/24/93 @ 17:37; 134.65 hours G.T. operation.
Coal fire: 8/19/93 @ 17:48 till 8/24/93 @ 13:28; 115.67 hours coal fire.
Run Objective: Mature bed at 115" bed lvl, Pitts #8, 95% SO₂ ret. w/ Plum Run coal
Conduct stack testing.
Conduct above bed SO₂/SO₃ testing for plumes.
Test 1: 115" bed lvl, Pitts #8, 90%S ret., Plum Run, wet paste
Test 2: 115" bed lvl, Pitts #8, 90%S ret., LIMESTONE
Test 3: 115" bed lvl, Pitts #8, 90%S ret., Plum Run, sorb. fines in paste.
Test 4: 115" bed lvl, Pitts #8, 85%S ret., Plum Run.
Major Observations: Limestone when burned with MM #8 coal will result in bed sinters.
Commissioned above bed SO₂/SO₃ meter but meter failed after reading extreme high readings over center of plume.
Major Accomplish/ Tests: 8/21 completed 2 tests, 115", 95% retention, Greenfield, Pitts. #8, (Tests #28 & 29).
Required very high sorbent flowrate of 28 to 30kpph which overwhelmed precip.
Sorbent in paste system commissioned on 8/22.
8/23 wet paste test was conducted, slump was 6", 115", 90% retention, Greenfield, Pitts. #8, (Test #30).

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Operations Problems: 2200 on 8/23, Delaware Limestone injected into bed, combustor manually tripped 1328 on 8/24.
During 95% tests on 8/21, high sorbent feedrates overwhelmed precip & required power off rapping.
During sorbent in paste commissioning, old sorbent cakes hindered operation. Flowability was acceptable with new sorbent.
Primary cyclone ash sampler would not operate.
Could not get SO₂/SO₃ meter to operate reliably.
During wet paste tests freeboard temperatures increased by 50°F due to higher moisture content.
Egg sinters were found in bed ash after limestone was injected.
Bed temperatures became unstable and dropped to 1500°F.
Test was aborted, limestone dry feed was stopped and dolomite in the paste was begun in attempt to save unit.
By 1328, bed was unstable, and 7 evaporator tubes were in alarm, so combustor was tripped.
South reinjection vessel plugged after coal fire and remained so throughout run.
On shutdown, north reinjection vessel discharge plugged.
Manual combustor trip due to evaporator tubes in alarm.

Shutdown reason: Clean sinters out of bed.
Major Outage Workscope: Fill reinjection vessels with sand.
Fix SO₂/SO₃ above bed meter.
Unplugged both reinjection vessels.

8/29/93 to 9/23/93

Run number: TD-SU-93-11-01
G.T. Ops.: 8/29/93 @ 9:22 till 9/24/93 @ 00:58; 615.60 hours G.T. operation.
Coal fire: 8/29/93 @ 23:35 till 9/23/93 @ 20:12; 596.62 hours coal fire.
Run Objective: Test #1: 115", Pitts. #8, Greenfield dolomite, 90%S retention, Sorbent fines in paste.
Test #2: 80", Pitts. #8, Greenfield dolomite, 90%S retention, Sorbent fines in paste.
Test #3: 115", Pitts. #8, Greenfield dolomite, 85%S retention, Dry pneumatic sorbent feed.
Test #4: 115", Pitts. #8, Peebles dolomite, 90%S retention, Dry pneumatic sorbent feed.
Test #5: 115", Pitts. #8, Peebles dolomite, 95%S retention, Dry pneumatic sorbent feed.
Test #6: 115", Pitts. #8, N.L. Carey dolomite, 90%S retention, Dry pneumatic sorbent feed.
Test #7: 115", Pitts. #8, N.L. Carey dolomite, 95%S retention, Dry pneumatic sorbent feed.
Test #8: 115", Pitts. #8, Greenfield dolomite, 90%S retention, Enhanced sorbent prep.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Major Observations:

Test #9: 115", Pitts. #8, Greenfield dolomite, 95%S retention, Enhanced sorbent prep.
On Sept 13th, ash leakage was detected at the backup APF cyclone indicating candle breakage in the APF.
Also starting at this time was problems with clearing high ash out of the APF hoppers.
The APF high ash alarm was in and out for the remainder of the run.
On 9/20, unit load was decreased to 45" to clean up APF without success. dP only lower to 140" this time.
After candle cleaning, APF ash level alarm was in for 24 hours.
Backup cyclone ash line also plugged with ash at this time but was blown out with nitrogen.
Broken sections of APF candles were found in ash lines from this point onward.
On 9/21, 152 tons of Peabody Anker coal was crushed with some heating of the crusher rolls.
On 9/23, above bed SO₂ system commissioned, 2600ppm above #1 nozzle, 15 times avg. SO₂ in flue gas.

Major Accomplish/ Tests:

Shortly after startup, sorbent prep size distribution was tested for effect from using smaller motor sheave on sorbent crusher.
After bed was matured at 100", bed level was raised to 115".
Test #1 conducted with sorbent fines in paste(14kpph sorb to 60 kpph coal), 115", 90% retention (Tests #31 & 32).
Test #2 was conducted with fines in paste, 80", and 90% retention.
Unplanned test was conducted at 115", 85% retention, with Greenfield dolomite (Test #33).
Unplanned test was conducted at 80", 90% retention, with Peebles dolomite (Test #34).
Unplanned test was conducted at 80", 95% retention, with Peebles dolomite - not stable test (Test #35).
Unplanned test was conducted at 80", 95% retention, with National Carey dolomite (Test #37).
Unplanned test was conducted at 80", 90% retention, with National Carey dolomite (Test #36).
On 9/17 conducted the first P11 cyclone spoiling test by injecting air in dip leg right above suction nozzle.
Max flowrate was 5700 pph and suction nozzle and dip leg temps dropped. No fires. Cyclone came back at end of test.
After Carey dolomite test was completed, sorbent crusher sheave was changed again to increase crusher speed.
On 9/21, unit load increased to 116" and P11 spoiling air system was placed in service.
The #2 HPT disc cooling air temp increased to 860°F requiring adjustable V6 to be opened more.
On 9/22 load was raised to 126" for test with Greenfield dolomite @ 90% retention (Test #38).

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Operations Problems: Paste pump did not start at initial coal fire or at second coal fire but was placed in service latter.
After 115" sorbent fines in paste test, lowered bed to 80" and precip opacity could not be maintained under 20%.
Continuous problems maintaining ash flowing out of APF.
On 9/8 sparge duct tiles found blocking both bed ash "L" valves thus limiting flowrates of bed ash removal.
On 9/7, #1 paste pump strainer plugged & tripped out pump.
On 9/7, sorbent prep screen failed and was replaced.
APF manway vibrator failed with leak in internal hoses.
Sorbent vel. meter drifted low causing flow and velocities to increase as valve went to 100% open.
East sorbent transport vel. probe did not match orifice flowrate thus restricting C.V. opening to 83% for rest of run.
On 9/9, unit load was reduced to 45" in order to clean blow the APF. dP was reduced from 250" to 100".
On 9/13, the sorbent transport pipe below the goal post isolation valve worn out resulting in the need to isolate the sorbent system.
The 840/850 and goal post isolation valve all leaking complicating the repair work.
While pneumatic sorbent was out for repairs, fines in paste was placed in service and bed began to sinter and become unstable.
On 9/16 Battelle attempted to collect ash samples from the APF inlet but the probe got stuck in the valve and could not be removed.
On 9/17 the bed ash conveyor had to be removed from service due to roller problems. Vacuum truck was used for ash removal.
Sorbent vib screen failed and was replaced on 9/19.
Outboard bearing on coal crusher reject screw feeder failed twice and required replacement.
On 9/23, APF ash hopper plugged and could not be unplugged.
On 9/23, a leak developed downstream of sorbent valve 850 and combustor was tripped.

Shutdown reason: Manual combustor trip due to leak in sorbent transport system.

Major Outage Workscope: Inspected intercooler for loose fins, many have slid on tubes.
Remaining snow hoods installed on GT air intake.
Switched to 6 cyclone string operation and disconnected the HGCU train.
Replaced gaskets in the primary ash system until system passed air leakage test.
Inspected boiler rupture discs, no problems.
Inspected sparge ducts, reinstalled 2 loose duct tiles that had fallen out.
Inspected reinjection vessels and filled with sand.
Repaired stack breaching damper expansion joints.
Tested sorbent flow meters to try and determine cause for flow imbalances from East to West trains.
Replaced section of worn out sorbent transport pipe just below goal post isolation valve.

Appendix II - Tidd Operations/Testing/Outage Overview Log

Sent out sorbent 840/850 valves to be reworked into class V leakage valves.
Replaced eroded sections of sorbent transport pipe just downstream of 840/850 valves.
Install sorbent T's inbed at end of sorbent pipe to direct sorbent under E/W centerline of paste skateboard.
Sorbent T's are 304SS standard tee's, 3" sch 160 by 2 1/2 sch 160 pipe.
Repaired numerous valves in 272 and 274 systems.
Installed new discharge cone in V102 with new cone from US Carbide. Previous cone was defective material from ABBC.
Rebuilt sorbent crusher and other parts of sorbent prep system.
Made numerous repairs to coal prep system including changing out 10 of 12 coal mixer blades.
Repaired LCV-U200A vert. sep. drain valve.
Dye check condenser and repaired two leaks.
Visually inspected GT LPT blades and inlet guide vanes.
Borescope inspected LPT blade roots.
Cleaned HPT 1st stage disc seal/cooling air T/C and air passage.

10/9/93 to 10/10/93

Run number:
G.T. Ops.:
Coal fire:
Run Objective:

Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

TD-SU-93-12-01

10/10/93 @ 6:15 till 10/10/93 @ 6:59; 0.73 hours G.T. operation.

Coal fire was not achieved.

Evaluate unit operation with inbed S.S. T's directing sorbent into center of skateboard.

Stablize unit @ 115", and 1480°F bed temp.

Test #1 - 115", Pitts #8, 1540°F, Greenfield sorbent, 90% retention.

Test #2 - 115", Pitts #8, 1580°F, Greenfield sorbent, 90% retention.

Test #3 - 115", Pitts #8, 1540°F, Greenfield sorbent, 95% retention.

Major Observations:

Right after sorbent booster compressor was placed in service, flanges leaks were found in the sorbent transport line around the 840/850 valves.

Major Accomplish/ Tests:

None

Operations Problems:

Vertical separator level control valve (LCV-U200A) was not responding properly and was placed in manual position.
Leaks were found in the sorbent transport piping flanges around the 840/850 valves.

Shutdown reason:

Tripped the GT in order to replace leaking gaskets in sorbent transport pipe.

Major Outage Workscope:

Replaced gaskets in sorbent transport pipe.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

10/10/93 to 10/11/93 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = 7.09%

Run number: **TD-SU-93-12-02**
G.T. Ops.: 10/10/93 @ 16:19 till 10/11/93 @ 10:33; 18.23 hrs of GT operation.
Coal fire: 10/11/93 @ 3:43 till 10/11/93 @ 6:17; 2.57 hours coal fire.
Run Objective: Same as run 12-01 above.
Major Observations: On oil fire all secondary cyclones except # 27 appeared to be plugged.
#23, #24, and #26 unplugged as pressure was increased.
After east sorbent train was placed in service & bed level increased, P14
cyclone ash line shutdown, indicating pluggage.

Major Accomplish/ Tests: None
Operations Problems: Several secondary cyclones plugged at startup.
P14 primary dipleg plugs at startup.

Shutdown reason: Manual combustor trip due to plugged P14 cyclone.
Major Outage Workscope: P14 ash line was found clear but the dip leg was plugged with ash, appeared
to be overwhelmed.
Machined high spots off the coal crusher rolls.
Relocated the coal crusher recycle chute from the top of T1 hopper to the side
of the hopper.
Air leakage test of the primary ash lines was negative, all ok.
Emptied the prepared sorbent hopper and refilled it with material with less
fines.
HCV-P586 valve was rebuilt.

10/13/93 to 10/14/93 Maximum Gross Unit Load Achieved: n/a MWHR.
Gross Capacity Factor @ 60 MWG = n/a

Run number: **TD-SU-93-13-01**
G.T. Ops.: 10/14/93 @ 5:15 till 10/14/93 @ 14:30; 9.25 hours of G.T. operation.
Coal fire: Coal fire was not achieved.
Run Objective: See the next startup objectives.
Major Observations: Right after oil fire, P14 primary cyclone showed signs of ash line pluggage.
Major Accomplish/ Tests: None
Operations Problems: P14 cyclone plugged at startup and startup was aborted.
Shutdown reason: Manual combustor trip due to plugged cyclone.
Major Outage Workscope: Loaded 23,000# of sand into reinjection vessels.
Inspected the following sections of the primary ash system without finding any
problems:
The south internal cooler collection header, the combustor penetration thermal
sleeve
The V102 orifice, inspection cap on exterior coolers, 90 deg bend located at
top of basement stairs,
90 deg bend on pipe walkway at NW corner of building.
Reduced startup bed level to below sparge ducts and vacuumed top of sparge
ducts.
Conducted air flow tests on the primary ash lines, each individually. No
problems confirmed.

Appendix II - Tidd Operations/Testing/Outage Overview Log

P14 ash line was found to be plugged solid from the suction nozzle to the cooler outlet.

10/16/93 to 11/6/93

Maximum Gross Unit Load Achieved: 61 MWHR.

Gross Capacity Factor @ 60 MWG = 83.85%

Run number:

TD-SU-93-14-01

G.T. Ops.:

10/17/93 @ 1:16 till 11/7/93 @ 2:29; 505.22 hours G.T. operation.

Coal fire:

10/17/93 @ 14:39 till 11/6/93 @ 22:09; 487.50 hours coal fire.

Run Objective:

See if the unit can be started up with inbed sorbent T's without plugging primary cyclones.

Test the effects of sorbent inbed T's, located on end of both sorbent lines, centerline of coal skateboards.

Come to 115" @ 1480°F and set for 2 days to evaluate tube bundle for sorbent deposits.

Test at 1540°F, Pitts #8, 90% retention.

Test at 115", Pitts #8, Greenfield sorbent, and 95% retention.

Major Observations:

On 10/26 baised middle paste flow up and end pumps down, sorbent utilization appeared to improve.

On line performance indications varied greatly.

Higher 6.0# sulfur coal hindered proper on line evaluation of bed process.

Unit is run for record time @ 142" bed level, 130 hours total, 84 hours continuously

Sorbent T's seem to have significant improvement on bed temperatures, very uniform temps.

On 10/26 increased bed lvl to 141" to see effect on GT vib, vibration actually went down.

On 11/1 raised bed lvl to 142" for 90% test, but bed starts to sinter during stablization time so test is aborted.

On 11/3 due to sintering, bed temp to 1500°F, paste slump increased, splitting air flow increased.

Bed ash recircled to break up sinters, bed seems to stablize by 11/4.

On 11/5 @ 1200 hrs sorbent fines injected into paste at 20% ratio sorbent to coal but sinters appeared at 1500 hrs.

Paste slump increased, dry sorbent flowrate increased, fines in paste flowrate cut in half.

Bed conditions leveled off but did not improve. At 2030 hrs precip opacity exceeded 20% again.

Dry sorbent feed decreased due to opacity, and then bed conditions appeared to further deteriorate.

On 11/6 bed lvl cut to 115" in attempt to stablize sinters and reduce evap. tube alarms.

Decided to remove unit from service due to possible sorbent clinker in bed on 11/6.

During outage, no sizable clinker found.

Major Accomplish/Tests:

On 10/19, completed 115", 1480°F, 90% retention test with tees on ends of both sorb. inj. lines (Test #39).

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

On 10/22 completed 115", 1540°F, 90% retention test with 4 sorbent points (Test #40).
On 10/22 attempted 95% test @ 115" but high sorbent flow and lack of sufficient bed drain capacity aborted test.
Placed sorbent fines in paste system inservice 10/25 @ 20% sorbent fines to coal ratio and ran till 1200 hrs on 10/29.
On 10/31 completed 115", 90% retention, 100% dry sorbent feed test, 1540°F (Test #41).
On 11/2 completed 142" test, 90% retention, 1540°F bed temp. (Test #42).
On 11/4 test at 142", 95% ret. is attempted but aborted on 11/5 when precip opacity can not be maintained below 20%.
Before shutdown, successfully test crushed and burned Sands Hill coal.
Successfully commissioned above bed SO2 sampling system this run.

Operations Problems:
Unit was started up in the most conservative manner possible.
Sorbent flow started on west vessel first with 9 - 10 kpph flowrate initially.
Initial process airflow to boiler bottom was delayed at startup and sorbent purge air flow was minimized both at startup.
At startup, combustor trip occurred at oil fire due to stuck PCV-B200 popping open and resulting in V.S. high lvl trip.
Coal crusher skewing occurred at startup due to outage machining of rolls and relocation of recycle inlet chute to crusher.
Coal recycle chute was moved back to original location at T1 hopper.
As initial air flow increased GT #2 horz brg went to 190 mils, GT was Carboblashed to reduce vib. but to no effect.
On 10/28 crusher skewing problems began again forcing bed level to be cut to conserve paste.
Crusher problem was at start of crusher, manipulated individual acc. isolation valves until crusher started and was on recycle.
On 10/28 sorbent prep cyclone separator plugged causing very hot air to burn up baghouse bags.
Load reduced to conserve sorbent while bags were replaced.
During unit shutdown, several primary cyclone ash lines shutdown their transport capacity.

Shutdown reason:
Major Outage Worksopce:
Manual combustor trip due to indicated sorbent clinker, latter not found.
Modified bed preheater air to come off L valve operating air supply.
Cut off sorbent inbed T's and installed new 4 point external distribution system.
Rebuilt sorbent prep crusher.
Rebuilt sorbent prep rotary feeders SVR-1 and SVR-2.
Primary ash line air inleakage was 3 times allowable.
A new design primary ash line end cap for return chambers was installed on P17.
No large sorbent deposits found in bed, only small deposit above a fuel nozzle.
Visually inspected GT LPT blade air foils.
Visually inspected the LPC inlet and HPT inlet.
Borescope inspected last 4 stages of LPC.
Suspected axial rub in LPT blade root seal area was cause for vibration.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Liquid cleaned LPC.

Found sorbent tees severely eroded adjacent to splitter plates at inlet.

Sorbent tees also eroded on downstream side of 90 degree bends.

North leg of north sorbent tee (Toward #2 fuel nozzle) was found plugged.

Repaired numerous sorbent prep and coal prep leaks.

Replaced bearings on the coal crusher screw feeder drive gearbox.

11/24/93 to 12/6/93

Maximum Gross Unit Load Achieved: 64 MWHR.

Gross Capacity Factor @ 60 MWG = 87.01%

Run number:

TD-SU-93-15-01

G.T. Ops.:

11/26/93 @ 00:50 till 12/6/93 @ 12:50; 252.00 hours G.T. ops.

Coal fire:

11/26/93 @ 18:00 till 12/6/93 @ 8:16; 230.27 hours coal fire.

Run Objective:

Startup and test new 4 point sorbent distribution system.

Test #1 142" bed lvl, Pitts. #8, P.R. Greenfield, 95% SO₂ retention, 30% sorbent fines in paste.

Test #2 142" bed lvl, Pitts. #8, P.R. Greenfield, 95% SO₂ retention, all pneumatic feed sorbent.

Test #3 142" bed lvl, Pitts. #8, P.R. Greenfield, 90% SO₂ retention, all pneumatic feed sorbent.

Test #4 115" bed lvl, Pitts. #8, P.R. Greenfield, 90% SO₂ retention, all pneumatic feed sorbent.

Test #5 142" bed lvl, Anker Peabody coal, P.R. Greenfield, 95% SO₂ retention, 30% sorbent fines in paste.

Test #6 142" bed lvl, Anker Peabody coal, National limestone, 95% SO₂ retention, 30% sorbent fines in paste.

Major Observations:

During low flow period at startup, S24, S25 & S27 cyclones were plugged but unplugged at higher pressures.

Bed sinters occurred frequently, especially over 1480°F bed temp.

Problems encountered with crushing Peabody Anker coal.

Major Accomplish/ Tests:

Max gross output over one hour - 64 MWG

Carboblasted the LPC during startup.

Conducted 115" test on 11/28 thru 11/29 at 90% retention, 1540°F, dry feed sorbent, Pitts #8 & Plum Run #57 sorbent (Test #43).

Attempted 142" test at 95% retention, Pitts #8 & Plum Run #57 sorbent, with 15% sorbent fines to coal in paste

Test aborted due to bed sintering. Bed dropped to 115", 1500°F and no sorbent fines in paste.

Conducted 142" test at 1480°F, 95% retention, Pitts #8, P.R. #57 sorbent, and 15% sorbent fines in paste (Test #44).

Test run from 2000 hrs on 12/2 to 1000 hrs on 12/3, tested aborted when fines system blower shaft broke.

Increased bed temp to 1490°F @ 0800 hrs. on 12/4 with no problems, then to 1500°F @ 2000 hrs on 12/4,

By 530 hrs on 12/5, bed sintering was occurring, bed temp dropped to 1480°F and bed stabilized.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Operations Problems: Bed temp increased to 1490 @ 1530 on 12/5 and by early 12/6 sintering was occurring again.
Problems with plugging #1, 4, 5, & 6 paste lines due to low splitting air, all blown out latter.
Splitting air flow on #6 paste line was lower than rest throughout run.
On 11/29 ruptured S24 ash line inner pipe at 1st bend outside combustor building.
Isolated line with valve, installed 3/8" plug in blowout port and opened valve. Line returned to service without problem.
On 11/30 bed began to sinter again with unstable temps in zone 0, several evaps in alarm and dropping density.
On 11/30 while repairing sorbent flow meter, system tripped and resulted in north dist header to temp. plug.
Attempted crushing of Peabody Anker coal, finer inlet coal size and higher H2O restricted crusher output to 38kpph. Test was aborted.
Sorbent transport system inside combustor blew hole around 0500 hrs on 12/6/93.
Precip opacity problems occurred at 142" bed level and 95% retention.

Shutdown reason: Combustor trip due to sorbent distribution system leak.

Major Outage Workscope: Found erosion in sorbent piping on north 2.624" line, several small holes downstream of bend.
Found S23 & S24 ash lines to have hard deposits in lines just after combustor building wall.
Found S23 ash line 1st bend downstream of suction nozzle to have hole in inner pipe.
Revised S23 combustor penetration to eliminate inner dual thermal sleeve flange.
Tie in HGCU process back into cycle.
Attempted to install 4 pipe ceramic sorbent system but decided to wait for proper pipe.
Returned to 2 sorbent pipe operation with dual 3" pipes(# sch 160 pipes)
Inspected HPT inlet guide vanes
Borescope inspected HPT 4th stage.
Borescope inspected inlet and outlet LPT blade roots.
Visually inspected LPT blades.
Visually inspected LPT guide ring for erosion.
Borescope inspected LPC 1st two stages of stationary guide vanes.
Disassembled LPC.
Replaced 1st, 2nd, 3rd, 4th & 9th stage LPC stationary guide vanes.
Found cracked guide vanes in 1st & 2nd LPC stages.
Found LPC 4th stage inner guide vane ring cracked.
Replace end cap gaskets on the primary internal ash cooler return chambers.
Modified fuel nozzles, new 8.7mm primary splitting air tube tips installed.
Retracted primary splitting air nozzle 5mm from 43 mm back to 48-50mm back.
Modified fuel nozzle end cap to permit secondary splitting air and modified external piping to increase capacity.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Relocated above bed O₂/SO₂ sample lines to above #2 fuel nozzle in order to map plume.

Boiler protection rupture discs were inspected and found to be ok.

Completed installation of 6" HGCU tempering gas air line.

Restored P11 cyclone to operation(6 string to 7 string operation).

Inspected #1 paste pump 'S' tube for erosion, 7/8" wall remained, 60% original wall.

Sorbent prep system fan rotor and housing were sprayed with Carbon 80.

Welded in new sections of pipe in all 7 O₂ cyclone sample lines.

Power relief valve was rebuilt with new stem, seat and springs.

Rebuilt bed ash valves HCV-J600 & J610.

1/8/94 to 1/11/94

Maximum Gross Unit Load Achieved: 55 MWHR.

Gross Capacity Factor @ 60 MWG = 45.52%

Run number:

G.T. Ops.:

Coal fire:

Run Objective:

TD-SU-94-01-01

1/9/94 @ 12:29 till 1/11/94 @ 03:08; 38.65 hours G.T. operation.

1/10/94 @ 06:41 till 1/11/94 @ 01:36; 18.92 hours coal fire.

1) Complete 250 to 500 hrs of operation on APF w/ stable dP's at inlet temps below 1400°F.

2) Determine if spoiling air is effective on increasing APF mean part. size @ inlet.

3) Determine if new APF tempering air system can maintain APF inlet temps. below 1400°F.

4) Evaluate the effect of bed temps. on sorbent utilization.

5) Evaluate bed temp. threshold for egg sinters @ 142" w/ changing splitting air flows and new sec. splitting air..

6) Evaluate unit perf. @ 142" w/ two sorbent inject. points - baseline data.

7) Evaluate unit perf. w/ expanded bed height of up to 150".

Evaluate new fuel nozzles with secondary splitting air and modified primary air.

Major Observations:

At startup, w/ 4 deg. ambient air, intercooler outlet water temp dropped to 34 degrees before GT valves were opened.

APF dP's were stable at temperatures below 1350°F.

After 18 hrs. on coal P13 cyclone plugged with no prior indication of problems for operators.

Outage inspection revealed ash fires occurred in almost all cyclone dip legs in ceramic cones but no indication of fires showed on T/C's.

After combustor trip, primary cyclones dropped in temp for 30 minutes, than shot up 200°F before dropping again.

Major Accomplish/ Tests:

None.

Operations Problems:

Due to cold ambient temps., 275 ash removal baghouse plugged with ice and ash.

During low air flow before coal fire, S23 plugged at econ. orifice.

During operation, S23 economizer orifice could only be cleaned by manually rodding it out.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Due to ash piles above sparge duct, P14 plugged for some time at oil fire but unplugged as air flow was increased.
When P14 began to flow again, P13 suction nozzle dropped 50 degrees.
Opacity exceedances occurred at startup between coal fire and 70" bed lvl.
At startup, evaporator legs #53 & 54 were running hot @ 780 deg. & could not be reduced with splitting air or pump bias adjustments.
HGCU exp jt #7 top middle bellows temp increased to 690 deg. requiring insulation removal.
At 00:30 on 1/11, P13 suction nozzle dropped indicating a primary cyclone plug.
Shutdown reason: Manual combustor trip due to plugged primary cyclone.
Major Outage Workscope: Found clinkers in P12 thru P17 cyclones from fires.
P13 cyclone dip leg filled up, carryover cleaned S23 cyclone.
P13 and P14 ash lines were found open.
P13 bellows box had very large clinkered deposit in bottom, very hard.
Sandblasted primary and secondary cyclones as required.
Install 2 additional T/C's on P12 thru P17 cyclones, 1 on upper cone above ceramic, 1 on cone in ceramic area.
Loaded sand into reinjection vessels.

1/15/94 to 1/29/94
APF I/S

Run number:
G.T. Ops.:
Coal fire:
Run Objective:

Maximum Gross Unit Load Achieved: 60 MWHR.
Gross Capacity Factor @ 60 MWG = 3.89%

TD-SU-94-02-01

1/15/94 @ 12:15 till 1/29/94 @ 20:35; 344.33 hours G.T. operation.

1/15/94 @ 23:42 till 1/29/94 @ 20:31; 332.82 hours coal fire.

- 1) Complete 250 to 500 hrs of operation on APF w/ stable dP's at inlet temps below 1400°F.
- 2) Determine if spoiling air is effective on increasing APF mean part. size @ inlet.
- 3) Determine if new APF tempering air system can maintain APF inlet temps. below 1400°F.
- 4) Evaluate the effect of bed temps. on sorbent utilization.
- 5) Evaluate bed temp. threshold for egg sinters @ 142" w/ changing splitting air flows and new sec. splitting air..
- 6) Evaluate unit perf. @ 142" w/ two sorbent inject. points - baseline data.
- 7) Evaluate unit perf. w/ expanded bed height of up to 150".

Evaluate new fuel nozzles with secondary splitting air and modified primary air.

Major Observations:

Total splitting air flow was set to 2350 pph at startup.

Placed spoiling air on #11 cyclone right after stable operation achieved.

Primary ash transport flow and pressure alarms came in during startup, possibly due to spoiling air.

During the entire run the #16 evaporator was 80 to 100°F higher than other evap. temperatures.

Total splitting air lower to 1600 pph to lower evap temps, no impact, returned to 2400 pph

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

- In an attempt to reduce evaporator temps, end fluidization nozzles pulsed but with no impact.
- On 1/24, dropped load to 45" in attempt to shake loose sinters in tube bundle, ramped back up to 115", no long lasting improvement.
- On 1/25, increased splitting air to 3200 pph and than 3500 pph to reduce sinters, no impact.
- On 1/26, dropped load to 28" in attempt to shake loose sinters in tube bundle, ramped back up to 115", same result as before.
- On 1/27, bed level increased to 142" and bed temp to 1510°F for "full load" test. Tempering air line commissioned first time at 13,600 pph to maintain APF temps.
- On 1/28, bed temp. increased to 1540°F but than reduced to 1530 due to high cyclone inlet temps. Tempering air increased to 20,000 pph to maintain APF temps.
- On 1/28, lower bed to 120" and 1520°F because of sintering.
- Major Accomplish/ Tests:** On 1/18 completed 115" test, 90% S ret., 1540°F bed temp, 2 sorb. inj. points at front wall (Test #45).
- On 1/19 completed 115" test, 90% S ret., 1540°F bed temp, 2 sorb. inj. points at front wall (Test #46).
- On 1/21 completed 115" test, 90% S ret., 1500°F bed temp, 2 sorb. inj. points at front wall (Test #47).
- On 1/20, Battelle conducted size distribution and dust loading tests on APF inlet and outlet gas.
- Operations Problems:** Extreme cold temps at beginning of run is hampering operations:
- Tent had to be built around sootblowers to keep them warm. Precip rappers have to be run continuously.
 - Coal and sorbent freezing in yard is problem, both won't stay on belt into plant, freeze in bottom of yard hoppers.
 - Heavy snow blinded GT intake filters requiring them to be removed and cleaned.
 - Minus 21F ambient caused waste water line up hill to freeze, installed temporary line to Cardinal.
 - Cold froze up APF flyash vacuum pump, GT blow-in doors stuck open.
- #3 T/C on #7 HGCU exp. jt. was not touching metal and thus causing controls to overheat joint.
- Beginning of run APF backpulse compressor tripped several times due to high 4th stage discharge pressure.
- Control circuit failure on 1/17 causes #1 paste pump to trip out, out for about 6 hours.
- Due to lack of coal and sorbent, load is cut on 1/18 to conserve fuel, returned to 115" by next morning.
- On 1/18, east sorbent feed very erratic, causing opacity problems.
- On 1/18, evaporator temps look unstable and there appears to be sinters or something on left sidewall.
- On 1/20, sorbent prep feeder SRA-1 failed and was temporarily repaired.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

On 1/21, recircled bed material between reinj. vessels in attempt to break up LSW deposit.

On 1/24, up to 8 evaporator tubes in alarm at 115", increased splitting air to no effect.

On 1/24, reduced load down to about 60 inches and blew sparge duct end fluidization, appeared to improve LSW deposit.

On 1/26, still evidence of LSW deposit but stable bed, reducing bed level to XX" to clear bed of sinters.

On 1/28, valve stem packing on HCV-J926, APF surge hopper outlet valve, leaking, filled by Leak Repair.

On 1/28, discovered two small leaks on APF anubar flow meter impulse line.

On 1/28, APF screw cooler stopped when ash removal system plugged with old candle pieces.

On 1/29, tube leak developed in 1st platen from north wall, eroded evaporator tubes.

Steam cutting of evaporator was caused by waterwall tube which eroded and failed

Waterwall tube may have eroded due to air leak in boiler access door directly below tubes.

West sorbent feeder stopped running several times during run with no alarms or reason.

Frozen coal conditions impacted coal crusher by not "pulling" coal into crusher resulting in less fines in paste.

Shutdown reason: Manual combustor trip when #14 evaporator tube exceeded 1000°F due to tube leak.

Major Outage Workslope: Repair north boiler sidewall for erosion of wall tubes and repair failure.

Pull 1st platen on north and south sidewalls, repair evap leaks(2) in north platen.

Modify startup bed zone liner top on north and south sidewalls.

Sandblast cyclones.

Air test primary ash removal system, leakage rate was xx psi in xx minutes, below min. acceptable level.

Replaced xx gaskets in primary ash system.

Removed last 90 deg. bend in 3/4" sec ash line in combustor on S26 line, no erosion found.

Replaced Neles sorbent B817/827 valves with new Jarecki valves.

Gas turbine inspection.

Inspected APF internals using borescope at instrument connections.

Repaired shaft on HGCU valve HCV-J926.

Added insulation to HGCU exp jts.

Remove outlet pipe on HGCU vessel for insulation repair.

Repaired HGCU exp. jt. #7.

Installed 4 point ceramic lined sorbent injection system into boiler, 6" into fluid bed.

Filled injection vessels with 74,000 pounds of sand.

Moved skateboards 8" further toward the rear wall.

Appendix II - Tidd Operations/Testing/Outage Overview Log

2/15/94 to 2/18/94
APF I/S

Maximum Gross Unit Load Achieved: 54 MWHR.
Gross Capacity Factor @ 60 MWG = 39.15%

Run number:
G.T. Ops.:
Coal fire:
Run Objective:

TD-SU-94-03-01

2/16/94 @ 22:18 till 2/18/94 @ 15:44; 41.43 hours G.T. operation.

2/17/94 @ 14:58 till 2/18/94 @ 14:14; 23:16 hours coal fire.

Evaluate 4 point sorbent distribution system.

Evaluate relocation of skateboards.

Need to cure new refractory installed in startup zone.

Evaluate effect of splitting air on sinters.

Major Observations:

Spoiling air to P11 cyclone started right after coal fire.

Bed was stabilized at 102" after startup for bed maturing.

During the entire run, boiler front wall bed T/C's were higher than previous runs(20 to 40°F).

Major Accomplish/ Tests:
Operations Problems:

None, run aborted.

Stack breeching bypass damper jamed at startup and result in GT shutdown after rollup.

Precip EPIC II controller failed at startup and precip was in manual operation for first day of run.

On second rollup attempt on GT, #3, 4, & 5 fuel nozzle splitting air nozzles were plugged, removed GT from service to cleanout.

On pre coal fire recirc of paste pumps, #6 line pluggeg and had to be cleaned.

A leak developed in the HGCU gas analyzer cabinet, Leak Repair called in to fix it.

HGCU screw cooler stopped on 2/17 due to old candle pieces plugging up the ash removal line.

Could not repair analyzer leak, unit tripped to make repairs.

Leak developed on econ. outlet fabric expansion joint.

Shutdown reason:

Manual combustor trip to facilitate HGCU analyzer repairs.

Major Outage Workscope:

Cut off HGCU analyzer sample pipe, insulated and welded end cap on pipe.

Filled reinjection vessels with bed material for hot restart.

2/18/94 to 2/25/94
APF I/S

Maximum Gross Unit Load Achieved: 61 MWHR.
Gross Capacity Factor @ 60 MWG = 24.28%

Run number:
G.T. Ops.:
Coal fire:
Run Objective:

TD-SU-94-03-02

2/18/94 @ 21:00 till 2/25/94 @ 14:25; 161.42 hours G.T. operation.

2/19/94 @ 6:12 till 2/25/94 @ 13:09; 150.95 hours coal fire.

Evaluate 4 point sorbent distribution system.

Evaluate relocation of skateboards.

Evaluate effect of splitting air on sinters.

Major Observations:

On 2/22, P11 dip leg caught fire, was controllable, higher air flow did not put out fire.

During run,splitting air on #1 & 6 lower to 750 pph, total splitting to 5500 pph from 6000.

Appendix II - Tidd Operations/ Testing/ Outage Overview Log

Major Accomplish/ Tests: On 2/25, #16 dip leg caught fire, raised air flow and reduced splitting air to 5300 pph reduced fire.
On 2/22, increased bed to 142", @ 1540°F, @ 90% retention, splitting air @ 6000pph, sec splitting @ 5.5 turns open, pumps biased for bed temps.

Operations Problems: On 2/23, dropped bed temps to 1520°F due to cyclone inlets above 1600°F and high evap. temps.
Had difficulty lighting bed preheater, had to close temp control valve TMV-B474 more than usual.
Coal fire was delayed due to need to change out paste tank agitator motor due to failed bearings.
On startup bed rampup, bed held at 105" due to high temps on HGCU APF outlet pipe.
On 2/21, Leak Repairs pumped 45 gallons of insulation into APF head to reduce hot spot temps to 300-350°F.
On 2/23, south paste agitator tripped with 42" of 3.5" slump paste, reset and restarted.
On 2/23, #4 paste pump tripped due to pluggage in strainer, cleaned out and restarted.
Sorbent compressor tripped due to unknown surge condition.

Shutdown reason: Manual combustor trip due to loss of sorbent compressor.

Major Outage Workscope: Inspected sorbent compressor, found inlet guide vanes stuck.
Also found sorbent inlet/outlet pressure transmitters miscalibrated.

Appendix III - Tidd PFBC Operations Time Log

Appendix III - Tidd PFBC Operations Time Log

This appendix presents the operating hours and statistics for each of the unit operational periods.

1990 Operating Hours Data

Tidd PFBC Operations Time Log - Year 1990									
RUN # Starting with 90-01-01>>	Start of Official Runs	1-1	1-1 Con't	2-1	2-1 Con't	3-1	3-2	4-1	5-1
Run Starting:		13-Oct-90	13-Oct	27-Oct	30-Oct	04-Nov	07-Nov	13-Nov	26-Nov
Summary of Outage Statistics:									
Outage Start Date:		20-Oct	20-Oct	21-Oct	30-Oct	31-Oct	06-Nov	09-Nov	15-Nov
Outage Start Time:		06:54 am	06:54 am	06:19 pm	10:11 pm	03:41 am	02:08 am	09:22 pm	11:59 pm
Outage End Date:		20-Oct	21-Oct	30-Oct	31-Oct	06-Nov	09-Nov	15-Nov	29-Nov
Outage End Time:		06:54 am	06:19 pm	07:11 pm	03:41 am	02:08 am	09:22 pm	11:59 pm	08:26 am
Outage Time in Hours:		0.0	35.4	216.9	5.5	142.5	91.2	146.6	320.5
YTD Outage Hours:		0.0	35.4	252.3	257.8	400.2	491.5	638.1	958.5
YTD Hours Till Outage End Time:		0.0	35.4	252.3	260.8	403.2	494.5	641.1	961.5
Outage Percentage:		ERR	100.00%	100.00%	98.85%	99.26%	99.39%	99.53%	99.69%
Summary of Operating Statistics:				< GT I/S >>>>>					
G.T. Time On:		04:48 am	12:26 pm	08:41 pm	10:11 pm	07:49 am	08:19 pm	12:28 pm	04:01 pm
G.T. Date On:		19-Oct	20-Oct	29-Oct	30-Oct	05-Nov	08-Nov	15-Nov	28-Nov
G.T. Time Off:		06:54 am	06:19 pm	10:11 pm	03:41 am	02:08 am	10:57 pm	11:59 pm	01:48 am
G.T. Date Off:		20-Oct	21-Oct	30-Oct	31-Oct	06-Nov	09-Nov	15-Nov	30-Nov
G.T. Time This Run:		26.10	29.88	25.50	5.50	18.32	26.63	11.52	33.78
Additional GT Time this Run:									
GT Time Adjustment:						0.82	2.79		1.00
Total G.T. Time:	128.57	26.10	29.88	25.50	5.50	19.14	29.42	11.52	34.78
Total GT Hours YTD in 1990:	128.57	154.67	184.55	210.05	215.55	234.69	264.11	275.63	310.41
Bed Preheater Time On:		11:22 pm	06:16 pm	06:56 am	10:44 pm	05:42 pm	05:37 am	08:33 pm	03:12 am
Bed Preheater Date On:		19-Oct	20-Oct	30-Oct	30-Oct	05-Nov	09-Nov	15-Nov	29-Nov
				First time					
Stm Turbine Time On:		06:54 am	06:19 pm	07:11 pm	03:41 am	02:08 am	09:22 pm	11:59 pm	08:26 am
Stm Turbine Date On:		20-Oct	21-Oct	30-Oct	31-Oct	06-Nov	09-Nov	15-Nov	29-Nov
Stm Turbine Time Off:		06:54 am	06:19 pm	10:11 pm	03:41 am	02:08 am	09:22 pm	11:59 pm	01:48 am
Stm Turbine Date Off:		20-Oct	21-Oct	30-Oct	31-Oct	06-Nov	09-Nov	15-Nov	30-Nov
Steam Turbine Time This Run:		0.00	0.00	3.00	0.00	0.00	0.00	0.00	17.37
Total Steam Turbine Time:		0.00	0.00	3.00	3.00	3.00	3.00	3.00	20.37
Total St Turb Time YTD in 1990:		0.0	0.0	3.0	3.0	3.0	3.0	3.0	20.4
Unit Availability YTD Based on Stm Turb.:		0.00%	0.00%	1.18%	1.15%	0.74%	0.61%	0.47%	2.08%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1990									
RUN # Starting with 90-01-01>>	Start of Official Runs	1-1	1-1 Con't	2-1	2-1 Con't	3-1	3-2	4-1	5-1
Run Starting:		13-Oct-90	13-Oct	27-Oct	30-Oct	04-Nov	07-Nov	13-Nov	26-Nov
Coal Time On:		06:54 am	06:19 pm	10:11 pm	03:41 am	02:08 am	11:24 am	11:59 pm	11:03 am
Coal Date On:		20-Oct	21-Oct	30-Oct	31-Oct	06-Nov	09-Nov	15-Nov	29-Nov
Coal Time Off:		06:54 am	06:19 pm	10:11 pm	03:41 am	02:08 am	09:22 pm	11:59 pm	01:48 am
Coal Date Off:		20-Oct	21-Oct	30-Oct	31-Oct	06-Nov	09-Nov	15-Nov	30-Nov
Coal Time This Run:		0.00	0.00	0.00	0.00	0.00	9.97	0.00	14.75
Coal Time Adjustment									
Grand Total Coal Time:	0.00	0.00	0.00	0.00	0.00	0.00	9.97	9.97	24.72
Total Coal Fire YTD in 1990:		0.0	0.0	0.0	0.0	0.0	10.0	10.0	24.7
Maximum Unit Load Achieved During Run:		0	0	0	0	0	0	0	0
Gross Gen for Run (MWhr):		0	0	3	0	0	0	0	125
Gross Output Factor for this Run:									
Gross Gen for Run (MWhr):		0	0	3	0	0	0	0	125
Gross Output Factor for Run @ 70MW:		0.00%	0.00%	1.43%	0.00%	0.00%	0.00%	0.00%	10.28%
Gross Output Factor for Run @ 60MW:		0.00%	0.00%	1.67%	0.00%	0.00%	0.00%	0.00%	12.00%
Gross Capacity Factor YTD in 1990:									
Gross Generation YTD:	0.00	0	0	3	3	3	3	3	128
Gross Capacity Factor @ 70MWG:		0.00%	0.00%	0.02%	0.02%	0.01%	0.01%	0.01%	0.19%
Gross Capacity Factor @ 60MWG:		0.00%	0.00%	0.02%	0.02%	0.01%	0.01%	0.01%	0.22%

Appendix III - Tidd PFBC Operations Time Log

1990 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1990										
RUN # Starting with 90-01-01>>	5-2	5-3	6-1	6-1 Con't.	6-1 Con't.	6-1 Con't.	End of 1990	Average	Min.	Max.
Run Starting:	02-Dec	06-Dec	15-Dec	19-Dec	19-Dec	20-Dec				
Summary of Outage Statistics:										
Outage Start Date:	30-Nov	05-Dec	07-Dec	19-Dec	19-Dec	20-Dec	21-Dec			
Outage Start Time:	01:48 am	11:44 am	12:26 pm	08:01 am	09:49 pm	09:16 am	12:48 am			
Outage End Date:	05-Dec	06-Dec	19-Dec	19-Dec	20-Dec	20-Dec	31-Dec			
Outage End Time:	03:07 am	10:08 pm	12:57 am	07:48 pm	01:19 am	01:35 pm	11:59 pm			
Outage Time in Hours:	121.3	34.4	276.5	11.8	3.5	4.3	263.2	100.7	0.0	320.5
YTD Outage Hours:	1079.9	1114.3	1390.8	1402.6	1406.1	1410.4	1673.6			
YTD Hours Till Outage End Time:	1100.2	1143.2	1434.1	1452.9	1458.4	1470.7	1745.1			
Outage Percentage:	98.15%	97.46%	96.98%	96.53%	96.41%	95.90%	95.90%			
							100.00%			
Summary of Operating Statistics:				<< GT I/S >>						
G.T. Time On:	11:40 am	02:59 am	03:48 am	11:40 am	09:49 pm	09:17 am				
G.T. Date On:	04-Dec	06-Dec	18-Dec	19-Dec	19-Dec	20-Dec				
G.T. Time Off:	11:44 am	03:09 pm	08:14 am	09:49 pm	09:17 am	02:19 am				
G.T. Date Off:	05-Dec	07-Dec	19-Dec	19-Dec	20-Dec	21-Dec				
G.T. Time This Run:	24.07	36.17	28.43	10.15	11.47	17.03		21.8	5.5	36.2
Additional GT Time this Run:										
GT Time Adjustment:		1.35	6.27				12.22			
Total G.T. Time:	24.07	37.52	34.70	10.15	11.47	17.03	12.22			
Total GT Hours YTD in 1990:	334.47	371.99	406.69	416.84	428.31	445.34	457.57			
Bed Preheater Time On:	11:26 pm	03:55 pm	01:40 pm	03:10 pm	11:08 pm	10:44 am				
Bed Preheater Date On:	04-Dec	06-Dec	18-Dec	19-Dec	19-Dec	20-Dec				
Stm Turbine Time On:	03:07 am	10:08 pm	12:57 am	07:48 pm	01:19 am	01:35 pm				
Stm Turbine Date On:	05-Dec	06-Dec	19-Dec	19-Dec	20-Dec	20-Dec				
Stm Turbine Time Off:	11:44 am	12:26 pm	08:01 am	09:49 pm	09:17 am	12:48 am				
Stm Turbine Date Off:	05-Dec	07-Dec	19-Dec	19-Dec	20-Dec	21-Dec				
Steam Turbine Time This Run:	8.62	14.30	7.07	2.02	7.97	11.22		5.1	0.0	17.4
Total Steam Turbine Time:	28.98	43.28	50.35	52.37	60.33	71.55	71.55			
Total St Turb Time YTD in 1990:	29.0	43.3	50.4	52.4	60.3	71.6	71.55			
Unit Availability YTD Based on Stm Turb.:	2.61%	3.74%	3.49%	3.60%	4.11%	4.83%	4.10%			

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1990										
RUN # Starting with 90-01-01>>	5-2	5-3	6-1	6-1 Con't.	6-1 Con't.	6-1 Con't.	End of 1990	Average	Min.	Max.
Run Starting:	02-Dec	06-Dec	15-Dec	19-Dec	19-Dec	20-Dec				
Coal Time On:	05:40 am	11:41 pm	07:48 am	09:41 pm	02:30 am	02:33 pm				
Coal Date On:	05-Dec	06-Dec	19-Dec	19-Dec	20-Dec	20-Dec				
Coal Time Off:	11:44 am	12:26 pm	08:01 am	09:49 pm	09:16 am	12:48 am	11:59 pm			
Coal Date Off:	05-Dec	07-Dec	19-Dec	19-Dec	20-Dec	21-Dec	31-Dec			
Coal Time This Run:	6.07	12.75	0.22	0.13	6.77	10.25		4.4	0.0	14.8
Coal Time Adjustment							0			
Grand Total Coal Time:	30.78	43.53	43.75	43.88	50.65	60.90	60.90			
Total Coal Fire YTD in 1990:	30.8	43.5	43.8	43.9	50.7	60.9	60.9			
Maximum Unit Load Achieved During Run:	0	0	0	0	0	0		0.0	0.0	0.0
Gross Gen for Run (MWhr):	81	135	49	14	54	76	0	38.4	0.0	135.0
Gross Output Factor for this Run:										
Gross Gen for Run (MWhr):	81	135	49	14	54	76	0			
Gross Output Factor for Run @ 70MW:	13.43%	13.49%	9.91%	9.92%	9.68%	9.68%		5.56%	0.00%	13.49%
Gross Output Factor for Run @ 60MW:	15.67%	15.73%	11.56%	11.57%	11.30%	11.29%		6.48%	0.00%	15.73%
Gross Capacity Factor YTD in 1990:										
Gross Generation YTD:	209	344	393	407	461	537	537			
Gross Capacity Factor @ 70MWG:	0.27%	0.42%	0.39%	0.40%	0.45%	0.52%	0.44%			
Gross Capacity Factor @ 60MWG:	0.31%	0.50%	0.45%	0.47%	0.52%	0.60%	0.51%			

Appendix III - Tidd PFBC Operations Time Log

1991 Operating Hours Data

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>	Start of 1991	90-7-1	1-1	2-1	2-2	3-1	4-1	4-1	5-1
Run Starting:		31-Dec-90	08-Jan-91	10-Jan	13-Jan	19-Jan	26-Jan	26-Jan	03-Feb
Summary of Outage Statistics:									
Outage Start Date:		01-Jan-91	02-Jan	08-Jan	12-Jan	14-Jan	22-Jan	28-Jan	29-Jan
Outage Start Time:		12:00 am	04:41 pm	03:07 pm	10:46 pm	04:51 am	02:52 am	09:43 pm	11:50 am
Outage End Date:		02-Jan	08-Jan	12-Jan	13-Jan	21-Jan	28-Jan	29-Jan	04-Feb
Outage End Time:		04:41 pm	01:11 pm	07:27 am	08:26 pm	03:37 pm	11:31 am	03:30 am	11:48 pm
Outage Time in Hours:		40.7	140.5	88.3	21.7	178.8	152.7	5.8	156.0
YTD Outage Hours:		40.7	181.2	269.5	291.2	470.0	622.6	628.4	784.4
YTD Hours Till Outage End Time:		40.7	181.2	271.5	308.4	495.6	659.5	675.5	839.8
Outage Percentage:		100.00%	100.00%	99.29%	94.41%	94.82%	94.40%	93.02%	93.40%
Total Calendar Hrs. for Year thru this Run:									
		40.7	183.1	286.8	317.0	506.9	669.8	683.8	849.0
Summary of Operating Statistics:									
G.T. Time On:		08:05 am	11:32 pm	10:14 am	08:38 am	07:01 pm	05:39 pm	09:46 pm	07:08 am
G.T. Date On:		02-Jan	07-Jan	11-Jan	13-Jan	20-Jan	27-Jan	28-Jan	04-Feb
G.T. Time Off:		07:51 pm	04:28 pm	10:46 pm	08:54 am	03:45 am	09:46 pm	05:27 pm	02:03 pm
G.T. Date Off:		02-Jan	08-Jan	12-Jan	14-Jan	22-Jan	28-Jan	29-Jan	05-Feb
G.T. Time This Run:		11.77	16.93	36.53	24.27	32.73	28.68	19.68	30.92
Additional GT Time this Run:									
GT Time Adjustment:									
Total GT Time This Run:		11.77	16.93	36.53	24.27	32.73	28.68	19.68	30.92
Total G.T. Time:	457.57	469.33	486.27	522.80	547.07	579.80	608.48	628.16	659.08
Total GT Hours YTD in 1991:		11.8	28.7	65.2	89.5	122.2	150.9	170.6	201.5
G.T. Time Since '91 Bed Surface Outage:									
Bed Preheater Time On:		03:43 pm	10:34 am	04:44 am	05:50 pm	01:33 pm	08:21 am	11:10 pm	05:55 pm
Bed Preheater Date On:		02-Jan	08-Jan	12-Jan	13-Jan	21-Jan	28-Jan	28-Jan	05-Feb
Stm Turbine Time On:		04:41 pm	01:11 pm	07:27 am	08:26 pm	03:37 pm	11:31 am	03:30 am	11:48 pm
Stm Turbine Date On:		02-Jan	08-Jan	12-Jan	13-Jan	21-Jan	28-Jan	29-Jan	04-Feb
Stm Turbine Time Off:		04:41 pm	03:07 pm	10:46 pm	04:51 am	02:52 am	09:43 pm	11:50 am	09:00 am
Stm Turbine Date Off:		02-Jan	08-Jan	12-Jan	14-Jan	22-Jan	28-Jan	29-Jan	05-Feb
Steam Turbine Time This Run:		0.00	1.93	15.32	8.42	11.25	10.20	8.33	9.20
Total Steam Turbine Time:	71.55	71.55	73.48	88.80	97.22	108.47	118.67	127.00	136.20
Total Steam Turbine YTD in 1991:		0.0	1.9	17.3	25.7	36.9	47.1	55.5	64.7
Unit Availability YTD based on Stm Turb:									
		0.00%	1.06%	6.02%	8.10%	7.28%	7.03%	8.11%	7.61%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>	Start of 1991	90-7-1	1-1	2-1	2-2	3-1	4-1	4-1	5-1
Run Starting:		31-Dec-90	08-Jan-91	10-Jan	13-Jan	19-Jan	26-Jan	26-Jan	03-Feb
Coal Time On:		04:41 pm	03:07 pm	03:17 pm	09:41 pm	05:18 pm	12:36 pm	01:58 am	12:34 am
Coal Date On:		02-Jan	08-Jan	12-Jan	13-Jan	21-Jan	28-Jan	29-Jan	05-Feb
Coal Time Off:		04:41 pm	03:07 pm	10:46 pm	05:01 am	02:51 am	09:46 pm	11:49 am	09:00 am
Coal Date Off:		02-Jan	08-Jan	12-Jan	14-Jan	22-Jan	28-Jan	29-Jan	05-Feb
Coal Time This Run:		0.00	0.00	7.48	7.33	9.55	9.17	9.85	8.43
Coal Time Adjustment									
Total Coal Time:	60.90	60.90	60.90	68.38	75.72	85.27	94.43	104.28	112.72
Total Coal Fire YTD in 1991:		0.0	0.0	7.5	14.8	24.4	33.5	43.4	51.8
Avail YTD based on Coal Fire:		0.00%	0.00%	2.61%	4.67%	4.81%	5.01%	6.34%	6.10%
Coal Time Since Bed Surface Outage:									
Maximum Unit Load Achieved During Run:		0	?	?	?	?	?	?	21
Gross Gen for Run (MWhr):		0	?	104	54	89	129	106	93
Gross Output Factor for this Run:									
Gross Gen for Run (MWhr):		0	?	104	54	89	129	106	93
Gross Output Factor for Run @ 70MW:		0.00%	0.00%	9.70%	9.17%	11.30%	18.07%	18.17%	14.44%
Gross Output Factor for Run @ 60MW:		0.00%	0.00%	11.32%	10.69%	13.19%	21.08%	21.20%	16.85%
Gross Capacity Factor YTD in 1990:									
Gross Gen YTD:	0.00	0	0	104	158	247	376	482	575
Gross Capacity Factor @ 70MWG:		0.00%	0.00%	0.52%	0.71%	0.70%	0.80%	1.01%	0.97%
Gross Capacity Factor @ 60MWG:		0.00%	0.00%	0.60%	0.83%	0.81%	0.94%	1.17%	1.13%

Appendix III - Tidd PFBC Operations Time Log

1991 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >	6-1	7-1	7-2	7-2 Con't.	8-1	9-1	10-1	11-1	12-1
Run Starting:	08-Feb	18-Feb	19-Feb	20-Feb	26-Feb	28-Feb	07-Mar	10-Mar	12-Mar
Summary of Outage Statistics:									
Outage Start Date:	05-Feb	10-Feb	19-Feb	20-Feb	21-Feb	28-Feb	28-Feb	08-Mar	12-Mar
Outage Start Time:	09:00 am	12:59 am	08:56 am	06:01 am	04:00 pm	04:15 am	10:23 pm	06:03 pm	02:12 am
Outage End Date:	09-Feb	19-Feb	19-Feb	21-Feb	28-Feb	28-Feb	08-Mar	12-Mar	13-Mar
Outage End Time:	08:45 pm	08:56 am	04:30 pm	02:36 am	02:51 am	04:37 pm	06:03 pm	02:12 am	12:40 pm
Outage Time in Hours:	107.8	224.0	7.6	20.6	154.9	12.4	187.7	80.2	34.5
YTD Outage Hours:	892.1	1116.1	1123.6	1144.2	1299.1	1311.4	1499.1	1579.2	1613.7
YTD Hours Till Outage End Time:	956.8	1184.9	1192.5	1226.6	1394.9	1408.6	1602.1	1682.2	1716.7
Outage Percentage:	93.24%	94.19%	94.22%	93.28%	93.13%	93.10%	93.57%	93.88%	94.00%
Total Calendar Hrs. for Year thru this Run:	961.0	1184.9	1206.0	1240.0	1396.3	1414.4	1602.1	1682.2	1717.5
Summary of Operating Statistics:									
G.T. Trip									GT Trip
G.T. Time On:	03:36 am	08:56 pm	12:06 pm	06:01 am	05:10 pm	11:53 am	04:53 pm	04:58 pm	11:16 pm
G.T. Date On:	09-Feb	18-Feb	19-Feb	20-Feb	27-Feb	28-Feb	08-Mar	11-Mar	12-Mar
G.T. Time Off:	03:04 am	08:56 am	06:01 am	08:15 pm	07:33 am	01:27 am	06:03 pm	02:12 am	01:28 pm
G.T. Date Off:	10-Feb	19-Feb	20-Feb	21-Feb	28-Feb	01-Mar	08-Mar	12-Mar	13-Mar
G.T. Time This Run:	23.47	12.00	17.92	38.23	14.38	13.57	1.17	9.23	15.17
Additional GT Time this Run:									
GT Time Adjustment:				0.04		-1.50	-0.20	-0.74	
Total GT Time This Run:	23.47	12.00	17.92	38.23	14.38	13.57	1.17	9.23	15.17
Total G.T. Time:	682.54	694.54	712.46	750.69	765.08	778.64	779.81	789.04	804.21
Total GT Hours YTD in 1991:	225.0	237.0	254.9	293.1	307.5	321.1	322.2	331.5	346.6
G.T. Time Since '91 Bed Surface Outage:									
Bed Preheater Time On:	12:32 pm	08:11 am	02:16 pm	10:24 pm	10:52 pm	02:28 pm	06:03 pm	02:12 am	08:04 am
Bed Preheater Date On:	09-Feb	19-Feb	19-Feb	20-Feb	27-Feb	28-Feb	08-Mar	12-Mar	13-Mar
Stm Turbine Time On:	08:45 pm	08:56 am	04:30 pm	02:36 am	02:51 am	04:37 pm	06:03 pm	02:12 am	12:40 pm
Stm Turbine Date On:	09-Feb	19-Feb	19-Feb	21-Feb	28-Feb	28-Feb	08-Mar	12-Mar	13-Mar
Stm Turbine Time Off:	12:59 am	08:56 am	06:01 am	04:00 pm	04:15 am	10:23 pm	06:03 pm	02:12 am	01:28 pm
Stm Turbine Date Off:	10-Feb	19-Feb	20-Feb	21-Feb	28-Feb	28-Feb	08-Mar	12-Mar	13-Mar
Steam Turbine Time This Run:	4.23	0.00	13.52	13.40	1.40	5.77	0.00	0.00	0.80
Total Steam Turbine Time:	140.43	140.43	153.95	167.35	168.75	174.52	174.52	174.52	175.32
Total Steam Turbine YTD in 1991:	68.9	68.9	82.4	95.8	97.2	103.0	103.0	103.0	103.8
Unit Availability YTD based on Stm Turb:	7.17%	5.81%	6.83%	7.73%	6.96%	7.28%	6.43%	6.12%	6.04%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >	6-1	7-1	7-2	7-2 Con't.	8-1	9-1	10-1	11-1	12-1
Run Starting:	08-Feb	18-Feb	19-Feb	20-Feb	26-Feb	28-Feb	07-Mar	10-Mar	12-Mar
Coal Time On:	09:22 pm	08:56 am	12:23 am	03:09 am	03:18 am	05:42 pm	06:03 pm	02:12 am	12:51 pm
Coal Date On:	09-Feb	19-Feb	20-Feb	21-Feb	28-Feb	28-Feb	08-Mar	12-Mar	13-Mar
Coal Time Off:	12:59 am	08:56 am	06:01 am	04:00 pm	04:15 am	10:21 pm	06:03 pm	02:12 am	01:28 pm
Coal Date Off:	10-Feb	19-Feb	20-Feb	21-Feb	28-Feb	28-Feb	08-Mar	12-Mar	13-Mar
Coal Time This Run:	3.62	0.00	5.63	12.85	0.95	4.65	0.00	0.00	0.62
Coal Time Adjustment						-0.04			
Total Coal Time:	116.33	116.33	121.97	134.82	135.77	140.38	140.38	140.38	140.99
Total Coal Fire YTD in 1991:	55.4	55.4	61.1	73.9	74.9	79.5	79.5	79.5	80.1
Avail YTD based on Coal Fire:	5.77%	4.68%	5.06%	5.96%	5.36%	5.62%	4.96%	4.72%	4.66%
Coal Time Since Bed Surface Outage:									
Maximum Unit Load Achieved During Run:	13	0	0	27.5	4.5	21	0	0	2
Gross Gen for Run (MWHr):	35	0	79	181	3	66	0	0	2
Gross Output Factor for this Run:									
Gross Gen for Run (MWHr):	35	0	79.2	180.8	3	66	0	0	2
Gross Output Factor for Run @ 70MW:	11.81%	0.00%	8.37%	19.28%	3.06%	16.35%	0.00%	0.00%	3.57%
Gross Output Factor for Run @ 60MW:	13.78%	0.00%	9.77%	22.49%	3.57%	19.08%	0.00%	0.00%	4.17%
Gross Capacity Factor YTD in 1990:									
Gross Gen YTD:	610	610	689	870	873	939	939	939	941
Gross Capacity Factor @ 70MWG:	0.91%	0.74%	0.82%	1.00%	0.89%	0.95%	0.84%	0.80%	0.78%
Gross Capacity Factor @ 60MWG:	1.06%	0.86%	0.95%	1.17%	1.04%	1.11%	0.98%	0.93%	0.91%

Appendix III - Tidd PFBC Operations Time Log

1991 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>>>>	12-2	13-1	13-1 Con't	14-1	14-2	15-1	16-1	17-1	18-1
Run Starting:	12-Mar	01-Apr	01-Apr	17-Apr	19-Apr	19-Apr	19-Apr	25-Apr	15-May
Summary of Outage Statistics:									
Outage Start Date:	13-Mar	15-Mar	03-Apr	04-Apr	19-Apr	19-Apr	19-Apr	21-Apr	02-May
Outage Start Time:	01:28 pm	02:08 pm	03:16 am	02:59 am	08:00 am	12:10 pm	03:58 pm	09:29 pm	01:09 pm
Outage End Date:	14-Mar	02-Apr	03-Apr	19-Apr	19-Apr	19-Apr	20-Apr	01-May	16-May
Outage End Time:	04:29 am	10:00 am	10:10 am	08:00 am	12:10 pm	03:58 pm	03:09 am	08:12 pm	06:35 pm
Outage Time in Hours:	15.0	427.9	6.9	365.0	4.2	3.8	11.2	238.7	341.4
YTD Outage Hours:	1628.7	2056.6	2063.5	2428.5	2432.7	2436.5	2447.7	2686.4	3027.8
YTD Hours Till Outage End Time:	1732.5	2194.0	2218.2	2600.0	2604.2	2608.0	2619.2	2900.2	3258.6
Outage Percentage:	94.01%	93.74%	93.03%	93.40%	93.41%	93.42%	93.45%	92.63%	92.92%
Total Calendar Hrs. for Year thru this Run:	1766.1	2211.2	2235.0	2600.0	2604.2	2608.0	2661.5	2928.1	3264.0
Summary of Operating Statistics:				GT Trip					
G.T. Time On:	09:36 pm	01:21 pm	03:16 am	11:13 pm	11:16 am	03:14 pm	07:11 pm	08:23 am	08:26 am
G.T. Date On:	13-Mar	01-Apr	03-Apr	18-Apr	19-Apr	19-Apr	19-Apr	01-May	16-May
G.T. Time Off:	02:31 pm	03:16 am	02:59 am	08:00 am	12:10 pm	03:58 pm	01:05 am	12:04 am	11:59 pm
G.T. Date Off:	15-Mar	03-Apr	04-Apr	19-Apr	19-Apr	19-Apr	22-Apr	03-May	16-May
G.T. Time This Run:	40.92	37.92	23.72	8.78	0.90	0.73	53.90	41.05	15.55
Additional GT Time this Run:									
GT Time Adjustment:	-1.41		-0.56				-10.58	-2.72	
Total GT Time This Run:	40.92	37.92	23.72	8.78	0.90	0.73	53.90	41.05	15.55
Total G.T. Time:	845.13	883.05	906.76	915.55	916.45	917.18	971.08	1012.13	1027.68
Total GT Hours YTD in 1991:	387.6	425.5	449.2	458.0	458.9	459.6	513.5	554.6	570.1
Bed Preheater Time On:	01:44 am	07:58 am	04:34 am	08:00 am	12:10 pm	03:58 pm	10:50 pm	05:02 pm	03:37 pm
Bed Preheater Date On:	14-Mar	02-Apr	03-Apr	19-Apr	19-Apr	19-Apr	19-Apr	01-May	16-May
Stm Turbine Time On:	04:29 am	10:00 am	10:10 am	08:00 am	12:10 pm	03:58 pm	03:09 am	08:12 pm	06:35 pm
Stm Turbine Date On:	14-Mar	02-Apr	03-Apr	19-Apr	19-Apr	19-Apr	20-Apr	01-May	16-May
Stm Turbine Time Off:	02:08 pm	03:16 am	02:59 am	08:00 am	12:10 pm	03:58 pm	09:29 pm	01:09 pm	11:59 pm
Stm Turbine Date Off:	15-Mar	03-Apr	04-Apr	19-Apr	19-Apr	19-Apr	21-Apr	02-May	16-May
Steam Turbine Time This Run:	33.65	17.27	16.82	0.00	0.00	0.00	42.33	16.95	5.40
Total Steam Turbine Time:	208.97	226.23	243.05	243.05	243.05	243.05	285.38	302.33	307.73
Total Steam Turbine YTD in 1991:	137.4	154.7	171.5	171.5	171.5	171.5	213.8	230.8	236.2
Unit Availability YTD based on Stm Turb:	7.78%	7.00%	7.67%	6.60%	6.59%	6.58%	8.03%	7.88%	7.24%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>>>>	12-2	13-1	13-1 Con't	14-1	14-2	15-1	16-1	17-1	18-1
Run Starting:	12-Mar	01-Apr	01-Apr	17-Apr	19-Apr	19-Apr	19-Apr	25-Apr	15-May
Coal Time On:	04:53 am	10:28 am	12:05 pm	08:00 am	12:10 pm	03:58 pm	04:05 am	09:37 pm	07:42 pm
Coal Date On:	14-Mar	02-Apr	03-Apr	19-Apr	19-Apr	19-Apr	20-Apr	01-May	16-May
Coal Time Off:	02:07 pm	03:13 am	02:59 am	08:00 am	12:10 pm	03:58 pm	09:28 pm	12:04 am	11:59 pm
Coal Date Off:	15-Mar	03-Apr	04-Apr	19-Apr	19-Apr	19-Apr	21-Apr	03-May	16-May
Coal Time This Run:	33.23	16.75	14.90	0.00	0.00	0.00	41.38	26.45	4.28
Coal Time Adjustment									
Total Coal Time:	174.23	190.98	205.88	205.88	205.88	205.88	247.26	273.71	277.99
Total Coal Fire YTD in 1991:	113.3	130.1	145.0	145.0	145.0	145.0	186.4	212.8	217.1
Avail YTD based on Coal Fire:	6.42%	5.88%	6.49%	5.58%	5.57%	5.56%	7.00%	7.27%	6.65%
Coal Time Since Bed Surface Outage:									
Maximum Unit Load Achieved During Run:	35		50	0	0	0	53	48	?
Gross Gen for Run (MWHr):	800	468	338	0	0	0	1416	524	30
Gross Output Factor for this Run:									
Gross Gen for Run (MWHr):	800	468	338	0	0	0	1416	524	30
Gross Output Factor for Run @ 70MW:	33.96%	38.72%	28.71%	0.00%	0.00%	0.00%	47.78%	44.16%	7.94%
Gross Output Factor for Run @ 60MW:	39.62%	45.17%	33.50%	0.00%	0.00%	0.00%	55.75%	51.52%	9.26%
Gross Capacity Factor YTD in 1990:									
Gross Gen YTD:	1741	2209	2547	2547	2547	2547	3963	4487	4517
Gross Capacity Factor @ 70MWG:	1.41%	1.43%	1.63%	1.40%	1.40%	1.40%	2.13%	2.19%	1.98%
Gross Capacity Factor @ 60MWG:	1.64%	1.66%	1.90%	1.63%	1.63%	1.63%	2.48%	2.55%	2.31%

Appendix III - Tidd PFBC Operations Time Log

1991 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>>>>	18-2	19-1	19-2	20-1	21-1	21-1 Con't	22-1	23-1	24-1
Run Starting:	17-May	17-May	19-May	20-May	02-Jun	02-Jun	06-Jun	12-Jun	24-Jun
Summary of Outage Statistics:									
Outage Start Date:	16-May	17-May	18-May	20-May	23-May	03-Jun	04-Jun	07-Jun	15-Jun
Outage Start Time:	11:59 pm	05:54 pm	04:34 pm	12:24 pm	05:20 pm	07:07 pm	12:51 am	11:29 am	04:27 am
Outage End Date:	17-May	18-May	20-May	21-May	03-Jun	03-Jun	06-Jun	13-Jun	24-Jun
Outage End Time:	03:23 pm	05:20 am	10:46 am	02:47 am	12:26 pm	11:05 pm	11:36 pm	02:01 am	12:48 pm
Outage Time in Hours:	15.4	11.4	42.2	14.4	259.1	4.0	70.8	134.5	224.4
YTD Outage Hours:	3043.2	3054.6	3096.8	3111.2	3370.3	3374.3	3445.0	3579.6	3803.9
YTD Hours Till Outage End Time:	3279.4	3293.3	3346.8	3362.8	3684.4	3695.1	3767.6	3914.0	4188.8
Outage Percentage:	92.80%	92.75%	92.53%	92.52%	91.47%	91.32%	91.44%	91.46%	90.81%
Total Calendar Hrs. for Year thru this Run:	3281.9	3304.6	3347.9	3425.3	3691.1	3696.9	3779.5	3964.5	4232.4
Summary of Operating Statistics:									
G.T. Time On:	07:43 am	11:25 pm	01:12 am	08:12 pm	12:55 am	07:07 pm	12:02 pm	05:36 pm	03:35 am
G.T. Date On:	17-May	17-May	20-May	20-May	03-Jun	03-Jun	06-Jun	12-Jun	24-Jun
G.T. Time Off:	07:04 pm	04:34 pm	01:18 pm	08:12 pm	07:07 pm	02:08 am	11:32 am	04:34 am	08:30 am
G.T. Date Off:	17-May	18-May	20-May	23-May	03-Jun	04-Jun	07-Jun	15-Jun	26-Jun
G.T. Time This Run:	11.35	18.87	12.10	72.00	18.20	7.02	30.42	62.57	52.92
Additional GT Time this Run:									
GT Time Adjustment:		-2.43	-0.37	-0.22			-0.60	-3.98	
Total GT Time This Run:	11.35	18.87	12.10	72.00	18.20	7.02	30.42	62.57	52.92
Total G.T. Time:	1039.03	1057.90	1070.00	1142.00	1160.20	1167.22	1197.63	1260.20	1313.12
Total GT Hours YTD in 1991:	581.5	600.3	612.4	684.4	702.6	709.6	740.1	802.6	855.5
Bed Preheater Time On:									
Bed Preheater Time On:	12:12 pm	02:08 am	07:15 am	11:31 pm	08:59 am	08:25 pm	08:55 pm	10:36 pm	09:52 am
Bed Preheater Date On:	17-May	18-May	20-May	20-May	03-Jun	03-Jun	06-Jun	12-Jun	24-Jun
Stm Turbine Time On:									
Stm Turbine Time On:	03:23 pm	05:20 am	10:46 am	02:47 am	12:26 pm	11:05 pm	11:36 pm	02:01 am	12:48 pm
Stm Turbine Date On:	17-May	18-May	20-May	21-May	03-Jun	03-Jun	06-Jun	13-Jun	24-Jun
Stm Turbine Time Off:									
Stm Turbine Time Off:	05:54 pm	04:34 pm	12:24 pm	05:20 pm	07:07 pm	12:51 am	11:29 am	04:27 am	08:30 am
Stm Turbine Date Off:	17-May	18-May	20-May	23-May	03-Jun	04-Jun	07-Jun	15-Jun	26-Jun
Steam Turbine Time This Run:	2.52	11.23	1.63	62.55	6.68	1.77	11.88	50.43	43.70
Total Steam Turbine Time:	310.25	321.48	323.12	385.67	392.35	394.12	406.00	456.43	500.13
Total Steam Turbine YTD in 1991:	238.7	249.9	251.6	314.1	320.8	322.6	334.5	384.9	428.6
Unit Availability YTD based on Stm Turb:	7.27%	7.56%	7.51%	9.17%	8.69%	8.73%	8.85%	9.71%	10.13%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>>>>	18-2	19-1	19-2	20-1	21-1	21-1 Con't	22-1	23-1	24-1
Run Starting:	17-May	17-May	19-May	20-May	02-Jun	02-Jun	06-Jun	12-Jun	24-Jun
Coal Time On:	04:14 pm	05:53 am	11:52 am	04:06 am	06:21 pm	11:20 pm	04:19 am	02:43 am	01:07 pm
Coal Date On:	17-May	18-May	20-May	21-May	03-Jun	03-Jun	07-Jun	13-Jun	24-Jun
Coal Time Off:	05:54 pm	04:34 pm	11:52 am	05:16 pm	07:07 pm	12:51 am	11:28 am	04:27 am	08:26 am
Coal Date Off:	17-May	18-May	20-May	23-May	03-Jun	04-Jun	07-Jun	15-Jun	26-Jun
Coal Time This Run:	1.67	10.68	0.00	61.17	0.77	1.52	7.15	49.73	43.32
Coal Time Adjustment		-0.126							
Total Coal Time:	279.66	290.22	290.22	351.38	352.15	353.67	360.82	410.55	453.87
Total Coal Fire YTD in 1991:	218.8	229.3	229.3	290.5	291.3	292.8	299.9	349.7	393.0
Avail YTD based on Coal Fire:	6.67%	6.94%	6.85%	8.48%	7.89%	7.92%	7.94%	8.82%	9.28%
Coal Time Since Bed Surface Outage:									
Maximum Unit Load Achieved During Run:	0	42	0	42	0	0	24	39	50
Gross Gen for Run (MWHr):	0	269	0	2029	11	0	102	1447	1259
Gross Output Factor for this Run:									
Gross Gen for Run (MWHr):	0	269	0	2029	11	0	102	1447	1259
Gross Output Factor for Run @ 70MW:	0.00%	34.21%	0.00%	46.34%	2.35%	0.00%	12.26%	40.99%	41.16%
Gross Output Factor for Run @ 60MW:	0.00%	39.91%	0.00%	54.06%	2.74%	0.00%	14.31%	47.82%	48.02%
Gross Capacity Factor YTD in 1990:									
Gross Gen YTD:	4517	4786	4786	6815	6826	6826	6928	8375	9634
Gross Capacity Factor @ 70MWG:	1.97%	2.07%	2.04%	2.84%	2.64%	2.64%	2.62%	3.02%	3.25%
Gross Capacity Factor @ 60MWG:	2.29%	2.41%	2.38%	3.32%	3.08%	3.08%	3.06%	3.52%	3.79%

Appendix III - Tidd PFBC Operations Time Log

1991 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>>>>	24-1 Con't.	24-2	25-1	26-1	27-1	28-1	29-1	30-1	31-1
Run Starting:	24-Jun	28-Jun	21-Jul	28-Jul	08-Aug	08-Aug	22-Aug	24-Aug	03-Sep
Summary of Outage Statistics:									
Outage Start Date:	26-Jun	27-Jun	01-Jul	23-Jul	01-Aug	08-Aug	13-Aug	24-Aug	25-Aug
Outage Start Time:	08:30 am	07:29 am	10:27 pm	03:07 am	05:16 am	11:22 am	04:40 pm	03:09 am	03:45 pm
Outage End Date:	26-Jun	28-Jun	22-Jul	29-Jul	08-Aug	09-Aug	24-Aug	24-Aug	05-Sep
Outage End Time:	06:52 pm	10:48 am	01:08 pm	10:56 am	11:22 am	01:46 am	03:09 am	02:08 pm	01:49 am
Outage Time in Hours:	10.4	27.3	494.7	151.8	174.1	14.4	250.5	11.0	250.1
YTD Outage Hours:	3814.3	3841.6	4336.3	4488.1	4662.2	4676.6	4927.1	4938.1	5188.1
YTD Hours Till Outage End Time:	4242.9	4282.8	4861.1	5026.9	5267.4	5281.8	5643.2	5654.1	5929.8
Outage Percentage:	89.90%	89.70%	89.20%	89.28%	88.51%	88.54%	87.31%	87.34%	87.49%
Total Calendar Hrs. for Year thru this Run:									
	4255.4	4366.4	4875.1	5093.3	5267.4	5392.7	5643.2	5679.7	5929.8
Summary of Operating Statistics:									
G.T. Time On:	08:30 am	04:11 am	11:38 pm	10:06 pm	09:32 am	05:03 pm	03:31 pm	08:21 am	02:52 pm
G.T. Date On:	26-Jun	28-Jun	21-Jul	28-Jul	08-Aug	08-Aug	23-Aug	24-Aug	04-Sep
G.T. Time Off:	07:27 am	10:20 am	04:04 am	12:00 pm	11:22 am	04:47 pm	03:09 am	08:03 pm	01:49 am
G.T. Date Off:	27-Jun	02-Jul	23-Jul	01-Aug	08-Aug	13-Aug	24-Aug	25-Aug	05-Sep
G.T. Time This Run:	22.95	102.15	28.43	85.90	1.83	119.73	11.63	35.70	10.95
Additional GT Time this Run:									
GT Time Adjustment:		-0.43		-0.27					
Total GT Time This Run:	22.95	102.15	28.43	85.90	1.83	119.73	11.63	35.70	10.95
Total G.T. Time:	1336.07	1438.22	1466.65	1552.55	1554.38	1674.12	1685.75	1721.45	1732.40
Total GT Hours YTD in 1991:	878.5	980.6	1009.1	1095.0	1096.8	1216.5	1228.2	1263.9	1274.8
Bed Preheater Time On:									
	03:31 pm	08:17 am	08:46 am	07:35 am	11:22 am	10:53 pm	11:57 pm	10:27 am	12:44 am
Bed Preheater Date On:									
	26-Jun	28-Jun	22-Jul	29-Jul	08-Aug	08-Aug	23-Aug	24-Aug	05-Sep
Stm Turbine Time On:									
	06:52 pm	10:48 am	01:08 pm	10:56 am	11:22 am	01:46 am	03:09 am	02:08 pm	01:49 am
Stm Turbine Date On:									
	26-Jun	28-Jun	22-Jul	29-Jul	08-Aug	09-Aug	24-Aug	24-Aug	05-Sep
Stm Turbine Time Off:									
	07:29 am	10:27 pm	03:07 am	05:16 am	11:22 am	04:40 pm	03:09 am	03:45 pm	01:49 am
Stm Turbine Date Off:									
	27-Jun	01-Jul	23-Jul	01-Aug	08-Aug	13-Aug	24-Aug	25-Aug	05-Sep
Steam Turbine Time This Run:									
	12.62	83.65	13.98	66.33	0.00	110.90	0.00	25.62	0.00
Total Steam Turbine Time:									
	512.75	596.40	610.38	676.72	676.72	787.62	787.62	813.23	813.23
Total Steam Turbine YTD in 1991:									
	441.2	524.9	538.8	605.2	605.2	716.1	716.1	741.7	741.7
Unit Availability YTD based on Stm Turb:									
	10.37%	12.02%	11.05%	11.88%	11.49%	13.28%	12.69%	13.06%	12.51%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1991									
RUN # Starting with 91-01-01 >>>>>	24-1 Con't.	24-2	25-1	26-1	27-1	28-1	29-1	30-1	31-1
Run Starting:	24-Jun	28-Jun	21-Jul	28-Jul	08-Aug	08-Aug	22-Aug	24-Aug	03-Sep
Coal Time On:	06:56 pm	11:20 am	05:07 pm	11:35 am	11:22 am	02:55 am	03:09 am	02:56 pm	01:49 am
Coal Date On:	26-Jun	28-Jun	22-Jul	29-Jul	08-Aug	09-Aug	24-Aug	24-Aug	05-Sep
Coal Time Off:	07:24 am	10:23 pm	03:06 am	05:15 am	11:22 am	04:39 pm	03:09 am	03:43 pm	01:49 am
Coal Date Off:	27-Jun	01-Jul	23-Jul	01-Aug	08-Aug	13-Aug	24-Aug	25-Aug	05-Sep
Coal Time This Run:	12.47	83.05	9.98	65.67	0.00	109.73	0.00	24.78	0.00
Coal Time Adjustment									
Total Coal Time:	466.33	549.38	559.37	625.03	625.03	734.77	734.77	759.55	759.55
Total Coal Fire YTD in 1991:	405.4	488.5	498.5	564.1	564.1	673.9	673.9	698.7	698.7
Avail YTD based on Coal Fire:	9.53%	11.19%	10.22%	11.08%	10.71%	12.50%	11.94%	12.30%	11.78%
Coal Time Since Bed Surface Outage:									
Maximum Unit Load Achieved During Run:	50	50	20	33	0	36	0	38	0
Gross Gen for Run (MWhr):	364	3473	144	1715	0	3264	0	618	0
Gross Output Factor for this Run:									
Gross Gen for Run (MWhr):	364	3473	144	1715	0	3264	0	618	0
Gross Output Factor for Run @ 70MW:	41.22%	59.31%	14.71%	36.93%	0.00%	42.05%	0.00%	34.46%	0.00%
Gross Output Factor for Run @ 60MW:	48.08%	69.20%	17.16%	43.09%	0.00%	49.05%	0.00%	40.21%	0.00%
Gross Capacity Factor YTD in 1990:									
Gross Gen YTD:	9998	13471	13615	15330	15330	18594	18594	19212	19212
Gross Capacity Factor @ 70MWG:	3.36%	4.41%	3.99%	4.30%	4.16%	4.93%	4.71%	4.83%	4.63%
Gross Capacity Factor @ 60MWG:	3.92%	5.14%	4.65%	5.02%	4.85%	5.75%	5.49%	5.64%	5.40%

Appendix III - Tidd PFBC Operations Time Log

1991 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1991							
RUN # Starting with 91-01-01 >>>>>	32-1	32-1 Con't	33-1	34-1	35-1	36-1	36-1 Con't.
Run Starting:	05-Sep	05-Sep	11-Sep	07-Dec	12-Dec	15-Dec	15-Dec
Summary of Outage Statistics:							
Outage Start Date:	05-Sep	05-Sep	08-Sep	12-Sep	10-Dec	12-Dec	17-Dec
Outage Start Time:	01:49 am	11:28 pm	12:07 pm	07:30 am	12:15 am	10:36 pm	07:14 pm
Outage End Date:	05-Sep	06-Sep	12-Sep	09-Dec	12-Dec	17-Dec	18-Dec
Outage End Time:	05:52 pm	04:58 am	07:30 am	11:47 pm	10:36 pm	02:00 am	12:39 am
Outage Time in Hours:	16.1	5.5	91.4	2128.3	70.4	99.4	5.4
YTD Outage Hours:	5204.2	5209.7	5301.1	7429.4	7499.7	7599.1	7604.5
YTD Hours Till Outage End Time:	5945.9	5957.0	6103.5	8231.8	8302.6	8402.0	8424.7
Outage Percentage:	87.53%	87.46%	86.85%	90.25%	90.33%	90.44%	90.27%
Total Calendar Hrs. for Year thru this Run:	5951.5	6012.1	6103.5	8232.2	8302.6	8419.2	8451.0
Summary of Operating Statistics:	Comb. Trip						
G.T. Time On:	05:20 am	11:28 pm	05:52 pm	01:20 pm	01:21 pm	04:17 pm	07:09 pm
G.T. Date On:	05-Sep	05-Sep	11-Sep	08-Dec	12-Dec	16-Dec	17-Dec
G.T. Time Off:	11:28 pm	04:18 pm	07:30 am	04:11 am	01:03 am	07:09 pm	04:45 am
G.T. Date Off:	05-Sep	08-Sep	12-Sep	10-Dec	13-Dec	17-Dec	19-Dec
G.T. Time This Run:	18.13	64.83	13.63	38.85	11.70	26.87	33.60
Additional GT Time this Run:							
GT Time Adjustment:					-0.46		
Total GT Time This Run:	18.13	64.83	13.63	38.85	11.70	26.87	33.60
Total G.T. Time:	1750.53	1815.37	1829.00	1867.85	1879.55	1906.42	1940.02
Total GT Hours YTD in 1991:	1293.0	1357.8	1371.4	1410.3	1422.0	1448.8	1482.4
Bed Preheater Time On:	02:47 pm	02:26 am	07:30 am	09:10 pm	07:58 pm	09:39 pm	09:46 pm
Bed Preheater Date On:	05-Sep	06-Sep	12-Sep	09-Dec	12-Dec	16-Dec	17-Dec
Stm Turbine Time On:	05:52 pm	04:58 am	07:30 am	11:47 pm	10:36 pm	02:00 am	12:39 am
Stm Turbine Date On:	05-Sep	06-Sep	12-Sep	09-Dec	12-Dec	17-Dec	18-Dec
Stm Turbine Time Off:	11:28 pm	12:07 pm	07:30 am	12:15 am	10:36 pm	07:14 pm	03:06 am
Stm Turbine Date Off:	05-Sep	08-Sep	12-Sep	10-Dec	12-Dec	17-Dec	19-Dec
Steam Turbine Time This Run:	5.60	55.15	0.00	0.47	0.00	17.23	26.45
Total Steam Turbine Time:	818.83	873.98	873.98	874.45	874.45	891.68	918.13
Total Steam Turbine YTD in 1991:	747.3	802.4	802.4	802.9	802.9	820.1	846.6
Unit Availability YTD based on Stm Turb:	12.56%	13.35%	13.15%	9.75%	9.67%	9.74%	10.02%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1991							
RUN # Starting with 91-01-01 >>>>>	32-1	32-1 Con't	33-1	34-1	35-1	36-1	36-1 Con't.
Run Starting:	05-Sep	05-Sep	11-Sep	07-Dec	12-Dec	15-Dec	15-Dec
Coal Time On:	08:01 pm	05:11 am	07:30 am	12:13 am	10:36 pm	05:03 am	02:40 am
Coal Date On:	05-Sep	06-Sep	12-Sep	10-Dec	12-Dec	17-Dec	18-Dec
Coal Time Off:	11:28 pm	12:05 pm	07:30 am	12:13 am	10:36 pm	07:09 pm	03:00 am
Coal Date Off:	05-Sep	08-Sep	12-Sep	10-Dec	12-Dec	17-Dec	19-Dec
Coal Time This Run:	3.45	54.90	0.00	0.00	0.00	14.10	24.33
Coal Time Adjustment							
Total Coal Time:	763.00	817.90	817.90	817.90	817.90	832.00	856.34
Total Coal Fire YTD in 1991:	702.1	757.0	757.0	757.0	757.0	771.1	795.4
Avail YTD based on Coal Fire:	11.80%	12.59%	12.40%	9.20%	9.12%	9.16%	9.41%
Coal Time Since Bed Surface Outage:				0.0	0.0	14.1	24.3
Maximum Unit Load Achieved During Run:	?	39	0	0	0	41	41
Gross Gen for Run (MWhr):	170	1672	0	0	0	423	646
Gross Output Factor for this Run:							
Gross Gen for Run (MWhr):	170	1672	0	0	0	423	646
Gross Output Factor for Run @ 70MW:	43.37%	43.31%	0.00%	0.00%	0.00%	35.06%	34.89%
Gross Output Factor for Run @ 60MW:	50.60%	50.53%	0.00%	0.00%	0.00%	40.91%	40.71%
Gross Capacity Factor YTD in 1990:							
Gross Gen YTD:	19382	21054	21054	21054	21054	21477	22123
Gross Capacity Factor @ 70MWG:	4.65%	5.00%	4.93%	3.65%	3.62%	3.64%	3.74%
Gross Capacity Factor @ 60MWG:	5.43%	5.84%	5.75%	4.26%	4.23%	4.25%	4.36%

Appendix III - Tidd PFBC Operations Time Log

1991 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1991				
RUN # Starting with 91-01-01 >>>>>	End of 1991	Average	Min	Max
Run Starting:				
Summary of Outage Statistics:				
Outage Start Date:	19-Dec			
Outage Start Time:	03:06 am			
Outage End Date:	31-Dec			
Outage End Time:	11:59 pm			
Outage Time in Hours:	308.9	146.2	0.0	2128.3
YTD Outage Hours:	7913.4			
YTD Hours Till Outage End Time:	8760.0			
Outage Percentage:	90.34%			
Total Calendar Hrs. for Year thru this Run:	8760.0			
Summary of Operating Statistics:				
G.T. Time On:				
G.T. Date On:				
G.T. Time Off:				
G.T. Date Off:				
G.T. Time This Run:		28.5	0.0	119.7
Additional GT Time this Run:				
GT Time Adjustment:	-26.42			
Total GT Time This Run:	0.00			
Total G.T. Time:	1940.02			
Total GT Hours YTD in 1991:	1482.4			
Bed Preheater Time On:				
Bed Preheater Date On:				
Stm Turbine Time On:				
Stm Turbine Date On:				
Stm Turbine Time Off:				
Stm Turbine Date Off:				
Steam Turbine Time This Run:		16.3	0.0	110.9
Total Steam Turbine Time:	918.13			
Total Steam Turbine YTD in 1991:	846.6			
Unit Availability YTD based on Stm Turb:	9.66%			

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1991				
RUN # Starting with 91-01-01 >>>>>	End of 1991	Average	Min	Max
Run Starting:				
Coal Time On:				
Coal Date On:				
Coal Time Off:	11:59 pm			
Coal Date Off:	31-Dec			
Coal Time This Run:		15.3	0.0	109.7
Coal Time Adjustment	-0.166			
Total Coal Time:	856.17			
Total Coal Fire YTD in 1991:	795.3			
Avail YTD based on Coal Fire:	9.08%			
Coal Time Since Bed Surface Outage:	24.3			
Maximum Unit Load Achieved During Run:		15.8	0.0	53.0
Gross Gen for Run (MWHr):		425.4	0.0	3473.0
Gross Output Factor for this Run:				
Gross Gen for Run (MWHr):				
Gross Output Factor for Run @ 70MW:		17.45%	0.00%	59.31%
Gross Output Factor for Run @ 60MW:		20.35%	0.00%	69.20%
Gross Capacity Factor YTD in 1990:				
Gross Gen YTD:	22123			
Gross Capacity Factor @ 70MWG:	3.61%			
Gross Capacity Factor @ 60MWG:	4.21%			

Appendix III - Tidd PFBC Operations Time Log

1992 Operating Hours Data

Tidd PFBC Operations Time Log - Year 1992		Printed on: 16-Aug-94						
RUN # Starting with 92-01-01 >>	Start of 1992 Year	1-1	1-2	1-2	2-1	2-2	2-2	3-1
Run Starting:		08-Jan	11-Jan	11-Jan	12-Jan	13-Jan	13-Jan	21-Jan
Summary of Outage Statistics:								
Outage Start Date:		01-Jan	10-Jan	11-Jan	11-Jan	12-Jan	14-Jan	16-Jan
Outage Start Time:		12:00 am	11:30 pm	12:31 pm	09:39 pm	09:29 pm	06:38 am	12:59 am
Outage End Date:		09-Jan	11-Jan	11-Jan	12-Jan	13-Jan	14-Jan	21-Jan
Outage End Time:		07:51 pm	08:31 am	04:58 pm	06:42 pm	05:45 pm	11:46 pm	04:00 pm
Outage Time in Hours:		211.9	9.0	4.5	21.1	20.3	17.1	135.0
YTD Outage Hours:		211.9	220.9	225.3	246.4	266.6	283.8	418.8
YTD Hours Till Outage End Time:		211.85	248.52	256.97	282.70	305.75	335.77	496.00
Outage Percentage:		100.00%	88.87%	87.68%	87.15%	87.21%	84.51%	84.43%
Total Calendar Hrs. for Year thru this Run:								
		239.5	252.5	261.7	285.5	318.6	361.0	590.1
Summary of Operating Statistics:								
Maint. Rel. Date		08-Jan	08-Jan	08-Jan				20-Jan
Maint. Rel. Time		03:42 pm	03:42 pm	03:42 pm				03:35 pm
GT Trip								
G.T. Time On:		11:20 am	04:15 am	04:15 am	11:38 am	08:14 am	08:14 am	08:22 am
G.T. Date On:		09-Jan	11-Jan	11-Jan	12-Jan	13-Jan	13-Jan	21-Jan
G.T. Time Off:		12:53 am	04:15 am	09:43 pm	09:29 pm	08:14 am	04:29 am	02:07 pm
G.T. Date Off:		11-Jan	11-Jan	11-Jan	12-Jan	13-Jan	16-Jan	25-Jan
G.T. Time This Run:		37.55	0.00	17.47	9.85	0.00	68.25	101.75
Additional GT Time this Run:								
GT Time Adjustment:							3.28	
Total GT Time This Run:		37.55	0.00	17.47	9.85	0.00	71.53	101.75
Total G.T. Time:	1940.02	1977.57	1977.57	1995.03	2004.88	2004.88	2076.41	2178.16
Total GT Hours YTD in 1991:		37.55	37.55	55.02	64.87	64.87	136.40	238.15
Bed Preheater Time On:								
Bed Preheater Time On:		04:09 pm	06:14 am	02:32 pm	03:01 pm	02:43 pm	09:57 pm	01:17 pm
Bed Preheater Date On:		09-Jan	11-Jan	11-Jan	12-Jan	13-Jan	14-Jan	21-Jan
Stm Turbine Time On:								
Stm Turbine Time On:		07:51 pm	08:31 am	04:58 pm	06:42 pm	05:45 pm	11:46 pm	04:00 pm
Stm Turbine Date On:		09-Jan	11-Jan	11-Jan	12-Jan	13-Jan	14-Jan	21-Jan
Serv. Hrs./Stm Tb This Run:		27.65	4.00	4.68	2.78	12.88	25.22	94.12
Total Steam Turbine Hours YTD in 1992:	0.00	27.65	31.65	36.33	39.12	52.00	77.22	171.33
Unit Availability YTD based on Stm Turb hrs:								
		11.54%	12.53%	13.89%	13.70%	16.32%	21.39%	29.03%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1992		Printed on: 16-Aug-94						
RUN # Starting with 92-01-01 >>	Start of 1992 Year	1-1	1-2	1-2	2-1	2-2	2-2	3-1
Run Starting:		08-Jan	11-Jan	11-Jan	12-Jan	13-Jan	13-Jan	21-Jan
Coal Time On:		12:34 am	09:44 am	09:39 pm	09:08 pm	09:00 pm	02:58 am	06:52 pm
Coal Date On:		10-Jan	11-Jan	11-Jan	12-Jan	13-Jan	15-Jan	21-Jan
Coal Time Off:		11:30 pm	12:31 pm	09:39 pm	09:29 pm	06:38 am	12:59 am	02:07 pm
Coal Date Off:		10-Jan	11-Jan	11-Jan	12-Jan	14-Jan	16-Jan	25-Jan
Coal Time This Run:		22.93	2.78	0.00	0.35	9.63	22.02	91.25
Coal Time Adjustment							-0.21	
Total Coal Time:	856.17	879.10	881.89	881.89	882.24	891.87	913.68	1004.93
Total Coal Fire YTD in 1992:		22.9	25.7	25.7	26.1	35.7	57.7	149.0
Avail YTD based on Coal Fire:		9.58%	10.18%	9.83%	9.13%	11.20%	15.99%	25.24%
Coal Time Since '91 Bed Surface Outage:	24.33	47.3	50.1	50.1	50.4	60.0	82.1	173.3
Coal Time Since '92 Turbine Outage:								
Maximum Unit Load Achieved During Run:		41	0	8	2	0	71	69
Gross Gen for Run (MWHr):		435	0	31	3	0	678	4629
Gross Output Factor for this Run:								
Gross Gen for Run (MWHr):		435	0	31	3	0	678	4629
Gross Output Factor for Run @ 70MW:		22.47%	0.00%	5.10%	1.54%	0.00%	25.42%	70.26%
Gross Output Factor for Run @ 60MW:		26.22%	0.00%	5.95%	1.80%	0.00%	29.66%	81.97%
Gross Capacity Factor YTD in 1992:								
Gross Gen YTD:	0.00	435	435	466	469	469	1147	5776
Gross Capacity Factor @ 70MWG:		2.59%	2.46%	2.54%	2.35%	2.10%	4.54%	13.98%
Gross Capacity Factor @ 60MWG:		3.03%	2.87%	2.97%	2.74%	2.45%	5.30%	16.31%

Appendix III - Tidd PFBC Operations Time Log

1992 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1992									
RUN # Starting with 92-01-01 >>	4-1	5-1	5-2	6-1	7-1	7-2	8-1	9-1	9-1 Con't
Run Starting:	02-Feb	15-Feb	16-Feb	28-Feb	15-Mar	17-Mar	23-May	07-Jun	08-Jun
Summary of Outage Statistics:									
Outage Start Date:	25-Jan	10-Feb	16-Feb	21-Feb	04-Mar	16-Mar	17-Mar	23-May	09-Jun
Outage Start Time:	02:07 pm	10:59 am	12:00 am	03:45 am	05:53 pm	08:49 am	12:00 am	07:41 am	02:11 am
Outage End Date:	03-Feb	16-Feb	17-Feb	29-Feb	15-Mar	17-Mar	21-May	08-Jun	09-Jun
Outage End Time:	05:03 pm	12:00 am	06:15 am	02:27 am	01:59 am	12:00 am	02:11 pm	02:12 pm	01:36 pm
Outage Time in Hours:	218.9	133.0	30.3	190.7	248.1	15.2	1574.2	390.5	11.4
YTD Outage Hours:	637.7	770.7	801.0	991.7	1239.8	1255.0	2829.2	3219.7	3231.1
YTD Hours Till Outage End Time:	809.05	1104.00	1134.25	1418.45	1777.98	1824.00	3398.18	3830.20	3853.60
Outage Percentage:	78.82%	69.81%	70.62%	69.91%	69.73%	68.80%	83.25%	84.06%	83.85%
Total Calendar Hrs. for Year thru this Run:									
	971.0	1104.0	1227.8	1529.9	1808.8	1824.0	3439.7	3842.2	4598.0
Summary of Operating Statistics:									
		GT Trip			Crusher Problems			Comb. Trip	
Maint. Rel. Date	02-Feb	15-Feb	15-Feb	27-Feb	14-Mar	14-Mar	19-May	07-Jun	07-Jun
Maint. Rel. Time	04:00 pm	08:03 pm	08:03 pm	08:04 pm	04:37 pm	04:37 pm	03:45 pm	09:47 am	09:47 am
G.T. Time On:	09:39 am	04:50 pm	03:12 am	03:32 pm	01:47 pm	05:19 am	07:17 pm	06:04 am	06:04 am
G.T. Date On:	03-Feb	16-Feb	17-Feb	28-Feb	15-Mar	17-Mar	20-May	08-Jun	08-Jun
G.T. Time Off:	02:58 pm	10:43 pm	09:43 am	02:04 am	11:43 am	04:52 pm	07:41 am	06:04 am	08:25 pm
G.T. Date Off:	10-Feb	16-Feb	21-Feb	05-Mar	16-Mar	17-Mar	23-May	08-Jun	10-Jul
G.T. Time This Run:	173.32	5.88	102.52	130.53	21.93	11.55	60.40	0.00	782.35
Additional GT Time this Run:									
GT Time Adjustment:			-0.08	0.63		-0.03	11		
Total GT Time This Run:	173.32	5.88	102.44	131.16	21.93	11.52	71.40	0.00	782.35
Total G.T. Time:	2351.48	2357.36	2459.80	2590.96	2612.90	2624.42	2695.82	2695.82	3478.17
Total GT Hours YTD in 1991:	411.46	417.35	519.78	650.95	672.88	684.40	755.80	755.80	1538.15
Bed Preheater Time On:									
	02:44 pm	10:12 pm	04:06 am	09:47 pm	08:35 pm	12:00 am	04:29 am	10:48 am	09:50 am
Bed Preheater Date On:									
	03-Feb	16-Feb	17-Feb	28-Feb	15-Mar	17-Mar	21-May	08-Jun	09-Jun
Stm Turbine Time On:									
	05:03 pm	12:00 am	06:15 am	02:27 am	01:59 am	12:00 am	02:11 pm	02:12 pm	01:36 pm
Stm Turbine Date On:									
	03-Feb	16-Feb	17-Feb	29-Feb	15-Mar	17-Mar	21-May	08-Jun	09-Jun
Serv. Hrs./Stm Tb This Run:	161.93	0.00	93.50	111.43	30.83	0.00	41.50	11.98	744.40
Total Steam Turbine Hours YTD in 1992:	333.27	333.27	426.77	538.20	569.03	569.03	610.53	622.52	1366.92
Unit Availability YTD based on Stm Turb hrs:									
	34.32%	30.19%	34.76%	35.18%	31.46%	31.20%	17.75%	16.20%	29.73%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1992									
RUN # Starting with 92-01-01 >>	4-1	5-1	5-2	6-1	7-1	7-2	8-1	9-1	9-1 Con't
Run Starting:	02-Feb	15-Feb	16-Feb	28-Feb	15-Mar	17-Mar	23-May	07-Jun	08-Jun
Coal Time On:	12:52 am	12:00 am	07:02 pm	06:08 am	08:49 am	12:00 am	08:26 pm	06:05 pm	06:00 pm
Coal Date On:	04-Feb	16-Feb	17-Feb	29-Feb	16-Mar	17-Mar	21-May	08-Jun	09-Jun
Coal Time Off:	10:59 am	12:00 am	03:45 am	05:53 pm	08:49 am	12:00 am	07:41 am	02:11 am	02:00 pm
Coal Date Off:	10-Feb	16-Feb	21-Feb	04-Mar	16-Mar	17-Mar	23-May	09-Jun	10-Jul
Coal Time This Run:	154.12	0.00	80.72	107.75	0.00	0.00	35.25	8.10	740.00
Coal Time Adjustment									
Total Coal Time:	1159.04	1159.04	1239.76	1347.51	1347.51	1347.51	1382.76	1390.86	2130.86
Total Coal Fire YTD in 1992:	303.1	303.1	383.8	491.6	491.6	491.6	526.8	534.9	1274.9
Avail YTD based on Coal Fire:	31.21%	27.45%	31.26%	32.13%	27.18%	26.95%	15.32%	13.92%	27.73%
Coal Time Since '91 Bed Surface Outage:	327.4	327.4	408.1	515.9	515.9	515.9	551.1	559.2	1299.2
Coal Time Since '92 Turbine Outage:							35.25	43.35	783.35
Maximum Unit Load Achieved During Run:	70	0	68	66	0	0	66	0	68
Gross Gen for Run (MWhr):	8211	0	2272	5356	0	0	1275	0	35395
Gross Output Factor for this Run:									
Gross Gen for Run (MWhr):	8211	0	2272	5356	0	0	1275	0	35395
Gross Output Factor for Run @ 70MW:	72.44%	0.00%	34.71%	68.66%	0.00%	0.00%	43.89%	0.00%	66.85%
Gross Output Factor for Run @ 60MW:	84.51%	0.00%	40.50%	80.11%	0.00%	0.00%	51.20%	0.00%	77.99%
Gross Capacity Factor YTD in 1992:									
Gross Gen YTD:	13987	13987	16259	21615	21615	21615	22890	22890	58285
Gross Capacity Factor @ 70MWG:	20.58%	18.10%	18.92%	20.18%	17.07%	16.93%	9.51%	8.51%	18.11%
Gross Capacity Factor @ 60MWG:	24.01%	21.12%	22.07%	23.55%	19.92%	19.75%	11.09%	9.93%	21.13%

Appendix III - Tidd PFBC Operations Time Log

1992 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1992									
RUN # Starting with 92-01-01 >>	10-1	11-1	11-2	12-1	13-1	13-1 Con't	14-1	14-2	14-3
Run Starting:	26-Jul	01-Aug	03-Aug	08-Aug	13-Sep	13-Sep	19-Sep	21-Sep	22-Sep
Summary of Outage Statistics:									
Outage Start Date:	10-Jul	27-Jul	02-Aug	04-Aug	27-Aug	15-Sep	15-Sep	21-Sep	22-Sep
Outage Start Time:	02:00 pm	01:00 pm	10:45 pm	08:21 am	03:41 am	01:36 am	11:15 am	01:28 am	01:39 am
Outage End Date:	27-Jul	02-Aug	03-Aug	09-Aug	14-Sep	15-Sep	20-Sep	22-Sep	22-Sep
Outage End Time:	09:03 am	01:53 pm	09:11 am	12:54 pm	07:06 pm	04:43 am	09:47 pm	01:39 am	03:53 pm
Outage Time in Hours:	403.1	144.9	10.4	124.6	447.4	3.1	130.5	24.2	14.2
YTD Outage Hours:	3634.1	3779.0	3789.5	3914.0	4361.4	4364.5	4495.1	4519.3	4533.5
YTD Hours Till Outage End Time:	5001.05	5149.88	5169.18	5316.90	6187.10	6196.72	6333.78	6361.65	6375.88
Outage Percentage:	72.67%	73.38%	73.31%	73.61%	70.49%	70.43%	70.97%	71.04%	71.10%
Total Calendar Hrs. for Year thru this Run:	5005.0	5158.8	5192.4	5739.7	6193.6	6203.3	6337.5	6361.7	6413.2
Summary of Operating Statistics:		Clean nozzles					Comb Trip		
Maint. Rel. Date	25-Jul	01-Aug		08-Aug	13-Sep	13-Sep			
Maint. Rel. Time	03:00 pm	10:25 am		02:35 pm	10:53 am	10:53 am			
G.T. Time On:	09:11 pm	02:19 am	05:11 am	11:37 pm	10:51 pm	01:36 am	01:32 pm	09:07 pm	10:01 am
G.T. Date On:	26-Jul	02-Aug	03-Aug	08-Aug	13-Sep	15-Sep	20-Sep	21-Sep	22-Sep
G.T. Time Off:	?????	11:35 pm	11:54 am	10:28 am	01:36 am	12:57 pm	05:43 am	01:39 am	10:14 am
G.T. Date Off:	26-Jul	02-Aug	04-Aug	27-Aug	15-Sep	15-Sep	21-Sep	22-Sep	24-Sep
G.T. Time This Run:	???	21.27	30.72	442.85	26.75	11.35	16.18	4.53	48.22
Additional GT Time this Run:									
GT Time Adjustment:	??????20.27								
Total GT Time This Run:	20.27	21.27	30.72	442.85	26.75	11.35	16.18	4.53	48.22
Total G.T. Time:	3498.44	3519.70	3550.42	3993.27	4020.02	4031.37	4047.55	4052.09	4100.30
Total GT Hours YTD in 1991:	1558.42	1579.69	1610.40	2053.25	2080.00	2091.35	2107.54	2112.07	2160.29
Bed Preheater Time On:	04:05 am	08:52 am	05:58 am	05:58 am	08:01 am	02:08 am	07:22 pm	01:39 am	12:42 pm
Bed Preheater Date On:	25-Jul	02-Aug	03-Aug	09-Aug	14-Sep	15-Sep	20-Sep	22-Sep	22-Sep
Stm Turbine Time On:	09:03 am	01:53 pm	09:11 am	12:54 pm	07:06 pm	04:43 am	09:47 pm	01:39 am	03:53 pm
Stm Turbine Date On:	27-Jul	02-Aug	03-Aug	09-Aug	14-Sep	15-Sep	20-Sep	22-Sep	22-Sep
Serv. Hrs./Stm Tb This Run:	3.95	8.87	23.17	422.78	6.50	6.53	3.68	0.00	37.28
Total Steam Turbine Hours YTD in 1992:	1370.87	1379.73	1402.90	1825.68	1832.18	1838.72	1842.40	1842.40	1879.68

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1992									
RUN # Starting with 92-01-01 >>	10-1	11-1	11-2	12-1	13-1	13-1 Con't	14-1	14-2	14-3
Run Starting:	26-Jul	01-Aug	03-Aug	08-Aug	13-Sep	13-Sep	19-Sep	21-Sep	22-Sep
Unit Availability YTD based on Stm Turb hrs:	27.39%	26.75%	27.02%	31.81%	29.58%	29.64%	29.07%	28.96%	29.31%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1992									
RUN # Starting with 92-01-01 >>	10-1	11-1	11-2	12-1	13-1	13-1 Con't	14-1	14-2	14-3
Run Starting:	26-Jul	01-Aug	03-Aug	08-Aug	13-Sep	13-Sep	19-Sep	21-Sep	22-Sep
Coal Time On:	12:47 pm	10:45 pm	12:31 pm	01:49 pm	01:32 am	11:15 am	01:21 am	01:39 am	07:44 pm
Coal Date On:	27-Jul	02-Aug	03-Aug	09-Aug	15-Sep	15-Sep	21-Sep	22-Sep	22-Sep
Coal Time Off:	01:00 pm	10:45 pm	08:21 am	03:41 am	01:36 am	11:15 am	01:28 am	01:39 am	05:10 am
Coal Date Off:	27-Jul	02-Aug	04-Aug	27-Aug	15-Sep	15-Sep	21-Sep	22-Sep	24-Sep
Coal Time This Run:	0.22	0.00	19.83	421.87	0.07	0.00	0.12	0.00	33.43
Coal Time Adjustment			-3.76	-2.41					
Total Coal Time:	2131.08	2131.08	2147.15	2566.61	2566.67	2566.67	2566.79	2566.79	2600.22
Total Coal Fire YTD in 1992:	1275.1	1275.1	1295.0	1716.8	1716.9	1716.9	1717.0	1717.0	1750.4
Avail YTD based on Coal Fire:	25.48%	24.72%	24.94%	29.91%	27.72%	27.68%	27.09%	26.99%	27.29%
Coal Time Since '91 Bed Surface Outage:	1299.5	1299.5	1319.3	1741.2	1741.2	1741.2	1741.3	1741.3	1774.8
Coal Time Since '92 Turbine Outage:	783.57	783.57	803.40	1225.27	1225.33	1225.33	1225.45	1225.45	1258.88
Maximum Unit Load Achieved During Run:	0	0	13	56	0	0	0	0	59
Gross Gen for Run (MWhr):	2	7	182	19342	18	0	2	0	1143
Gross Output Factor for this Run:									
Gross Gen for Run (MWhr):	2	7	182	19342	18	0	2	0	1143
Gross Output Factor for Run @ 70MW:	0.72%	1.13%	11.22%	65.36%	3.96%	0.00%	0.78%	0.00%	43.80%
Gross Output Factor for Run @ 60MW:	0.84%	1.32%	13.09%	76.25%	4.62%	0.00%	0.90%	0.00%	51.10%
Gross Capacity Factor YTD in 1992:									
Gross Gen YTD:	58287	58294	58476	77818	77836	77836	77838	77838	78981
Gross Capacity Factor @ 70MWG:	16.64%	16.14%	16.09%	19.37%	17.95%	17.93%	17.55%	17.48%	17.59%
Gross Capacity Factor @ 60MWG:	19.41%	18.83%	18.77%	22.60%	20.95%	20.91%	20.47%	20.39%	20.53%

Appendix III - Tidd PFBC Operations Time Log

1992 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1992						
RUN # Starting with 92-01-01 >>	15-1	16-1	17-1	18-1	18-2	19-1
Run Starting:	28-Sep	26-Oct	14-Nov	20-Nov	25-Nov	12-Dec
Summary of Outage Statistics:						
Outage Start Date:	24-Sep	01-Oct	01-Nov	17-Nov	24-Nov	07-Dec
Outage Start Time:	05:10 am	01:01 am	11:32 pm	10:50 am	10:50 pm	09:56 am
Outage End Date:	29-Sep	28-Oct	17-Nov	21-Nov	25-Nov	13-Dec
Outage End Time:	08:31 pm	01:12 pm	03:58 am	02:12 pm	11:18 am	10:23 pm
Outage Time in Hours:	135.4	660.2	364.4	99.4	12.5	156.5
YTD Outage Hours:	4668.8	5329.0	5693.5	5792.8	5805.3	5961.7
YTD Hours Till Outage End Time:	6548.52	7237.20	7707.97	7814.20	7907.30	8350.38
Outage Percentage:	71.30%	73.63%	73.86%	74.13%	73.42%	71.39%
Total Calendar Hrs. for Year thru this Run:	6577.0	7343.5	7714.8	7894.8	8193.9	8433.9
Summary of Operating Statistics:						
Maint. Rel. Date	28-Sep	26-Sep	14-Nov	20-Nov		12-Dec
Maint. Rel. Time	08:00 pm	07:30 pm	10:55 pm	03:15 pm		11:40 pm
G.T. Time On:	07:06 am	08:05 pm	05:59 pm	03:38 am	07:21 am	01:01 pm
G.T. Date On:	29-Sep	27-Oct	16-Nov	21-Nov	25-Nov	13-Dec
G.T. Time Off:	04:46 am	03:54 am	11:32 am	04:08 am	05:13 pm	11:39 am
G.T. Date Off:	01-Oct	02-Nov	17-Nov	25-Nov	07-Dec	17-Dec
G.T. Time This Run:	45.67	127.82	17.55	96.50	297.87	94.63
Additional GT Time this Run:						
GT Time Adjustment:						
Total GT Time This Run:	45.67	127.82	17.55	96.50	297.87	94.63
Total G.T. Time:	4145.97	4273.79	4291.34	4387.84	4685.70	4780.34
Total GT Hours YTD in 1991:	2205.95	2333.77	2351.32	2447.82	2745.69	2840.32
Bed Preheater Time On:	01:46 pm	04:46 am	11:21 pm	10:08 am	07:52 am	07:17 pm
Bed Preheater Date On:	29-Sep	28-Oct	16-Nov	21-Nov	25-Nov	13-Dec
Stm Turbine Time On:	08:31 pm	01:12 pm	03:58 am	02:12 pm	11:18 am	10:23 pm
Stm Turbine Date On:	29-Sep	28-Oct	17-Nov	21-Nov	25-Nov	13-Dec
Serv. Hrs./Stm Tb This Run:	28.50	106.33	6.87	80.63	286.63	83.47
Total Steam Turbine Hours YTD in 1992:	1908.18	2014.52	2021.38	2102.02	2388.65	2472.12
Unit Availability YTD based on Stm Turb hrs:	29.01%	27.43%	26.20%	26.63%	29.15%	29.31%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1992						
RUN # Starting with 92-01-01 >>	15-1	16-1	17-1	18-1	18-2	19-1
Run Starting:	28-Sep	26-Oct	14-Nov	20-Nov	25-Nov	12-Dec
Coal Time On:	10:22 pm	06:10 pm	09:33 am	06:41 pm	12:11 pm	03:02 am
Coal Date On:	29-Sep	28-Oct	17-Nov	21-Nov	25-Nov	14-Dec
Coal Time Off:	01:01 am	11:32 pm	10:50 am	10:50 pm	09:56 am	09:51 am
Coal Date Off:	01-Oct	01-Nov	17-Nov	24-Nov	07-Dec	17-Dec
Coal Time This Run:	26.65	101.37	1.28	76.15	285.75	78.82
Coal Time Adjustment						-1
Total Coal Time:	2626.87	2728.24	2729.52	2805.67	3091.42	3169.24
Total Coal Fire YTD in 1992:	1777.1	1878.5	1879.7	1955.9	2241.6	2320.5
Avail YTD based on Coal Fire:	27.02%	25.58%	24.37%	24.77%	27.36%	27.51%
Coal Time Since '91 Bed Surface Outage:	1801.4	1902.8	1904.1	1980.2	2266.0	2344.8
Coal Time Since '92 Turbine Outage:	1285.53	1386.90	1388.18	1464.33	1750.08	1828.90
Maximum Unit Load Achieved During Run:	54	60	0	64	56	61
Gross Gen for Run (MWhr):	941	3592	9	2994	12528	3582
Gross Output Factor for this Run:						
Gross Gen for Run (MWhr):	941	3592	9	2994	12528	3582
Gross Output Factor for Run @ 70MW:	47.17%	48.26%	1.87%	53.04%	62.44%	61.31%
Gross Output Factor for Run @ 60MW:	55.03%	56.30%	2.18%	61.89%	72.85%	71.53%
Gross Capacity Factor YTD in 1992:						
Gross Gen YTD:	79922	83514	83523	86517	99045	102627
Gross Capacity Factor @ 70MWG:	17.36%	16.25%	15.47%	15.66%	17.27%	17.38%
Gross Capacity Factor @ 60MWG:	20.25%	18.95%	18.04%	18.26%	20.15%	20.28%

Appendix III - Tidd PFBC Operations Time Log

1992 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - Year 1992						
RUN # Starting with 92-01-01 >>	20-1	20-2	End of	Average	Min	Max
Run Starting:	27-Dec	29-Dec	1992			
Summary of Outage Statistics:						
Outage Start Date:	17-Dec	28-Dec	31-Dec			
Outage Start Time:	09:51 am	05:30 pm	07:59 am			
Outage End Date:	28-Dec	29-Dec	31-Dec			
Outage End Time:	01:16 pm	09:05 am	11:59 pm			
Outage Time in Hours:	267.4	15.6	16.0	189.2	3.1	1574.2
YTD Outage Hours:	6229.2	6244.7	6260.7			
YTD Hours Till Outage End Time:	8701.27	8721.08	8784.00			
Outage Percentage:	71.59%	71.61%	71.27%			
			100.00%			
Total Calendar Hrs. for Year thru this Run:	8705.5	8768.0	8784.0			
Summary of Operating Statistics: Comb. Trip						
Maint. Rel. Date	23-Dec					
Maint. Rel. Time	12:00 pm					
G.T. Time On:	11:43 pm	04:45 am				
G.T. Date On:	27-Dec	29-Dec				
G.T. Time Off:	07:02 pm	12:31 pm				
G.T. Date Off:	28-Dec	31-Dec				
G.T. Time This Run:	19.32	55.77				
Additional GT Time this Run:						
GT Time Adjustment:		-1	34.07			
Total GT Time This Run:	19.32	54.77		88.3	0.0	782.4
Total G.T. Time:	4799.65	4854.42	4854.42			
Total GT Hours YTD in 1991:	2859.64	2914.40	2914.40			
Bed Preheater Time On:	07:45 am	06:09 am				
Bed Preheater Date On:	28-Dec	29-Dec				
Stm Turbine Time On:	01:16 pm	09:05 am				
Stm Turbine Date On:	28-Dec	29-Dec				
Serv. Hrs./Stm Tb This Run:	4.23	46.90		76.5	0.0	744.4
Total Steam Turbine Hours YTD in 1992:	2476.35	2523.25	2523.25			
Unit Availability YTD based on Stm Turb hrs:	28.45%	28.78%	28.73%			

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1992						
RUN # Starting with 92-01-01 >>	20-1	20-2	End of	Average	Min	Max
Run Starting:	27-Dec	29-Dec	1992			
Coal Time On:	04:20 pm	10:29 am				
Coal Date On:	28-Dec	29-Dec				
Coal Time Off:	05:30 pm	07:59 am	11:59 pm			
Coal Date Off:	28-Dec	31-Dec	31-Dec			
Coal Time This Run:	1.17	45.50		71.7	0.0	740.0
Coal Time Adjustment		4	4.62			
Total Coal Time:	3170.41	3219.91	3219.91			
Total Coal Fire YTD in 1992:	2321.6	2367.1	2367.1			
Avail YTD based on Coal Fire:	26.67%	27.00%	26.95%			
Coal Time Since '91 Bed Surface Outage:	2346.0	2391.5	2391.5			
Coal Time Since '92 Turbine Outage:	1830.07	1875.57	1875.57			
Maximum Unit Load Achieved During Run:	0	61		30.7	0.0	71.0
Gross Gen for Run (MWHr):	10	1871		3166.9	0.0	35395.0
Gross Output Factor for this Run:						
Gross Gen for Run (MWHr):	10	1871				
Gross Output Factor for Run @ 70MW:	3.37%	56.99%		26.45%	0.00%	72.44%
Gross Output Factor for Run @ 60MW:	3.94%	66.49%		30.86%	0.00%	84.51%
Gross Capacity Factor YTD in 1992:						
Gross Gen YTD:	102637	104508	104508			
Gross Capacity Factor @ 70MWG:	16.84%	17.03%	17.00%			
Gross Capacity Factor @ 60MWG:	19.65%	19.87%	19.83%			

Appendix III - Tidd PFBC Operations Time Log

1993 Operating Hours Data

Tidd PFBC Operations Time Log - 1993									
RUN # Starting with 93-01-01 >>	As of	1-01	2-01	3-01	4-01	5-01	6-01	7-01	8-01
Run Starting:	01-Jan	18-Jan	05-Feb	08-Feb	26-Jun	04-Jul	17-Jul	09-Aug	10-Aug
Summary of Outage Statistics:									
Outage Start Date:		01-Jan	31-Jan	06-Feb	09-Feb	03-Jul	05-Jul	05-Aug	09-Aug
Outage Start Time:		12:00 am	03:40 pm	12:00 am	02:29 pm	05:05 am	05:17 pm	12:22 pm	11:37 am
Outage End Date:		20-Jan	06-Feb	08-Feb	30-Jun	04-Jul	18-Jul	09-Aug	10-Aug
Outage End Time:		05:52 am	12:00 am	03:16 pm	03:53 pm	10:34 pm	03:28 pm	06:49 am	11:01 pm
Outage Time in Hours:		461.9	128.3	63.3	3385.4	46.0	310.2	90.5	35.4
YTD Outage Hours:		461.9	590.2	653.5	4038.9	4084.9	4395.0	4485.5	4520.9
YTD Hours Till Outage End Time:		461.9	864.0	927.3	4335.9	4438.6	4767.5	5286.8	5327.0
Outage Percentage:		100.00%	68.31%	70.47%	93.15%	92.03%	92.19%	84.84%	84.87%
						Includes stm turb			
Total Calendar Hrs. for Yr thru this Run:		735.67	864.00	950.48	4397.08	4457.28	5196.37	5291.62	5405.45
Summary of Operating Statistics:									
Maint. Rel. Date		18-Jan	05-Feb	08-Feb	26-Jun	04-Jul	16-Jul	08-Aug	10-Aug
Maint. Rel. Time		07:30 pm	08:28 pm	07:30 pm	08:03 pm	03:00 pm	04:25 pm	04:37 pm	12:50 pm
G.T. Time On:		10:23 am	01:33 pm	08:42 am	08:59 pm	05:10 pm	11:25 pm	08:58 pm	03:21 pm
G.T. Date On:		19-Jan	06-Feb	08-Feb	29-Jun	04-Jul	17-Jul	08-Aug	10-Aug
G.T. Time Off:		16:29	22:39	14:29	09:48	22:16	15:33	11:38	12:11
G.T. Date Off:		31-Jan	06-Feb	09-Feb	03-Jul	05-Jul	05-Aug	09-Aug	14-Aug
G.T. Time This Run:		294.10	9.10	29.78	84.82	29.10	448.13	14.67	92.83
Total G.T. Time:	4854.4	5148.5	5157.6	5187.4	5272.2	5301.3	5749.5	5764.1	5857.0
Total G.T. Hours YTD for 1993:		294.1	303.2	333.0	417.8	446.9	895.0	909.7	1002.5
G.T. Time Since Rebuild:	2230.00	2524.1	2533.2	2563.0	84.8	113.9	562.1	576.7	669.6
Bed Preheater Time On:		11:56 pm	12:00 am	11:11 am	09:08 am	07:39 pm	10:53 am	03:43 am	04:23 pm
Bed Preheater Date On:		19-Jan	06-Feb	08-Feb	30-Jun	04-Jul	18-Jul	09-Aug	10-Aug
Stm Turbine Time On:		05:52 am	12:00 am	03:16 pm	03:53 pm	10:34 pm	03:28 pm	06:49 am	11:01 pm
Stm Turbine Date On:		20-Jan	06-Feb	08-Feb	30-Jun	04-Jul	18-Jul	09-Aug	10-Aug
Serv. Hrs./Stm Tb This Run:		273.80	0.00	23.22	61.20	14.22	428.90	4.80	78.43
Total Steam Turbine Hours YTD in 1993:		273.80	273.80	297.02	358.22	372.43	801.33	806.13	884.57
Unit Availability YTD based on Stm Turb hrs:		37.22%	31.69%	31.25%	8.15%	8.36%	15.42%	15.23%	16.36%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - 1993									
RUN # Starting with 93-01-01 >>	As of	1-01	2-01	3-01	4-01	5-01	6-01	7-01	8-01
	01-Jan	18-Jan	05-Feb	08-Feb	26-Jun	04-Jul	17-Jul	09-Aug	10-Aug
Run Starting:									
Coal Time On:		06:05 am	12:00 am	04:40 pm	05:27 pm	12:35 am	06:20 pm	10:18 am	10:29 pm
Coal Date On:		20-Jan	06-Feb	08-Feb	30-Jun	05-Jul	18-Jul	09-Aug	10-Aug
Coal Time Off:		03:40 pm	12:00 am	02:29 pm	05:05 am	05:17 pm	12:22 pm	11:37 am	05:27 am
Coal Date Off:		31-Jan	06-Feb	09-Feb	03-Jul	05-Jul	05-Aug	09-Aug	14-Aug
Coal Time This Run:		273.58	0.00	21.82	59.63	16.70	426.03	1.32	78.97
Grand Total Coal Time:	3219.91	3493.5	3493.5	3515.3	3574.9	3591.6	4017.7	4019.0	4098.0
Coal Time Since Rebuild:	2391.5	2665.0	2665.0	2686.9	59.6	76.3	502.4	503.7	582.7
Total Coal Fire YTD in 1993:		273.6	273.6	295.4	355.0	371.7	797.8	799.1	878.1
Avail YTD based on Coal Fire:		37.19%	31.66%	31.08%	8.07%	8.34%	15.35%	15.10%	16.24%
Maximum Unit Load Achieved During This Run:		61	0	60	53	36	45	0	58
Gross Gen for Run (MWhr):		12566	0	887	1383	315	11819	12	3497
Gross Output Factor for this Run:									
Gross Gen for Run (MWhr):		12566	0	887	1383	315	11819	12	3497
Gross Output Factor for Run @ 70MW:		65.56%	0.00%	54.58%	32.28%	31.65%	39.37%	3.57%	63.69%
Gross Output Factor for Run @ 60MW:		76.49%	0.00%	63.68%	37.66%	36.93%	45.93%	4.17%	74.31%
Gross Capacity Factor YTD in 1993:									
Gross Gen YTD:		12566	12566	13453	14836	15151	26970	26982	30479
Gross Capacity Factor @ 70MWG:		24.40%	20.78%	20.22%	4.82%	4.86%	7.41%	7.28%	8.06%
Gross Capacity Factor @ 60MWG:		28.47%	24.24%	23.59%	5.62%	5.67%	8.65%	8.50%	9.40%

Appendix III - Tidd PFBC Operations Time Log

1993 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - 1993								
RUN # Starting with 93-01-01 >>	9-01	10-01	11-01	12-01	12-02	13-01	14-01	15-01
Run Starting:	14-Aug	18-Aug	28-Aug	09-Oct	10-Oct	13-Oct	16-Oct	24-Oct
Summary of Outage Statistics:								
Outage Start Date:	14-Aug	15-Aug	24-Aug	23-Sep	10-Oct	11-Oct	14-Oct	06-Nov
Outage Start Time:	05:27 am	12:00 am	01:28 pm	08:12 pm	12:00 am	06:17 am	12:00 am	10:09 pm
Outage End Date:	15-Aug	19-Aug	29-Aug	10-Oct	11-Oct	14-Oct	17-Oct	26-Nov
Outage End Time:	12:00 am	02:34 pm	09:29 pm	12:00 am	01:21 am	12:00 am	01:27 pm	05:09 pm
Outage Time in Hours:	18.6	110.6	128.0	387.8	25.4	65.7	85.5	475.0
YTD Outage Hours:	4539.4	4650.0	4778.0	5165.8	5191.2	5256.9	5342.3	5817.3
YTD Hours Till Outage End Time:	5424.0	5534.6	5781.5	6768.0	6793.4	6864.0	6949.5	7913.2
Outage Percentage:	83.69%	84.02%	82.64%	76.33%	76.42%	76.59%	76.87%	73.51%
Total Calendar Hrs. for Yr thru this Run:								
	5424.00	5653.47	6380.20	6768.00	6798.28	6864.00	7438.15	8144.27
Summary of Operating Statistics:								
Maint. Rel. Date	14-Aug	18-Aug	28-Aug	09-Oct	09-Oct	13-Oct	16-Oct	24-Oct
Maint. Rel. Time	08:00 pm	03:45 pm	07:15 pm	03:00 pm	03:00 pm	04:50 pm	03:50 pm	07:53 pm
G.T. Time On:								
	10:05 pm	02:58 am	09:22 am	06:15 am	04:19 pm	05:15 am	01:16 am	12:50 am
G.T. Date On:								
	14-Aug	19-Aug	29-Aug	10-Oct	10-Oct	14-Oct	17-Oct	26-Nov
G.T. Time Off:								
	03:49	17:37	00:58	06:59	10:33	14:30	02:29	12:50 pm
G.T. Date Off:								
	15-Aug	24-Aug	24-Sep	10-Oct	11-Oct	14-Oct	07-Nov	06-Dec
G.T. Time This Run:								
	5.73	134.65	615.60	0.73	18.23	9.25	505.22	252.00
Total G.T. Time:								
	5862.7	5997.3	6612.9	6613.7	6631.9	6641.2	7146.4	7398.4
Total G.T. Hours YTD for 1993:								
	1008.3	1142.9	1758.5	1759.3	1777.5	1786.7	2292.0	2544.0
G.T. Time Since Rebuild:								
	675.3	809.9	1425.5	1426.3	1444.5	1453.8	1959.0	2211.0
Bed Preheater Time On:								
	11:18 pm	11:34 am	06:06 pm	12:00 am	09:36 pm	11:28 am	08:38 am	01:19 pm
Bed Preheater Date On:								
	14-Aug	19-Aug	29-Aug	10-Oct	10-Oct	14-Oct	17-Oct	26-Nov
Stm Turbine Time On:								
	12:00 am	02:34 pm	09:29 pm	12:00 am	01:21 am	12:00 am	01:27 pm	05:09 pm
Stm Turbine Date On:								
	15-Aug	19-Aug	29-Aug	10-Oct	11-Oct	14-Oct	17-Oct	26-Nov
Serv. Hrs./Stm Tb This Run:								
	0.00	118.90	598.72	0.00	4.93	0.00	488.70	231.12
Total Steam Turbine Hours YTD in 1993:								
	884.57	1003.47	1602.18	1602.18	1607.12	1607.12	2095.82	2326.93
Unit Availability YTD based on Stm Turb hrs:								
	16.31%	17.75%	25.11%	23.67%	23.64%	23.41%	28.18%	28.57%

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - 1993								
RUN # Starting with 93-01-01 >>	9-01	10-01	11-01	12-01	12-02	13-01	14-01	15-01
Run Starting:	14-Aug	18-Aug	28-Aug	09-Oct	10-Oct	13-Oct	16-Oct	24-Oct
Coal Time On:	12:00 am	05:48 pm	11:35 pm	12:00 am	03:43 am	12:00 am	02:39 pm	06:00 pm
Coal Date On:	15-Aug	19-Aug	29-Aug	10-Oct	11-Oct	14-Oct	17-Oct	26-Nov
Coal Time Off:	12:00 am	01:28 pm	08:12 pm	12:00 am	06:17 am	12:00 am	10:09 pm	08:16 am
Coal Date Off:	15-Aug	24-Aug	23-Sep	10-Oct	11-Oct	14-Oct	06-Nov	06-Dec
Coal Time This Run:	0.00	115.67	596.62	0.00	2.57	0.00	487.50	230.27
Grand Total Coal Time:	4098.0	4213.6	4810.2	4810.2	4812.8	4812.8	5300.3	5530.6
Coal Time Since Rebuild:	582.7	698.3	1294.9	1294.9	1297.5	1297.5	1785.0	2015.3
Total Coal Fire YTD in 1993:	878.1	993.7	1590.3	1590.3	1592.9	1592.9	2080.4	2310.7
Avail YTD based on Coal Fire:	16.19%	17.58%	24.93%	23.50%	23.43%	23.21%	27.97%	28.37%
Maximum Unit Load Achieved During This Run:	0	54	58	0	0	0	61	64
Gross Gen for Run (MWhr):	0	5498	22217	0	21	0	24586	12065
Gross Output Factor for this Run:								
Gross Gen for Run (MWhr):	0	5498	22217	0	21	0	24586	12065
Gross Output Factor for Run @ 70MW:	0.00%	66.06%	53.01%	0.00%	6.08%	0.00%	71.87%	74.58%
Gross Output Factor for Run @ 60MW:	0.00%	77.07%	61.85%	0.00%	7.09%	0.00%	83.85%	87.01%
Gross Capacity Factor YTD in 1993:								
Gross Gen YTD:	30479	35977	58194	58194	58215	58215	82801	94866
Gross Capacity Factor @ 70MWG:	8.03%	9.09%	13.03%	12.28%	12.23%	12.12%	15.90%	16.64%
Gross Capacity Factor @ 60MWG:	9.37%	10.61%	15.20%	14.33%	14.27%	14.14%	18.55%	19.41%

Appendix III - Tidd PFBC Operations Time Log

1993 Operating Hours Data - Continued

Tidd PFBC Operations Time Log - 1993				
RUN # Starting with 93-01-01 >>	End	Average	Min	Max
Run Starting:	of 1993			
Summary of Outage Statistics:				
Outage Start Date:	06-Dec			
Outage Start Time:	08:16 am			
Outage End Date:	31-Dec			
Outage End Time:	11:59 pm			
Outage Time in Hours:	615.7	363.6	18.6	3385.4
YTD Outage Hours:	6433.1			
YTD Hours Till Outage End Time:	8760.0			
Outage Percentage:	73.44%			
	100.00%			
Total Calendar Hrs. for Yr thru this Run:	8760.00			
Summary of Operating Statistics:				
Maint. Rel. Date				
Maint. Rel. Time				
G.T. Time On:				
G.T. Date On:				
G.T. Time Off:				
G.T. Date Off:				
G.T. Time This Run:		159.0	0.7	615.6
Total G.T. Time:	7398.4			
Total G.T. Hours YTD for 1993:	2544.0			
G.T. Time Since Rebuild:	2211.0			
Bed Preheater Time On:				
Bed Preheater Date On:				
Stm Turbine Time On:				
Stm Turbine Date On:				
Serv. Hrs./Stm Tb This Run:		145.4	0.0	598.7
Total Steam Turbine Hours YTD in 1993:	2326.93			
Unit Availability YTD based on Stm Turb hrs:	26.56%			

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - 1993				
RUN # Starting with 93-01-01 >>	End	Average	Min	Max
Run Starting:	of 1993			
Coal Time On:				
Coal Date On:				
Coal Time Off:	11:59 pm			
Coal Date Off:	31-Dec			
Coal Time This Run:		144.4	0.0	596.6
Grand Total Coal Time:	5530.6			
Coal Time Since Rebuild:	2015.3			
Total Coal Fire YTD in 1993:	2310.7			
Avail YTD based on Coal Fire:	26.38%			
Maximum Unit Load Achieved During This Run:		34.4	0.0	64.0
Gross Gen for Run (MWHr):		5929.1	0.0	24586.0
Gross Output Factor for this Run:				
Gross Gen for Run (MWHr):				
Gross Output Factor for Run @ 70MW:		35.14%	0.00%	74.58%
Gross Output Factor for Run @ 60MW:		41.00%	0.00%	87.01%
Gross Capacity Factor YTD in 1993:				
Gross Gen YTD:	94866			
Gross Capacity Factor @ 70MWG:	15.47%			
Gross Capacity Factor @ 60MWG:	18.05%			

Appendix III - Tidd PFBC Operations Time Log

1994 Operating Hours Data

Tidd PFBC Operations Time Log - Year 1994									
RUN # Starting with 94-01-01 >	Start of 1994 Year	1-01	2-01	3-01	3-02	End of 3 Year Period	Avg.	Min	Max
Run Starting:		08-Jan-94	14-Jan	15-Feb	18-Feb				
Summary of Outage Statistics:									
Outage Start Date:		01-Jan	11-Jan	29-Jan	18-Feb	25-Feb			
Outage Start Time:		12:00 am	01:36 am	08:31 pm	02:14 pm	01:09 pm			
Outage End Date:		10-Jan	15-Jan	17-Feb	19-Feb	28-Feb			
Outage End Time:		04:57 am	11:04 pm	12:58 pm	03:29 am	11:59 pm			
Outage Time in Hours:		221.0	117.5	448.5	13.3	82.8	200.0	13.3	448.5
YTD Outage Hours:		221.0	338.4	786.9	800.1	883.0			
YTD Hours Till Outage End Time:		221.0	359.1	1141.0	1179.5	1416.0			
Outage Percentage:		100.00%	94.25%	68.96%	67.84%	62.36%			
Unit Availability % YTD:		8.55%	51.13%	32.53%	39.98%	37.64%			
Summary of Operating Statistics:									
Maint. Rel. Date		08-Jan	14-Jan	15-Feb	18-Feb				
Maint. Rel. Time		07:25 pm	09:50 pm	07:10 pm	05:58 pm				
G.T. Time On:		12:29 pm	12:15 pm	10:18 pm	09:00 pm				
G.T. Date On:		09-Jan	15-Jan	16-Feb	18-Feb				
G.T. Time Off:		03:08 am	08:35 pm	03:44 pm	02:25 pm				
G.T. Date Off:		11-Jan	29-Jan	18-Feb	25-Feb				
G.T. Time This Run:		38.65	344.33	41.43	161.42		146.5	38.7	344.3
Additional GT Roll Times:				0.68					
Total G.T. Time:	7398.4	7437.0	7781.4	7823.5	7984.9	7984.9			
Total G. T. Hours YTD for 1994:		38.7	383.0	425.1	586.5	586.5			
G.T. Time Since 1993 Rebuild:	2211.0	2249.6	2594.0	2636.1	2797.5	2797.5			
Bed Preheater Time On:		11:10 pm	07:12 pm	07:26 am	11:48 pm				
Bed Preheater Date On:		09-Jan	15-Jan	17-Feb	18-Feb				
Stm Turbine Time On:		04:57 am	11:04 pm	12:58 pm	03:29 am				
Stm Turbine Date On:		10-Jan	15-Jan	17-Feb	19-Feb				
Serv. Hrs/Stm Tb This Run:		20.65	333.45	25.27	153.67	0.00	133.3	20.7	333.5
Total Stm. Turb. Hours YTD in 1994:	0	20.65	354.10	379.37	533.03	533.03			
Unit Availability YTD based on Stm Turb hrs:		8.55%	51.13%	32.53%	39.98%	37.64%			
Avail since 93 outage based on Stm Turb hrs:		0.44%	6.92%	6.79%	9.26%	9.13%			

Appendix III - Tidd PFBC Operations Time Log

Tidd PFBC Operations Time Log - Year 1994									
RUN # Starting with 94-01-01 >	Start of 1994 Year	1-01	2-01	3-01	3-02	End of 3 Year Period	Avg.	Min	Max
Run Starting:		08-Jan-94	14-Jan	15-Feb	18-Feb				
Coal Time On:		06:41 am	11:42 pm	02:58 pm	06:12 am				
Coal Date On:		10-Jan	15-Jan	17-Feb	19-Feb				
Coal Time Off:		01:36 am	08:31 pm	02:14 pm	01:09 pm	11:59 pm			
Coal Date Off:		11-Jan	29-Jan	18-Feb	25-Feb	28-Feb			
Coal Time This Run:		18.92	332.82	232.7	150.95		131.5	18.9	332.8
Grand Total Coal Time:	5530.6	5549.5	5882.3	5905.6	6056.5	6056.5			
Coal Time Since 1993 GT Rebuild:	2015.3	2034.2	2367.0	2390.3	2541.2	2541.2			
Total Coal Fire Hours YTD in 1994:		18.9	351.7	375.0	526.0	526.0			
Avail YTD based on Coal Fire:		7.83%	50.79%	32.15%	39.45%	37.14%			
Maximum Unit Load Achieved During Run:		55	60	54	61		57.5	54.0	61.0
Gross Gen for Run (MWHr):		564	15705	718	7020		6001.8	564.0	15705.0
Gross Output Factor for this Run:									
Gross Gen for Run (MWHr):		564	15705	718	7020				
Gross Output Factor for Run@70MW:		39.02%	67.28%	40.60%	65.26%		53.04%	39.02%	67.28%
Gross Output Factor for Run@60MW:		45.52%	78.50%	47.36%	76.14%		61.88%	45.52%	78.50%
Capacity Factor Year YTD in 1994:									
Gross Generation YTD:	0	564	16269	16987	24007	24007			
Gross Capacity Factor @ 70MWG:		3.33%	33.56%	20.81%	25.73%	24.22%			
Gross Capacity Factor @ 60MWG:		3.89%	39.15%	24.28%	30.01%	28.26%			

Appendix IV - General Arrangement Drawings

Appendix IV - General Arrangement Drawings

Two groups of general arrangement drawings were developed for the project, one group for the existing plant and another for the new combustor building.

These drawings are enclosed and listed below.

Site Plan Drawings

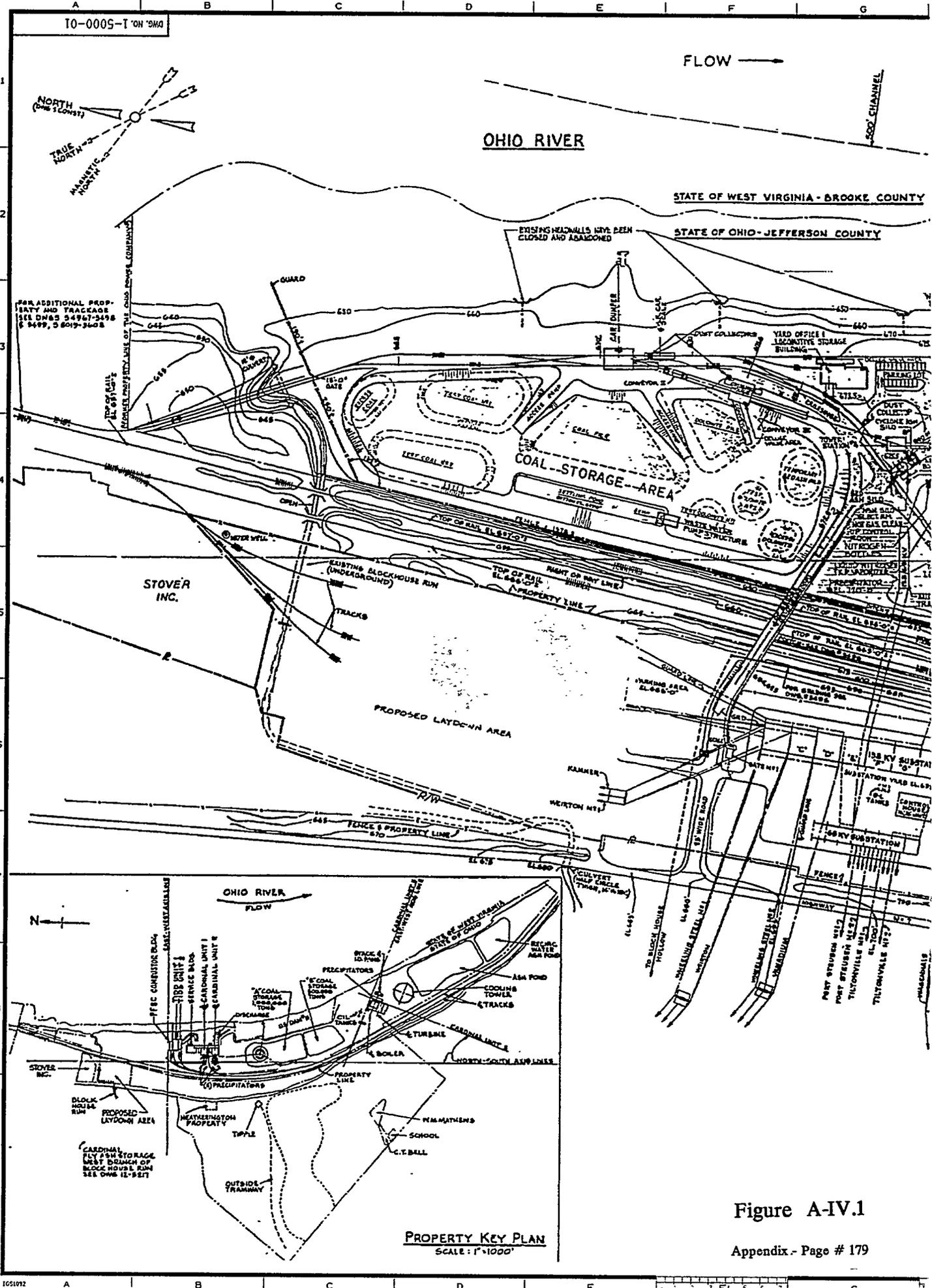
<u>Figure #</u>	<u>Drawing #</u>	<u>Title</u>
A-IV.1	1-5000-01	Gen. Arg't Plant On-Site Plan

Combustor Building Drawings

<u>Figure #</u>	<u>Drawing #</u>	<u>Title</u>
A-IV.2	1-5001-01	Gen. Arg't Combustor Building Plans @ El. 652' and 660'
A-IV.3	1-5001-02	Gen. Arg't Combustor Building Plans @ El. 676' and 686'
A-IV.4	1-5001-03	Gen. Arg't Combustor Building Plans @ El. 703' and 728'
A-VI.5	1-5001-04	Gen. Arg't Precipitator and Economizer Plan
A-VI.6	1-5001-05	Gen. Arg't Plan & Sections Precipitator 1A & 1B Duct Modifications
A-IV.7	1-5001-06	Gen. Arg't Plan & Sections Precipitator 1A & 1B Duct Modifications
A-IV.8	1-5001-07	Gen. Arg't Ash Handling Facility
A-IV.9	1-5001-08	Gen. Arg't Combustor Building Sections
A-IV.10	1-5001-09	Gen. Arg't Combustor Building Sections
A-IV.11	1-5001-10	Gen. Arg't Combustor Building Sections
A-IV.12	1-5001-11	Gen. Arg't Combustor Building Sections
A-IV.13	1-5001-12	Gen. Arg't Waste Water Pumps Structure Plan & Sections
A-IV.14	1-5001-13	Gen. Arg't Combustor Building Plans @ El. 744' and Roof

Existing Building Drawings

<u>Figure #</u>	<u>Drawing #</u>	<u>Title</u>
A-IV.15	1-5010-01	General Cross Section of Plant Unit #1
A-IV.16	1-5010-02	General Cross Section of Plant Unit #1
A-IV.17	1-5010-03	Floor Plans of Turbine Room Elev's @ 608', 624', and 636', Unit #1
A-IV.18	1-5010-04	Basement Floor Plan of Plant Elev's @ 650' and 665', Unit #1
A-IV.19	1-5010-05	Basement Floor Plan of Plant Elev's @ 650', Unit #1
A-IV.20	1-5010-06	Main Floor Plan of Plant Elev. 676', Unit #1
A-IV.21	1-5010-07	Main Floor Plan of Plant Elev. 676', Unit #1
A-IV.22	1-5010-08	Floor Plans of Boiler Room & Heater Bay Elev's @ 707', 708', 710', 727', 720', and 732', Unit #1
A-IV.23	1-5010-09	Floor Plans of Boiler Room & Heater Bay Elev's @ 741', 747', & 751'; Fan floor Elev. 766', Unit #1
A-IV.24	1-5010-10	Longitudinal Section Heater Bay and Turbine Room Unit #1
A-IV.25	1-5010-11	Screen House General Arrangement



10-0005-T ON 10MD

FLOW →

OHIO RIVER

STATE OF WEST VIRGINIA - BROOKE COUNTY

STATE OF OHIO - JEFFERSON COUNTY

FOR ADDITIONAL PROPERTY AND TRACEAGE SEE DWGS 9-4927-5498 & 9499, 9-5019-3408

STOVER INC.

COAL STORAGE AREA

PROPOSED LAYDOWN AREA

OHIO RIVER
FLOW →

N

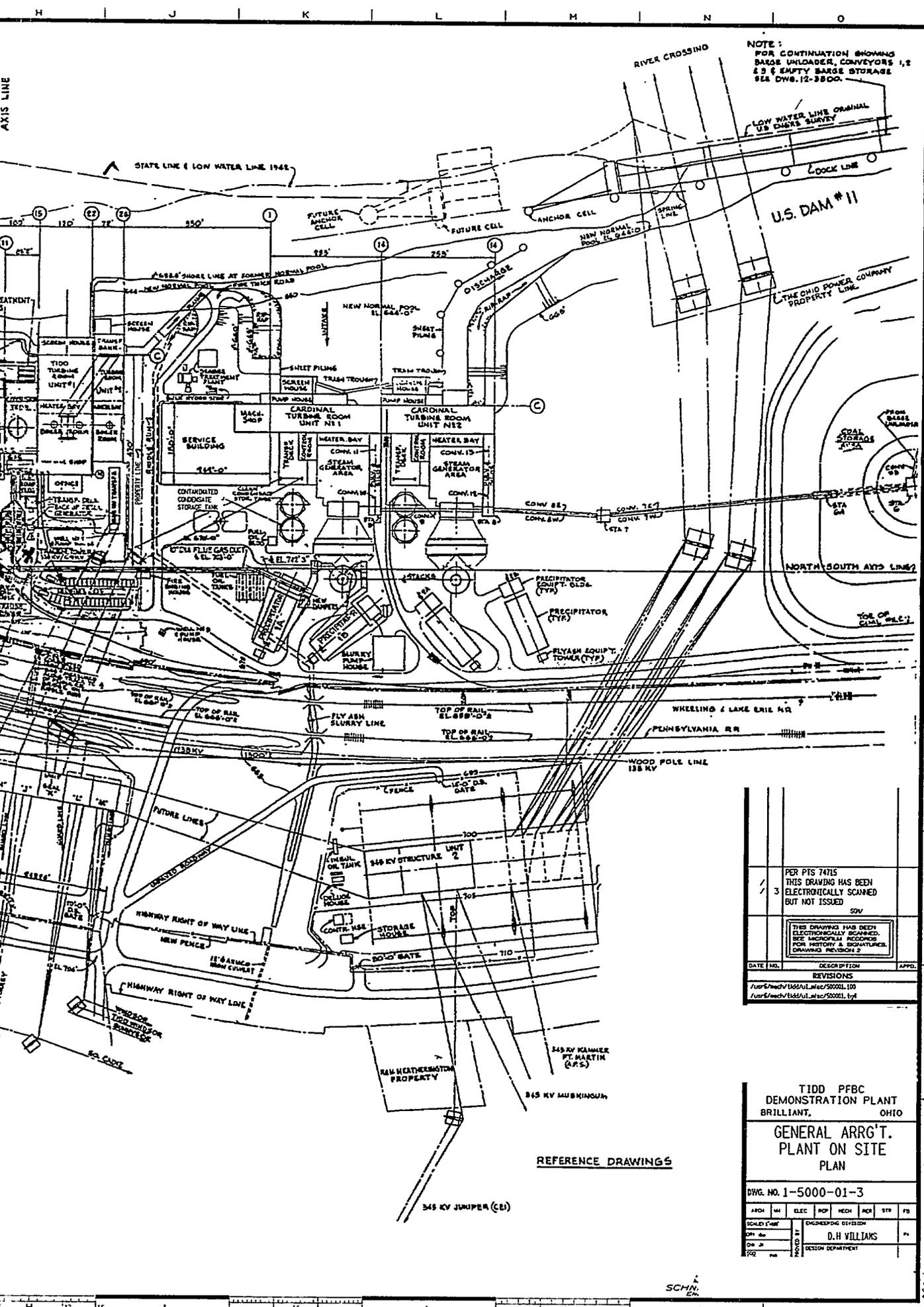
CARDINAL FLY ASH STORAGE WEST BRANCH OF BLOCK HOUSE RUN SEE DWG 11-5217

PROPERTY KEY PLAN
SCALE: 1"=1000'

Figure A-IV.1

105192

CH 1 2 3 4 5 6 7 8 9



NOTE:
FOR CONTINUATION SHOWING
BARGE UNLOADER, CONVEYORS 1,2
& 3 & EMPTY BARGE STORAGE 1,2
SEE DWG. 12-3800.

U.S. DAM #11

DATE	NO.	DESCRIPTION	APP'D.
REVISIONS			
/usr6/mech/1465/ul/atc/50001.100			
/usr6/mech/1465/ul/atc/50001.tyl			

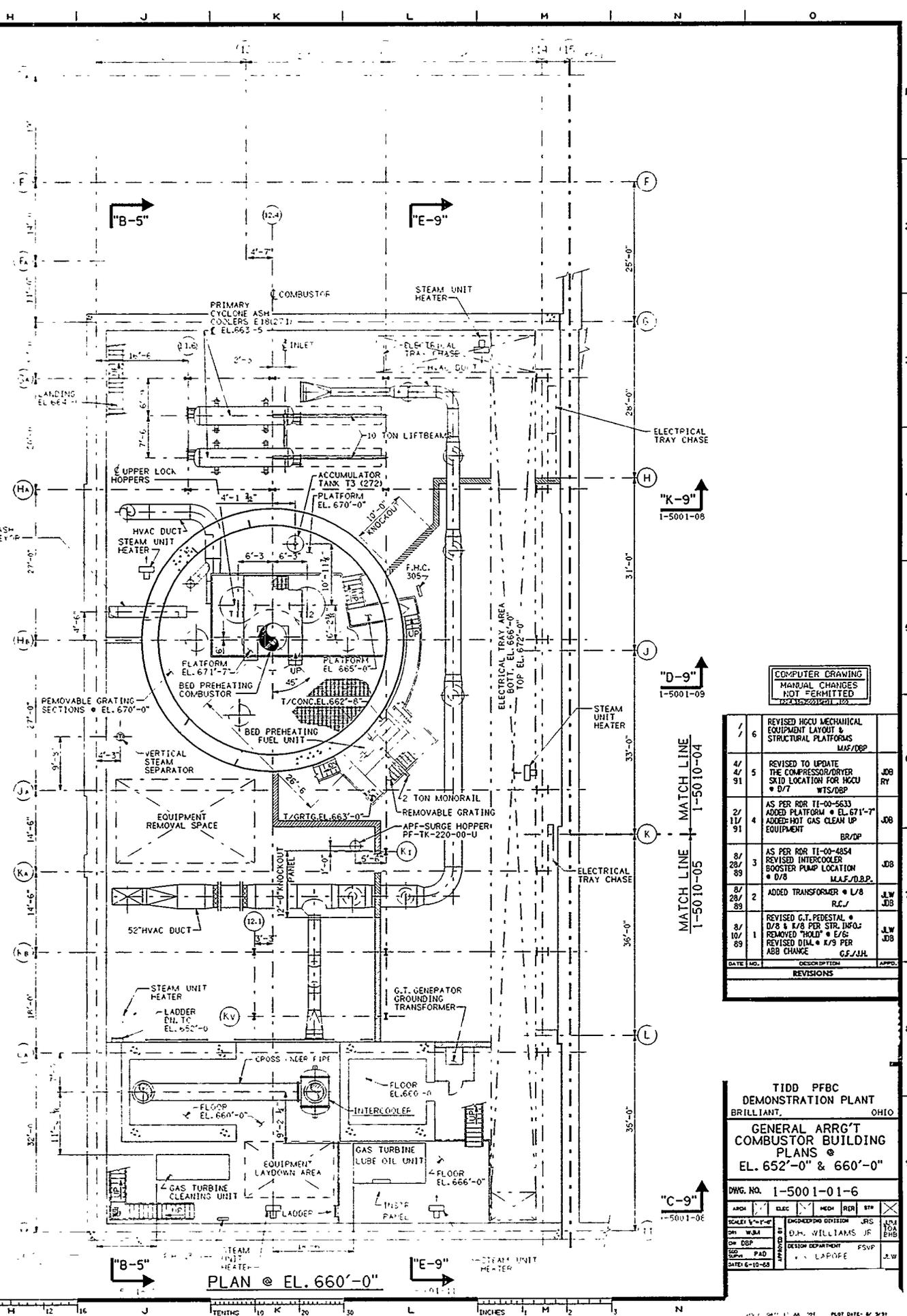
TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

GENERAL ARR'G'T.
PLANT ON SITE
PLAN

DWG. NO. 1-5000-01-3							
ARCH	ME	ELEC	MECH	PIPE	STR	TR	
DESIGNING DIVISION				D. H. WILLIAMS			
DESIGN DEPARTMENT							

REFERENCE DRAWINGS

SCHN.



PLAN @ EL. 660'-0"

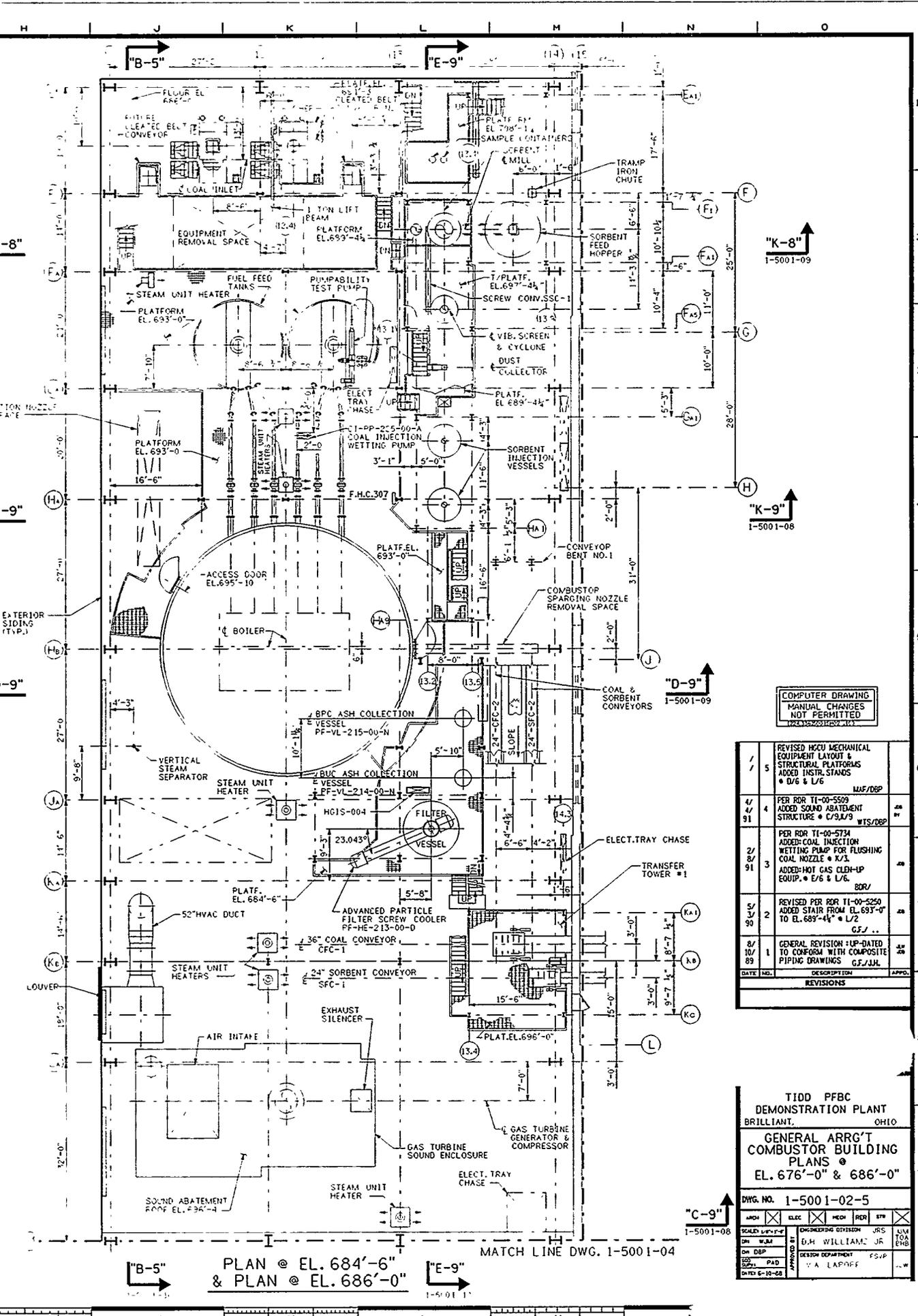
COMPUTER DRAWING
MANUAL CHANGES
NOT PERMITTED
12/21/82 20101-102

NO.	DATE	DESCRIPTION	BY	APP'D.
6	11/89	REVISED HCU MECHANICAL EQUIPMENT LAYOUT & STRUCTURAL PLATFORMS	MAF/DBP	
5	4/91	REVISED TO UPDATE THE COMPRESSOR/DRYER SKID LOCATION FOR HCU	JOB RY	
4	11/91	AS PER RDR TI-00-5633 ADDED PLATFORM @ EL. 671'-7" ADDED HOT GAS CLEAN UP EQUIPMENT	JOB BR/DP	
3	8/89	AS PER RDR TI-00-4854 REVISED INTERCOOLER BOOSTER PUMP LOCATION	JOB D/B MAF/DBP	
2	8/89	ADDED TRANSFORMER @ L/8	JLW R.C./	
1	8/89	REVISED G.T. PEDESTAL @ D/8 & K/8 PER STR. INFO.; REMOVED "HOLD" @ E/8; REVISED DIM. @ K/5 PER ABB CHANGE	JLW JHL	

TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO
GENERAL ARR'GT
COMBUSTOR BUILDING
PLANS @
EL. 652'-0" & 660'-0"

DWG. NO. 1-5001-01-6

APPROVED	ELEC	MED	DR	STR	
SCALE: 1/4" = 1'-0"	DESIGNED BY	ENGINEERING DIVISION	JRS	LDL	TOA
CHK: WJM	DRAWN BY	D.H. WILLIAMS JR			PHB
CHK: DBP	DESIGN DEPARTMENT	PSVP			
APP'D: PAD	DATE	6-10-88			



PLAN @ EL. 684'-6"
& PLAN @ EL. 686'-0"

MATCH LINE DWG. 1-5001-04

COMPUTER DRAWING
MANUAL CHANGES
NOT PERMITTED
(REVISED BY 1-5001-09)

DATE	NO.	DESCRIPTION	APPROV.
1-5001-09	5	REVISED HCUV MECHANICAL EQUIPMENT LAYOUT & STRUCTURAL PLATFORMS ADDED INSTR. STANDS • D/G & L/G	MJF/DBP
1-5001-09	4	PER RDR TI-00-5509 ADDED SOUND ABATEMENT STRUCTURE • C/9/L/9	DBP
1-5001-09	3	PER RDR TI-00-5734 ADDED COAL INJECTION WETTING PUMP FOR FLUSHING COAL NOZZLE • K/3. ADDED HOT GAS CLEAN-UP EQUIP. • E/G & L/G.	DBP
1-5001-09	2	REVISED PER RDR TI-00-5250 ADDED STAIR FROM EL. 693'-0" TO EL. 689'-4" • L/2.	DBP
1-5001-09	1	GENERAL REVISION UP-DATED TO CONFORM WITH COMPOSITE PIPING DRAWINGS G.F./J.L.	DBP

TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

GENERAL ARR'GT
COMBUSTOR BUILDING
PLANS •
EL. 676'-0" & 686'-0"

DWG. NO. 1-5001-02-5

ARCH	ELEC	MECH	PER	STR
<input checked="" type="checkbox"/>				

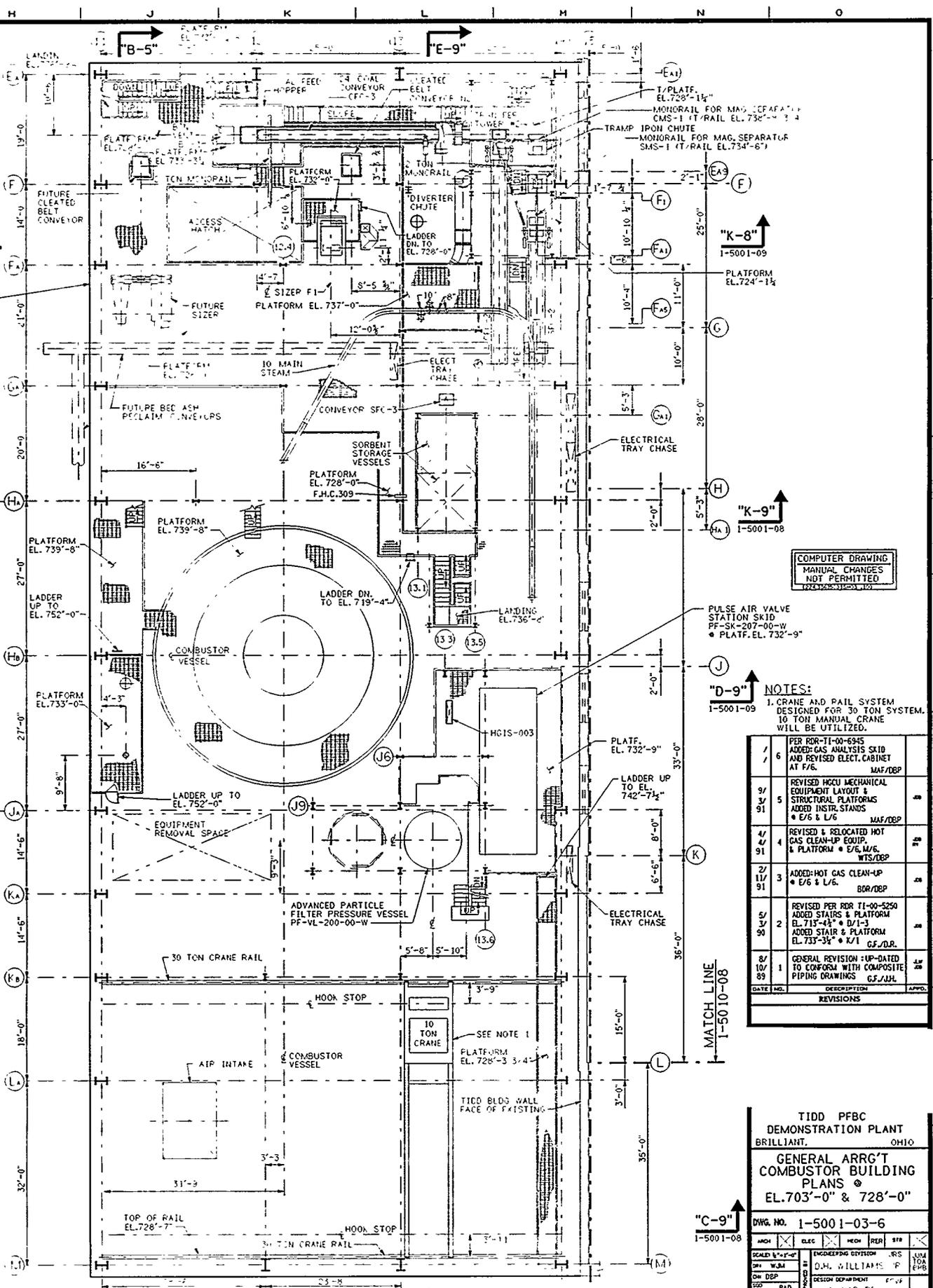
SCALE: 1/4" = 1'-0"

DESIGNED BY: D.H. WILLIAMS, JR.

CHECKED BY: J.S. JONES

DATE: 1-18-68





COMPUTER DRAWING
MANUAL CHANGES
NOT PERMITTED
12231232312323123

NOTES:
1. CRANE AND RAIL SYSTEM
DESIGNED FOR 30 TON SYSTEM.
10 TON MANUAL CRANE
WILL BE UTILIZED.

DATE	NO.	DESCRIPTION	APP'D.
8/10/89	1	GENERAL REVISION: UP-DATED TO CONFORM WITH COMPOSITE PIPING DRAWINGS	C.F./J.H.
5/3/90	2	REVISED PER RDR TI-00-5250 ADDED STAIRS & PLATFORM EL. 713'-4 1/2" • D/1-3 ADDED STAIR & PLATFORM EL. 733'-3 1/2" • K/1	C.F./D.R.
2/11/91	3	ADDED HOT GAS CLEAN-UP • E/6 & L/6	BOR/DBP
4/4/91	4	REVISED & RELOCATED HOT GAS CLEAN-UP EQUIP. & PLATFORM • E/6, M/6, WTS/DBP	WTS/DBP
3/31/91	5	REVISED HCCU MECHANICAL EQUIPMENT LAYOUT & STRUCTURAL PLATFORMS ADDED INSTR. STANDS • E/6 & L/6	MAF/DBP
1/1/91	6	PER RDR TI-00-5945 ADDED GAS ANALYSIS SKID AND REVISED ELECT. CABINET AT F/6	MAF/DBP

TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO
GENERAL ARR'GT
COMBUSTOR BUILDING
PLANS •
EL. 703'-0" & 728'-0"

DWG. NO. 1-5001-03-6

APPROVED	DESIGN DEPARTMENT	DATE
A. LARPER		6-10-89

SCALE	ENGINEERING DIVISION	DESIGNER
1"=10'-0"	JRS	D.H. WILLIAMS
CHECKED	DESIGN DEPARTMENT	DATE

PLAN @ EL. 728'-0"



DOC. NO. 1-5001-04

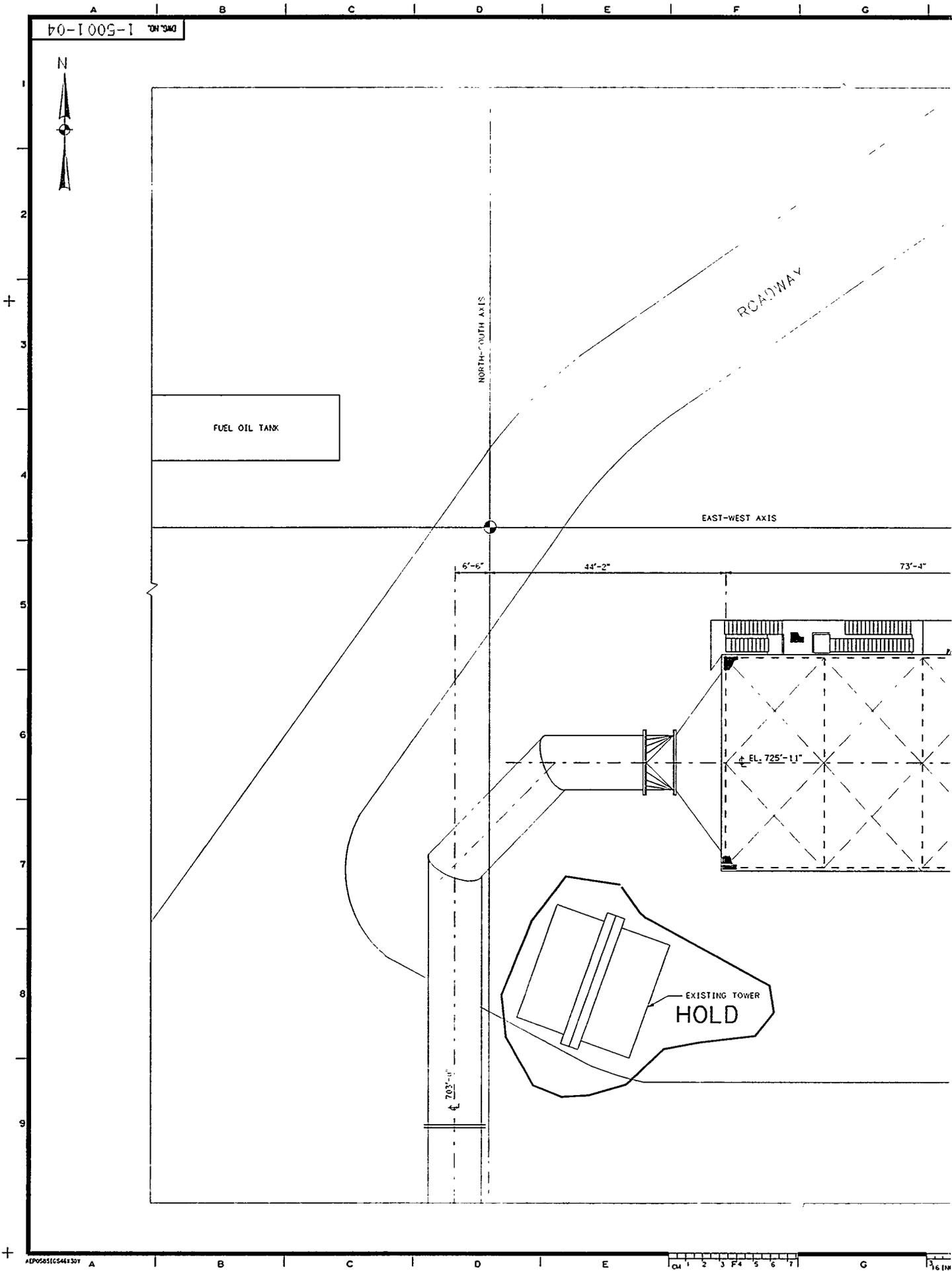
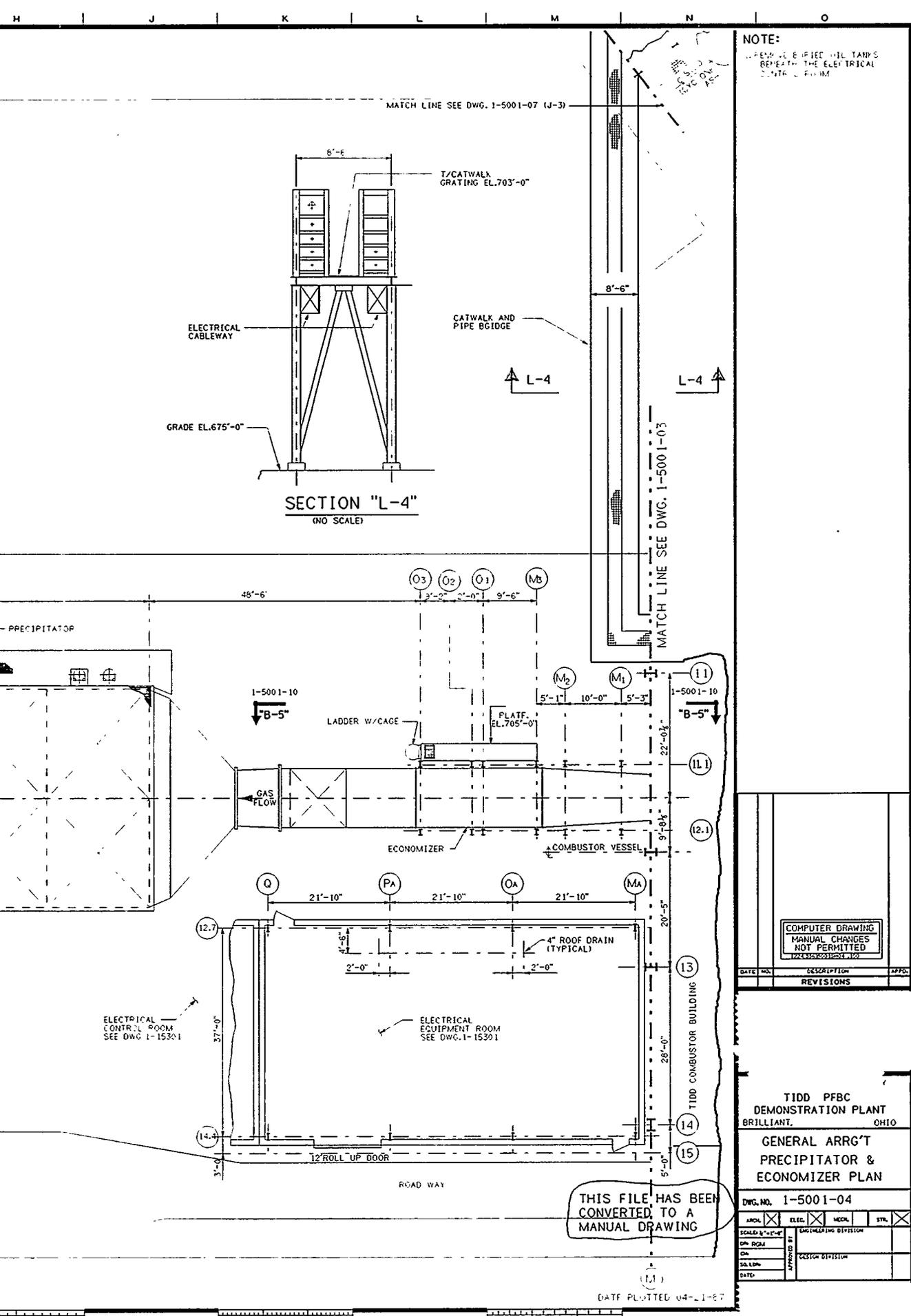


Figure A-VI5



NOTE:
 ALL FRESH AIR SUPPLIES SHALL BE FILLED WITH TANKS
 BENEATH THE ELECTRICAL
 CONTROL ROOM

SECTION "L-4"
 (NO SCALE)

COMPUTER DRAWING
 MANUAL CHANGES
 NOT PERMITTED

DATE	NO.	DESCRIPTION	APPD.
REVISIONS			

TIDD PFBC
 DEMONSTRATION PLANT
 BRILLIANT, OHIO

GENERAL ARRGT
 PRECIPITATOR &
 ECONOMIZER PLAN

DWG. NO. 1-5001-04

ARCH	<input checked="" type="checkbox"/>	ELEC	<input checked="" type="checkbox"/>	MECH	<input checked="" type="checkbox"/>	STR.	<input checked="" type="checkbox"/>
SCALE	1/4"=1'-0"	DESIGNED BY	ENGINEERING DIVISION				
DATE		APPROVED BY	DESIGN DIVISION				

THIS FILE HAS BEEN
 CONVERTED TO A
 MANUAL DRAWING

DATE PLOTTED 04-1-87



50-T005-T ON '9114



10' 0" DIA PFBC GAS FLUE

NORTH SOUTH AXIS

EXIST 13' 6" X 22' 6" DUCT FROM PRECIP 1A

FOR GENERAL ROUTING OF THIS LINE, SEE SITE PLAN DWG 15000-01

EXIST 13' 6" X 27' 6" DUCT TO PRECIP 1A

PRECIPITATOR EQUIP BLDG

DAMPER OPERATOR HAND WHEEL

DAMPER

PLATFORM EL 727' 3"

NEW EXIST PLATF

PLAT FL 72

PRE DAM LOL

JIDD PFBC PRECIPITATOR SHUT OFF DAMPER (NEW) GUILLOTINE TYPE

PLATFORM EL 730' 2"

EXIST PLATF

NEW PLATF

OUTSIDE CASING OF PRECIPITATOR

52'-8 3/4"

10'-0 3/4" DUCT

24"

16'-0"

EL 742'-3"

PLAT EL 729' 7"

T/EXIST DUCT EL 726'-0"

7'-6" HD W/

EL 713'-3"

13'-6" X 27'-6"

EXIST PLATFORM EL 730'-2"

EXIST PLATF

NEW PLATF

DAMPER OPERATOR PLATFORM EL 729' 3" (NEW)

DAMPER DRIVE EL 733'-6"

PRECIPITATOR 1A SHUT OFF DAMPER (NEW) (LOUVER TYPE)

EXISTING PLATFORM EL 727'-3"

T/EXIST DUCT EL 724'-6"

EXIST DUCT 13'-6" X 22'-6" (CLEAN GAS)

PFBC PRECIPITATOR SHUT OFF DAMPER (NEW) (GUILLOTINE TYPE)

EXIST 13' 6" X 27' 6" DUCT (DIRTY GAS)

B/ DUCT EL 699' 6"

GRADE EL 670'-0"

SECTION 'C-9'

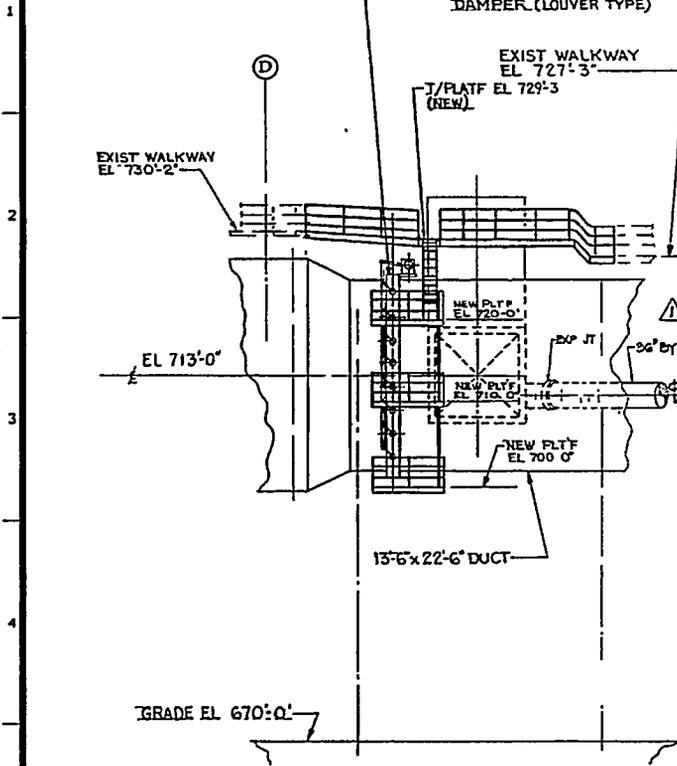
1051092

A B C D E F G

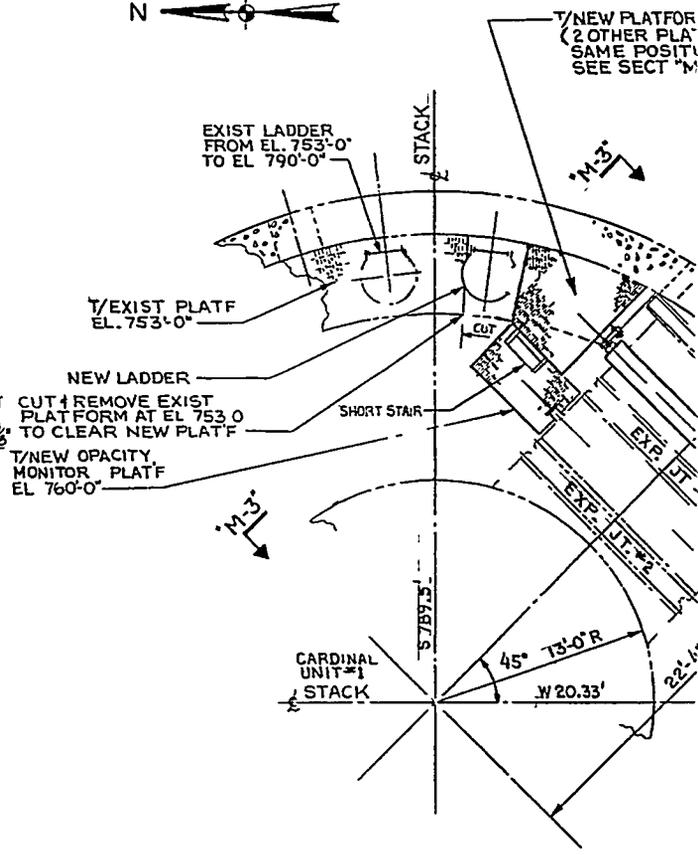
0 1 2 3 4 5 6 7 1

Figure A-VI.6 Appendix - Page # 184

90-T005-T ON DWG



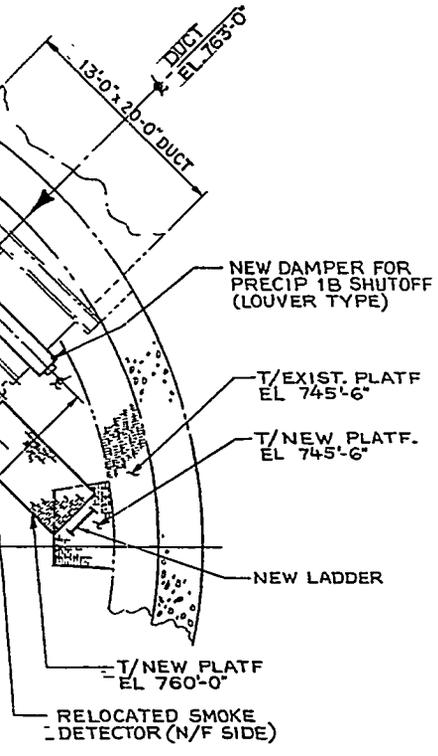
SECTION C-3
 DWG. 1-5001-05
 (SCALE 1/4"=1'-0")



ENLARGED PLAN AT
 PRECIP 1B SHUTOFF
 DAMPER
 DWG. 1-5001-05
 (SCALE 1/4"=1'-0")

Figure A-IV.7

768'-6"
MS
BELOW



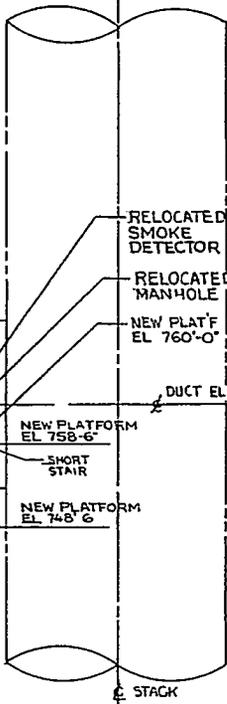
NEW PRECIPITATOR 1B
SHUTOFF DAMPER
(LOUVER TYPE)

NEW PLATFORM
EL 768'-6"

NEW LADDER

PLATF EL 753'-0"
(EXIST)

PLATF EL 745'-6"
(EXIST)



SECTION "M-3"
(SCALE 1/8" = 1'-0")

GENERAL NOTES

REFERENCE DRAWINGS
LISTED ON DWG 1-5001-05

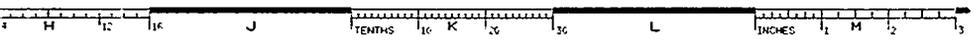
DATE	NO.	DESCRIPTION	APPD.
	2	PER DIS 14716 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED SDV	
<p>THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED SEE MICROFILM RECORDING FOR HISTORY & DIMENSIONS DRAWING REVISION 1</p>			
<p>REVISIONS</p> <p>USER/MECH/1456/01.MISC/S20106.170</p> <p>USER/MECH/1456/01.MISC/S20106.174</p>			

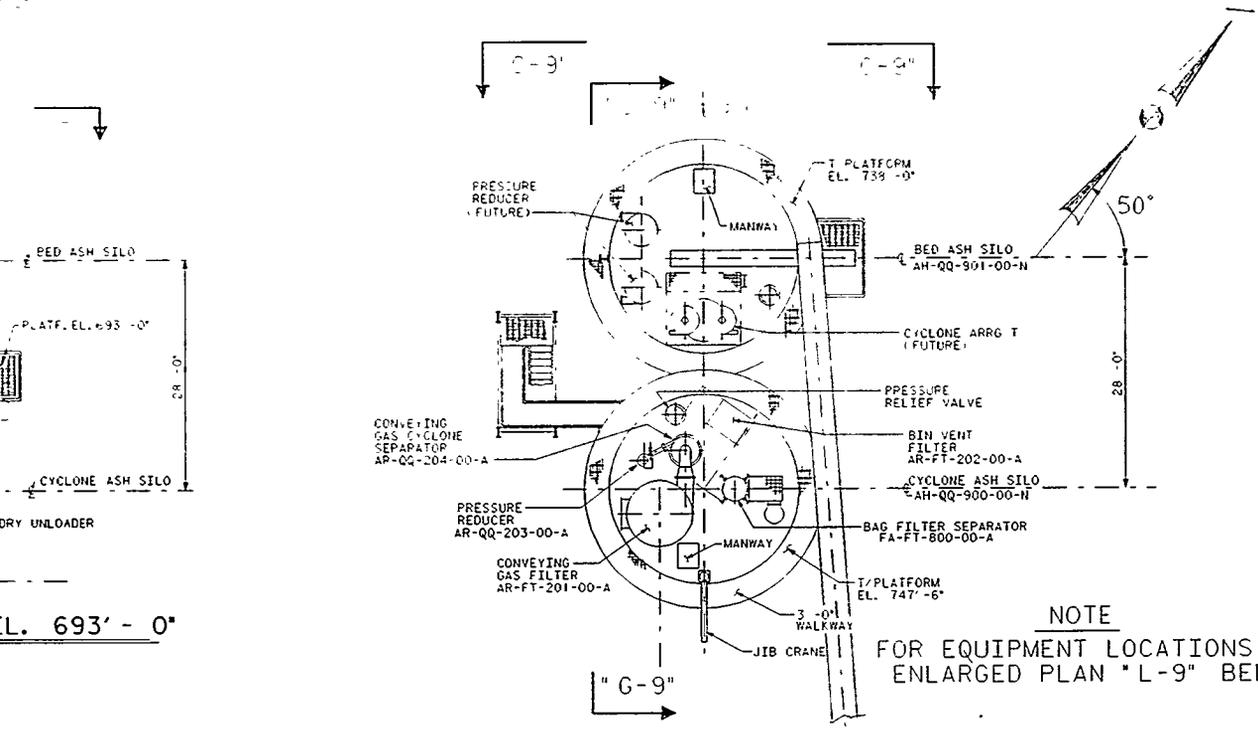
TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

GENERAL ARR'GT
PRECIP. 1A & 1B
DUCT MODIFICATIONS
PLAN & SECTIONS

DWG. NO. 1-5001-06-2

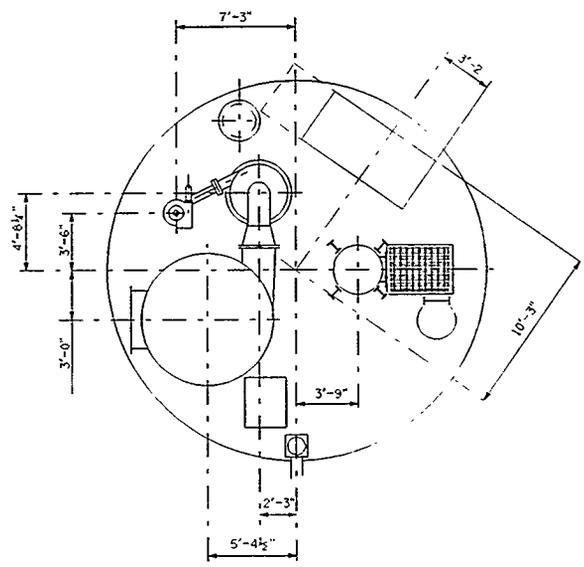
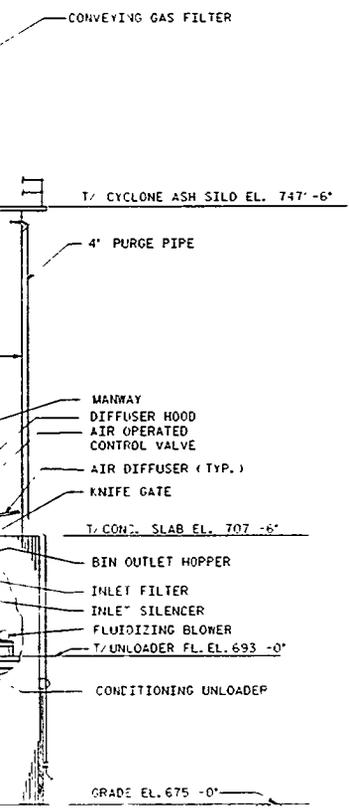
APCH	ELEC	MECH	MEH	STR
SCALE AS NOTED	ENGINEERING DIVISION			
DRN: JNJ	D.H. WILLIAMS			
CHK: AC/ab	DESIGN DEPARTMENT			
APPD: V.A. LEPORE				





NOTE
FOR EQUIPMENT LOCATIONS SEE
ENLARGED PLAN "L-9" BELOW

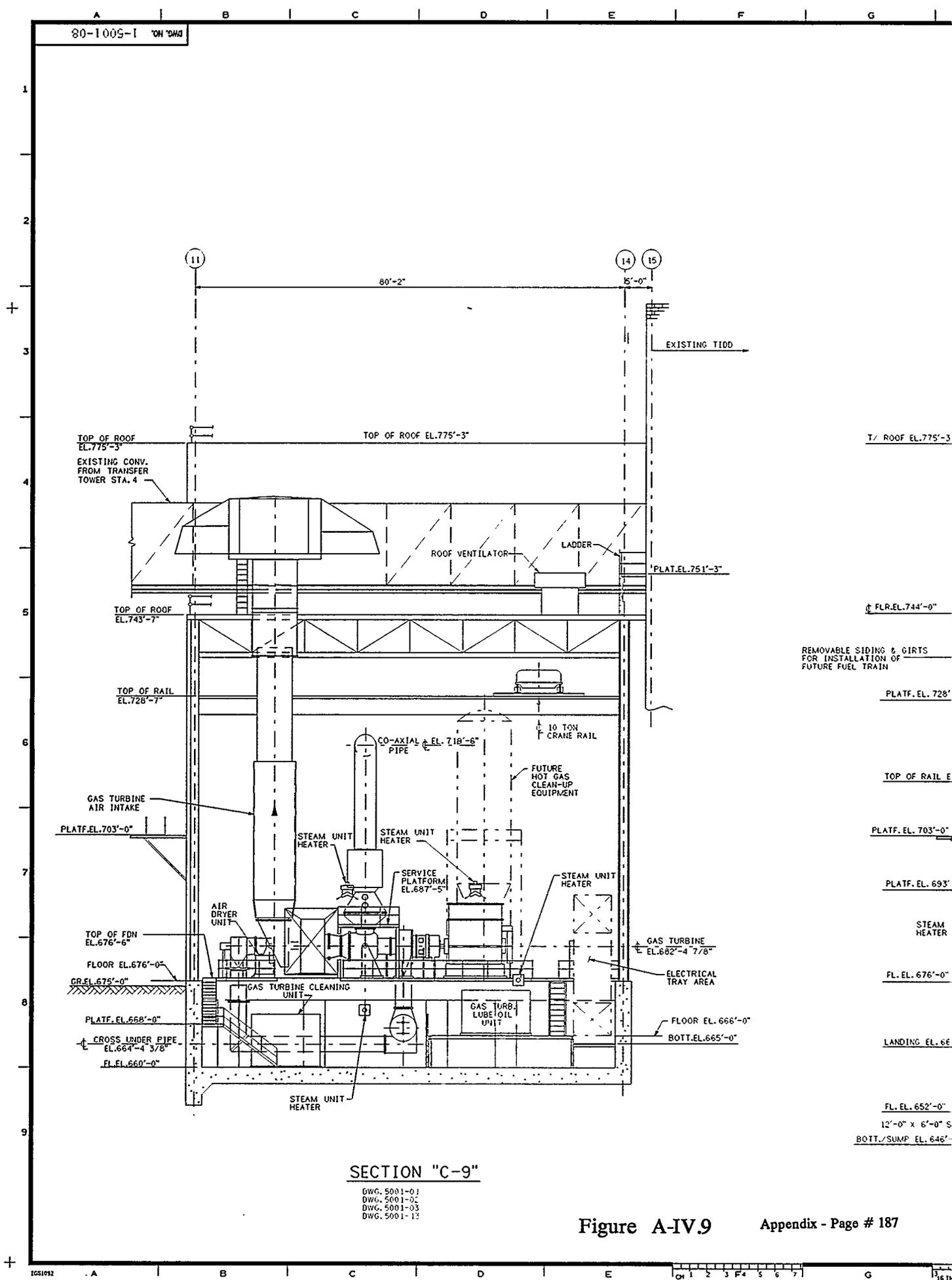
PLAN AT SILO ROOFS

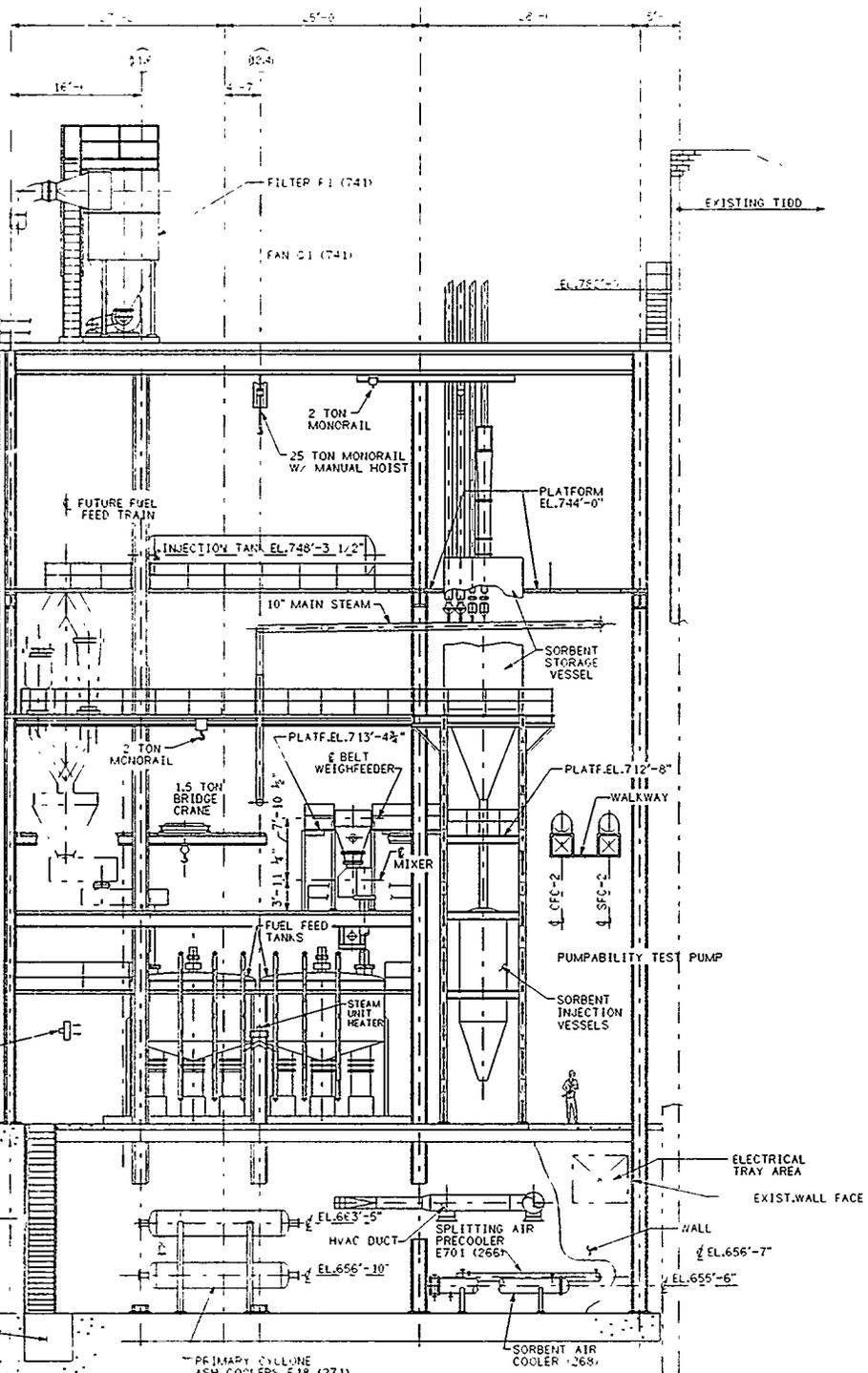


ENLARGED PLAN "L-9"

COMPUTER DRAWING MANUAL CHANGES NOT PERMITTED (282-312323123123)-110		
1	REVISED LADDER LOCATION • M/A & M/S-REMOVED "HOLD" • B/A/D/T/G/V/G/A/G/T/H/B/X/L M/A/W/T C.F.J. ..	APPROV.
DATE	DESCRIPTION	APPROV.
REVISIONS		

TIDD PFBC DEMONSTRATION PLANT BRILLIANT, OHIO				
GEN. ARRGM'T ASH HANDLING FACILITY				
DWG. NO. 1-5001-07-1				
APPROV. <input checked="" type="checkbox"/>	ELEC. <input checked="" type="checkbox"/>	MECH. <input checked="" type="checkbox"/>	PER. <input checked="" type="checkbox"/>	STR. <input checked="" type="checkbox"/>
SCALE: 1/4"=1'-0"		ENGINEERING DIVISION		
DR. W.J.K.		D.H. WILLIAMS JR.		
DESIGN DIVISION		DESIGN DIVISION		
SOLUTION: PAD		V.A. LAPORE		
DATE: 6-10-88				





SECTION "K-9"

NOTES:
1. CRANE AND RAIL SYSTEM DESIGNED FOR 30 TON SYSTEM. 10 TON MANUAL CRANE WILL BE UTILIZED.

COMPUTER DRAWING MANUAL CHANGES NOT PERMITTED 12/23/89 12:23:10		
1/2	REVISED PER RDR 11-00-5250 ADDED PLATFORM EL. 713'-4 1/2" • K/G	CFJ
8/10/89	GENERAL REVISION (UP-DATED TO CONFORM WITH COMPOSITE PIPING DRAWINGS	CFJ/JHL
DATE	NO.	DESCRIPTION
REVISIONS		

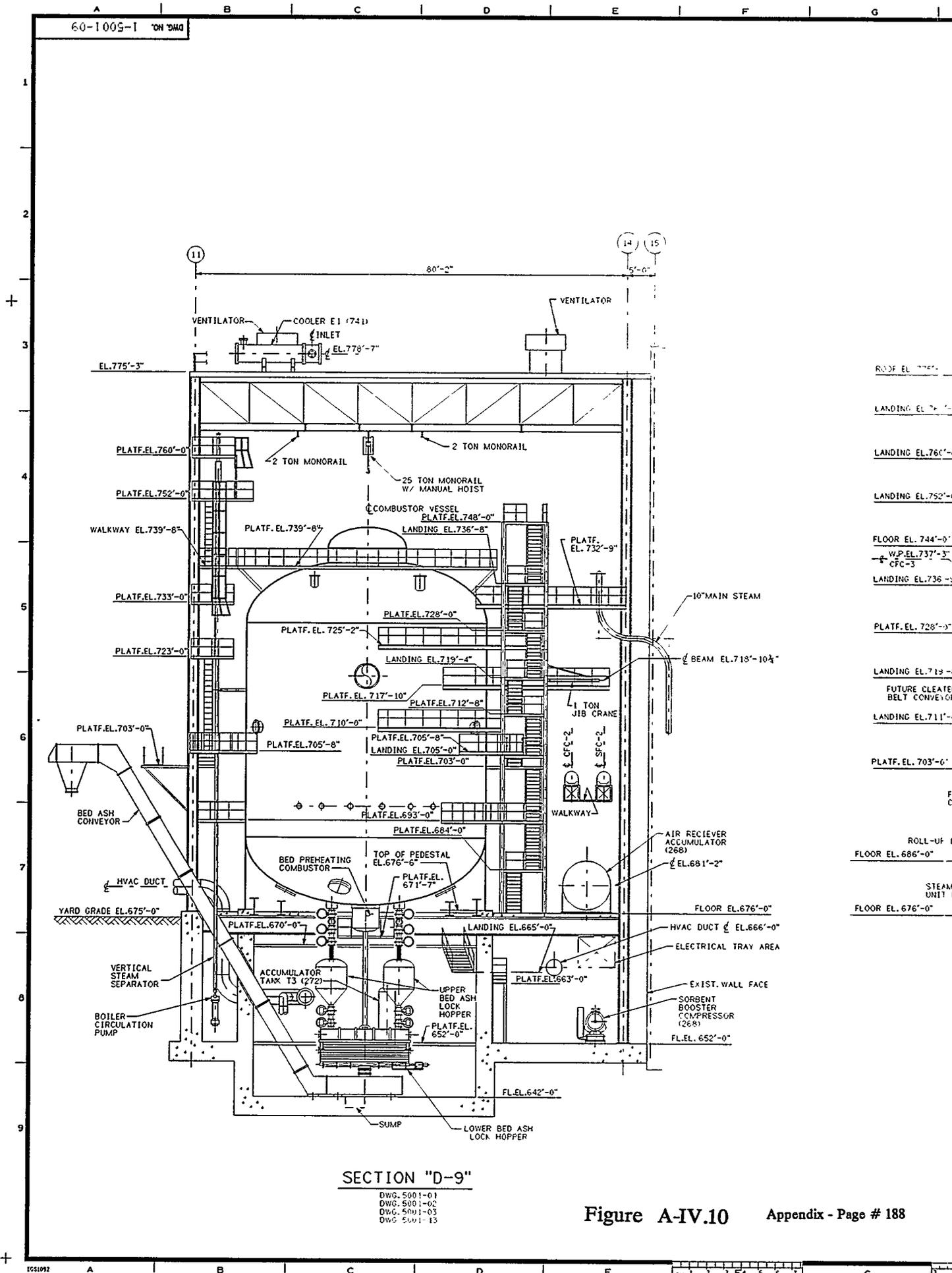
TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

GENERAL ARR'GT
COMBUSTOR BUILDING
SECTIONS

DWG. NO. 1-5001-08-2

ARCH	ELEC	MECH	PER	STR
SCALE	ENGINEERING DIVISION			
DR	D.H. WILLIAMS JR.			
OR	DESIGN DEPARTMENT			
APP	A. LAPUFE			
DATE	6-10-88	APPROVED	FSVP	LW

60-1005-1 'ON DWG



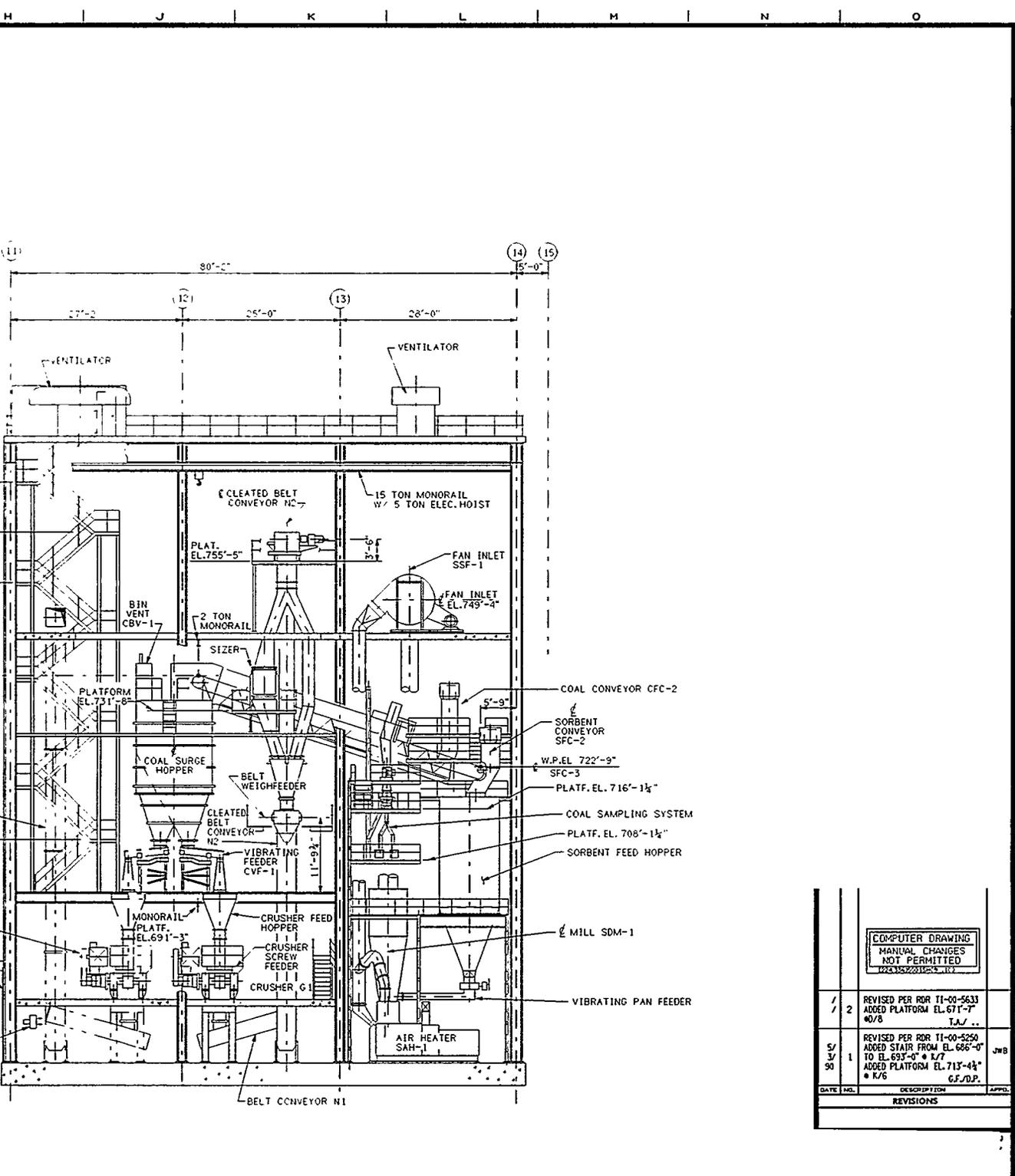
- ROOF EL. 775'-0"
- LANDING EL. 775'-0"
- LANDING EL. 760'-0"
- LANDING EL. 752'-0"
- FLOOR EL. 744'-0"
- W.P. EL. 737'-3"
- CFC-3
- LANDING EL. 736'-0"
- PLATF. EL. 728'-0"
- LANDING EL. 719'-0"
- FUTURE CLEARED BELT CONVEYOR
- LANDING EL. 711'-4"
- PLATF. EL. 703'-0"
- FL. EL. 686'-0"
- ROLL-UP D
- FLOOR EL. 686'-0"
- STEAM UNIT
- FLOOR EL. 676'-0"

SECTION "D-9"
 DWG. 5001-01
 DWG. 5001-02
 DWG. 5001-03
 DWG. 5001-15

Figure A-IV.10 Appendix - Page # 188

1051092

A B C D E F G 1 2 3 4 5 6 7 8 9



SECTION "K-8"

DWG. 5001-02
 DWG. 5001-03
 DWG. 5001-13

COMPUTER DRAWING MANUAL CHANGES NOT PERMITTED 122335220125.167			
1	2	REVISED PER RDR TI-00-5633 ADDED PLATFORM EL. 671'-7" #0/8 T.J.A.	
5/3/90	1	REVISED PER RDR TI-00-5250 ADDED STAIR FROM EL. 686'-0" TO EL. 693'-0" # 1/2" ADDED PLATFORM EL. 713'-4 1/4" # K/6 G.F./D.P.	J.W.B.
DATE	NO.	DESCRIPTION	APPROV.
REVISIONS			

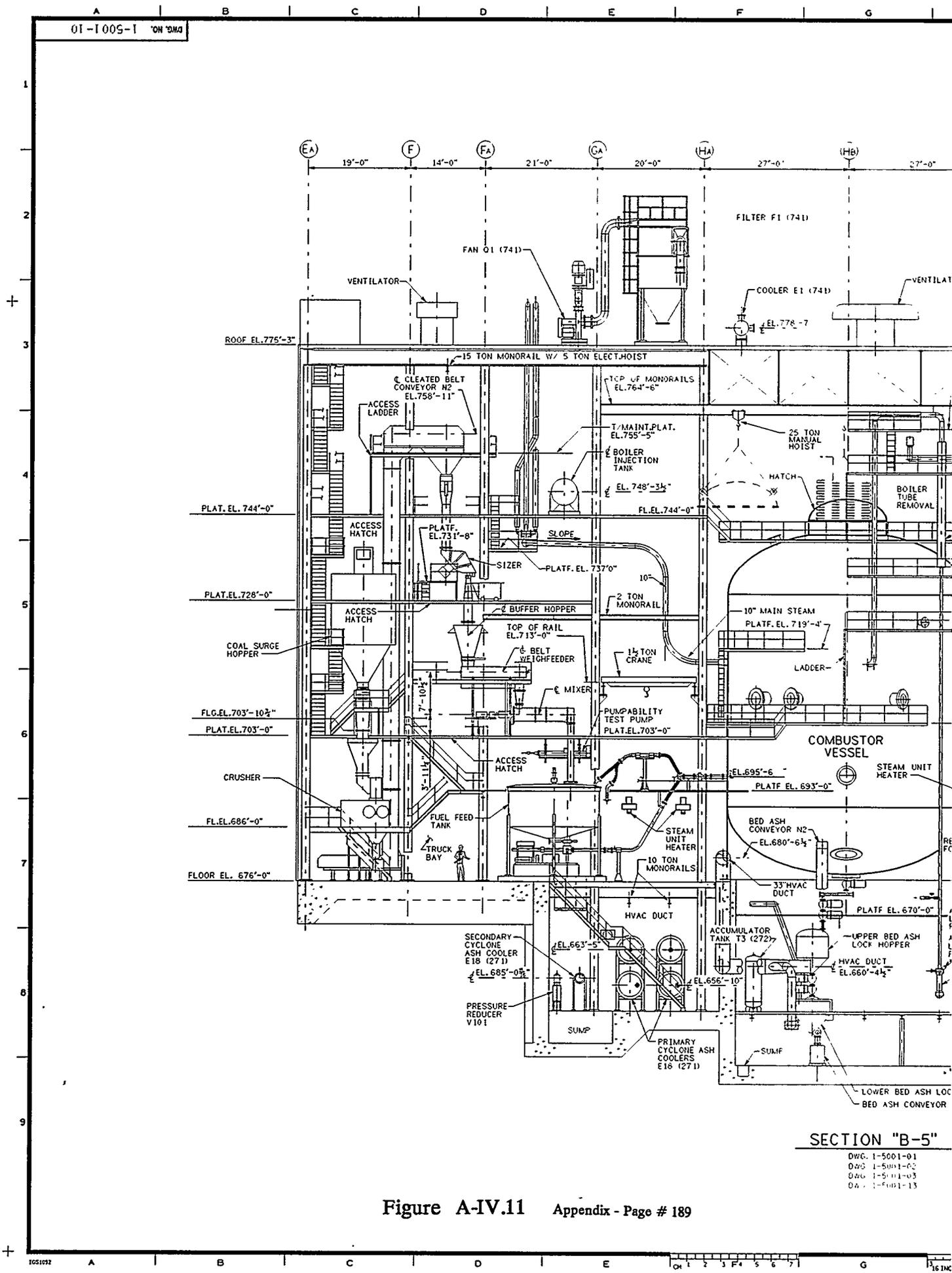
TIDD PFBC
 DEMONSTRATION PLANT
 BRILLIANT, OHIO

GENERAL ARR'G'T
 COMBUSTOR BUILDING
 SECTIONS

DWG. NO. 1-5001-09-2

ARCH	ELEC	MECH	REF	STR
DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
DR	WJM	D.H. WILLIAMS	F	LJA
DR	DSP	DESIGN DEPARTMENT	F	LJA
DESIGN	PAD	DESIGN DEPARTMENT	F	LJA
DATE	6-19-88	2-2 LAF YRF		





SECTION "B-5"

DWG. 1-5001-01
 020 1-5001-02
 030 1-5001-03
 04 1-5001-13

Figure A-IV.11 Appendix - Page # 189

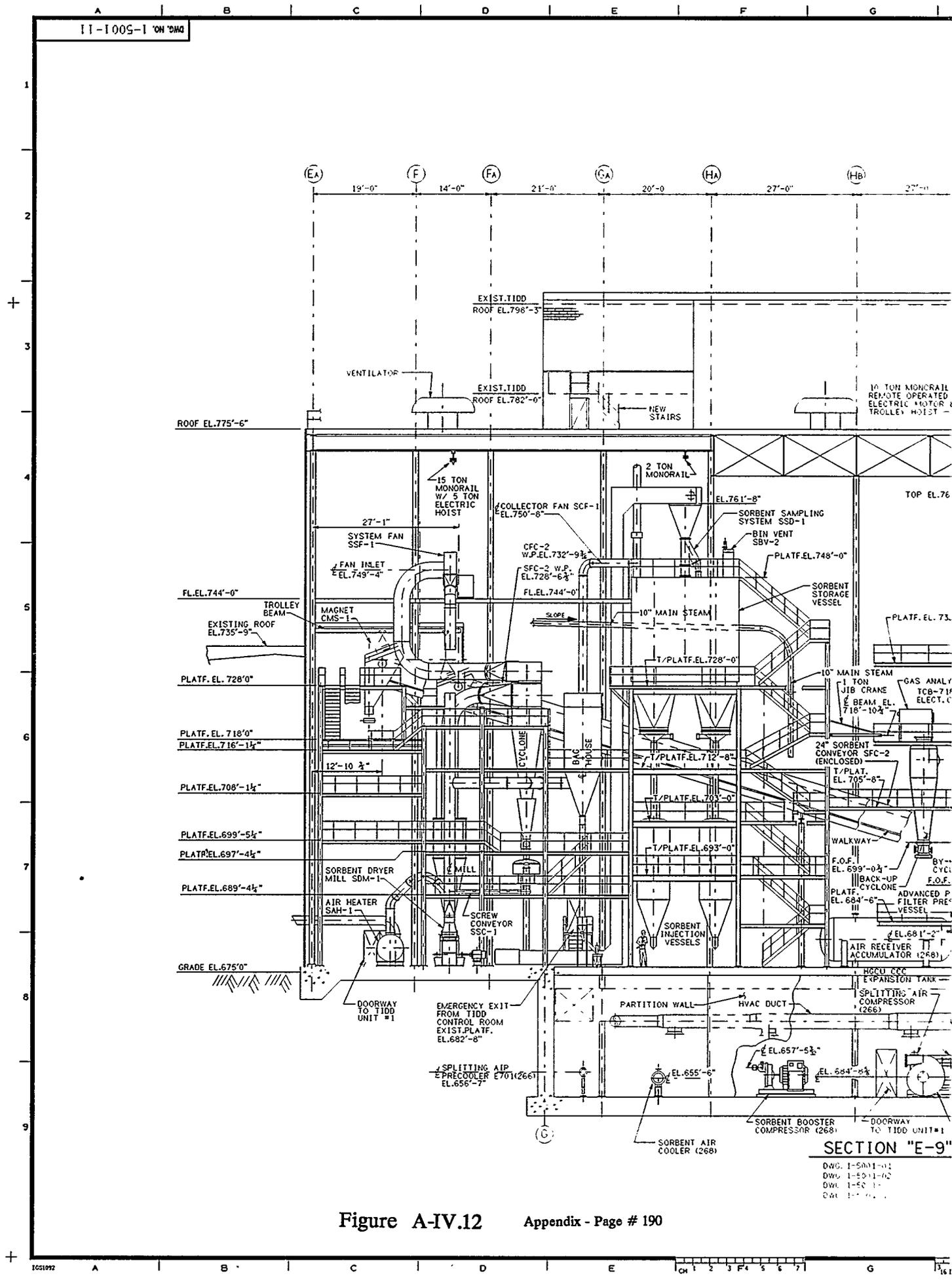
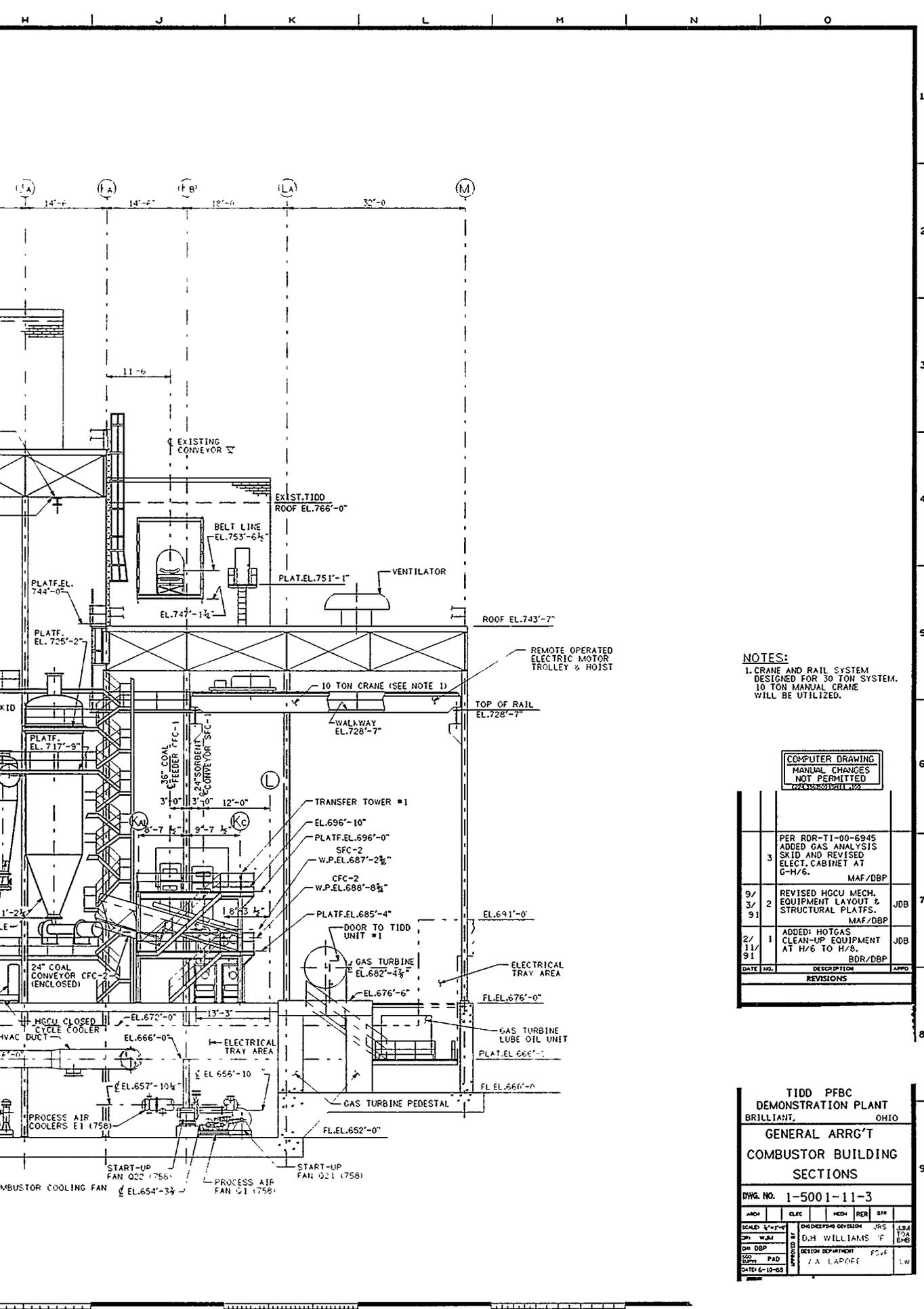


Figure A-IV.12 Appendix - Page # 190



NOTES:
 1. CRANE AND RAIL SYSTEM DESIGNED FOR 30 TON SYSTEM. 10 TON MANUAL CRANE WILL BE UTILIZED.

COMPUTER DRAWING
 MANUAL CHANGES NOT PERMITTED
 (REVISED 03/11/92)

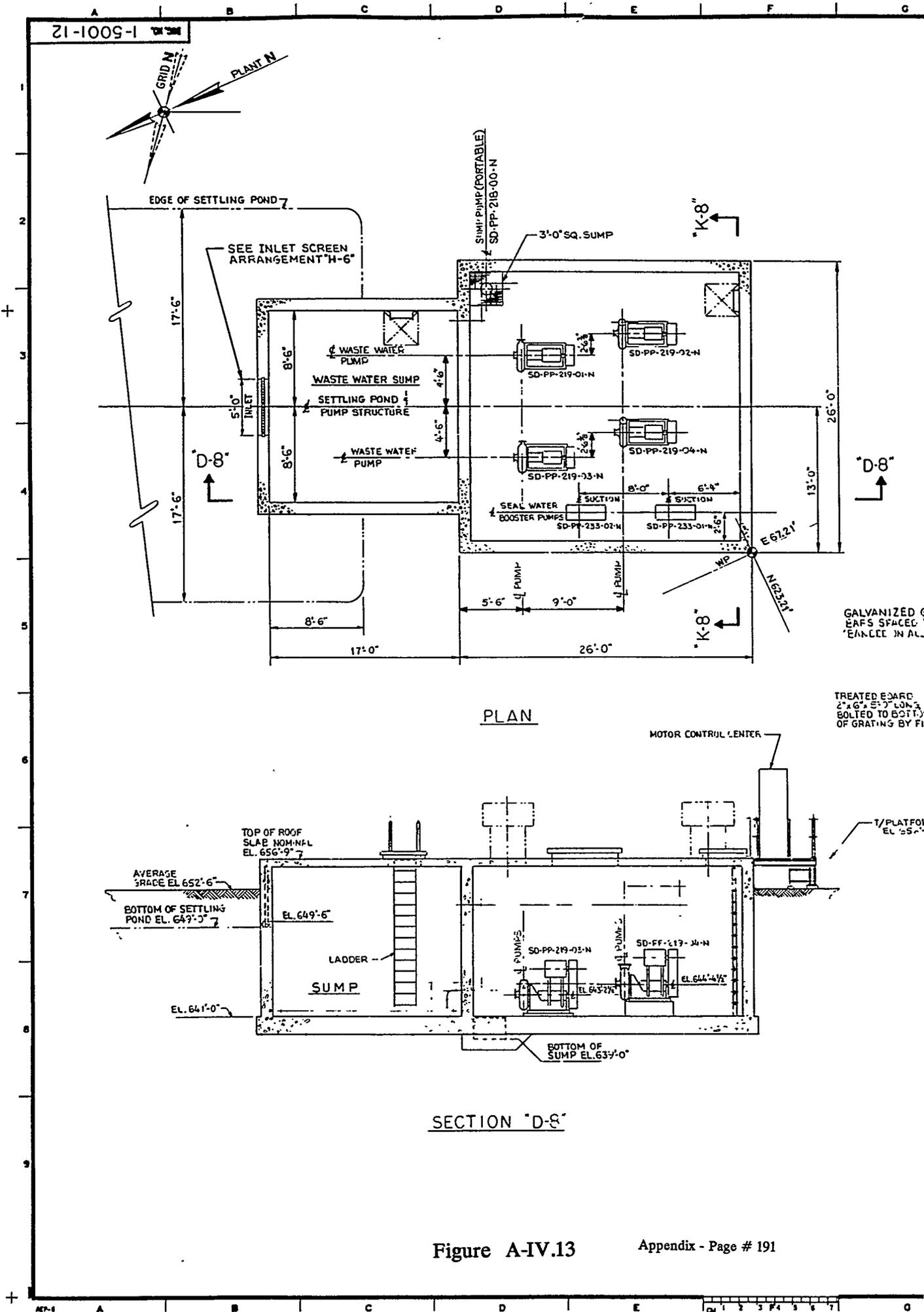
DATE	NO.	DESCRIPTION	APPROV.
		PER RDR-TI-00-6945 ADDED GAS ANALYSIS SKID AND REVISED ELECT. CABINET AT C-H/6.	MAF/DBP
9/3/91	2	REVISED HCCU MECH. EQUIPMENT LAYOUT & STRUCTURAL PLATFS.	JDB
2/11/91	1	ADDED: HOT GAS CLEAN-UP EQUIPMENT AT H/6 TO H/6.	JDB
REVISIONS			

TIDD PFBC DEMONSTRATION PLANT
 BRILLIANT, OHIO

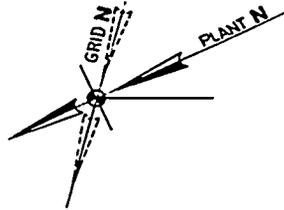
GENERAL ARR'GT
COMBUSTOR BUILDING SECTIONS

DWG. NO. 1-5001-11-3

ARCH	ELC	MECH	PER	STR
SCALE: 1/4"=1'-0"	DESIGNED BY DIVISION	JRS	LEA	TOA
DRN: WJM	BY	D.H. WILLIAMS	F	6-H
CHK: DBP	DESIGN DEPARTMENT	PCVF		
APP: PAD	APPROVED BY	J.A. LAPORE	LW	
DATE: 6-10-88				



ZI-1005-1



PLAN

SECTION "D-8"

GALVANIZED STEEL DECK SPACERS SPACED 12" ON CENTER

TREATED BOARD 2" x 6" x 5' 7" LONG, BOLTED TO BOTTOM OF GRATING BY 1/2"

Figure A-IV.13

GENERAL NOTES

REFERENCE DWGS.

- 1-5170-02- FLOW DIAGRAM
STATION DRAINAGE
& WASTE WATER
DISCHARGE
- 1-5470-01- STATION DRAINAGE
& WASTE WATER
YARD PLAN
- 1-31035- WASTE WATER PUMP
STRUCTURE &
FRAMING PLAN & ELEV.
- 1-21035- WASTE WATER PUMP
STRUCTURE MAINTENANCE
& REINFORCEMENT
- 1-31137- WASTE WATER PUMP
STRUCTURE - ROOF
FRAMING & DETAILS
- 1-5470-09- STATION DRAINAGE
& WASTE WATER
PUMP STRUCTURE
PIPING APP'NT

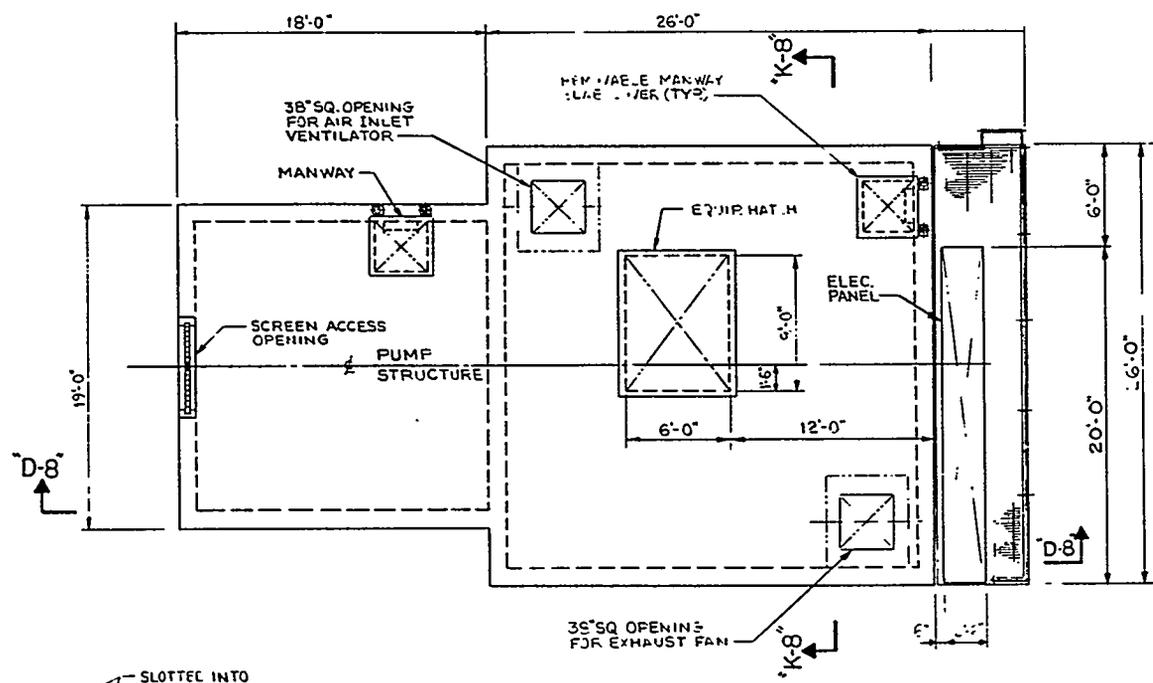
DATE	DESCRIPTION	APP'D.
REVISIONS		

**TIDD PFBC
DEMONSTRATION PLANT**
BRILLIANT, OHIO

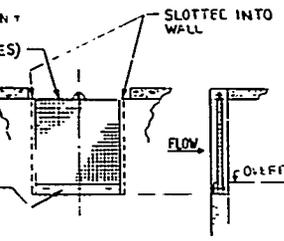
**GENERAL ARRGT.
WASTE WATER PUMPS
STRUCTURE
PLAN & SECTIONS**

DWG. NO. 1-5001-12

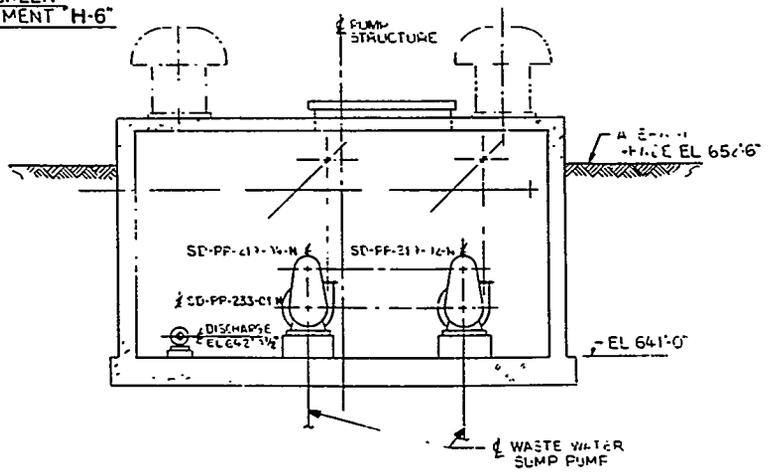
SCALE: 1/4" = 1'-0"	DATE: 11-1-77	BY: J.M.J.	CHECKED: H.V.V.
DESIGNED: H.V.V.	ENGINEERING: H.V.V.	PROJECT: TIDD PFBC	LOCATION: BRILLIANT, OHIO



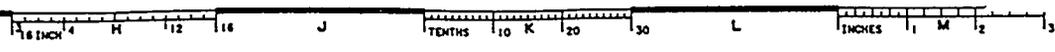
ROOF SLAB PLAN



**INLET SCREEN
ARRANGEMENT H-6**



SECTION K-8



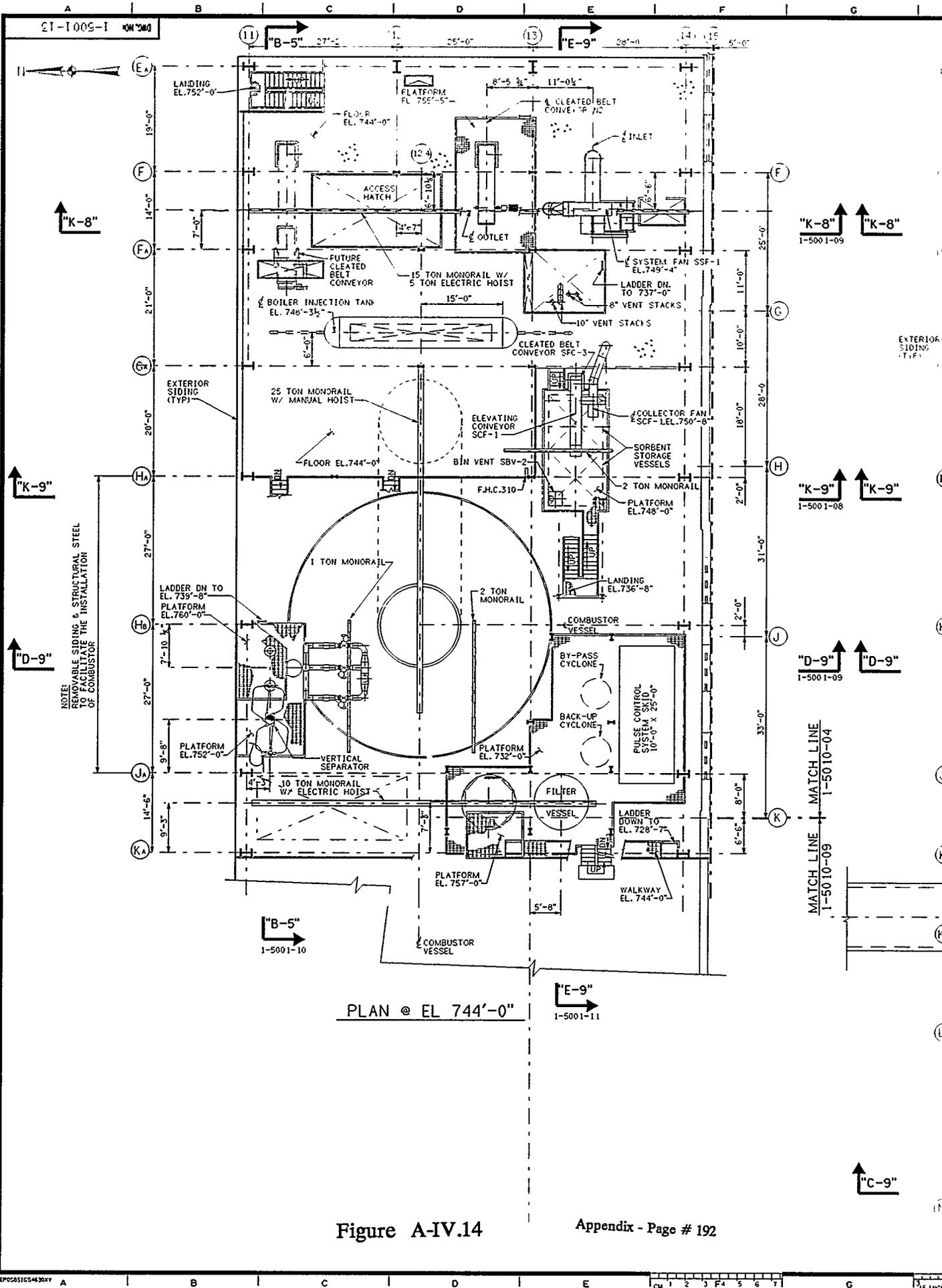
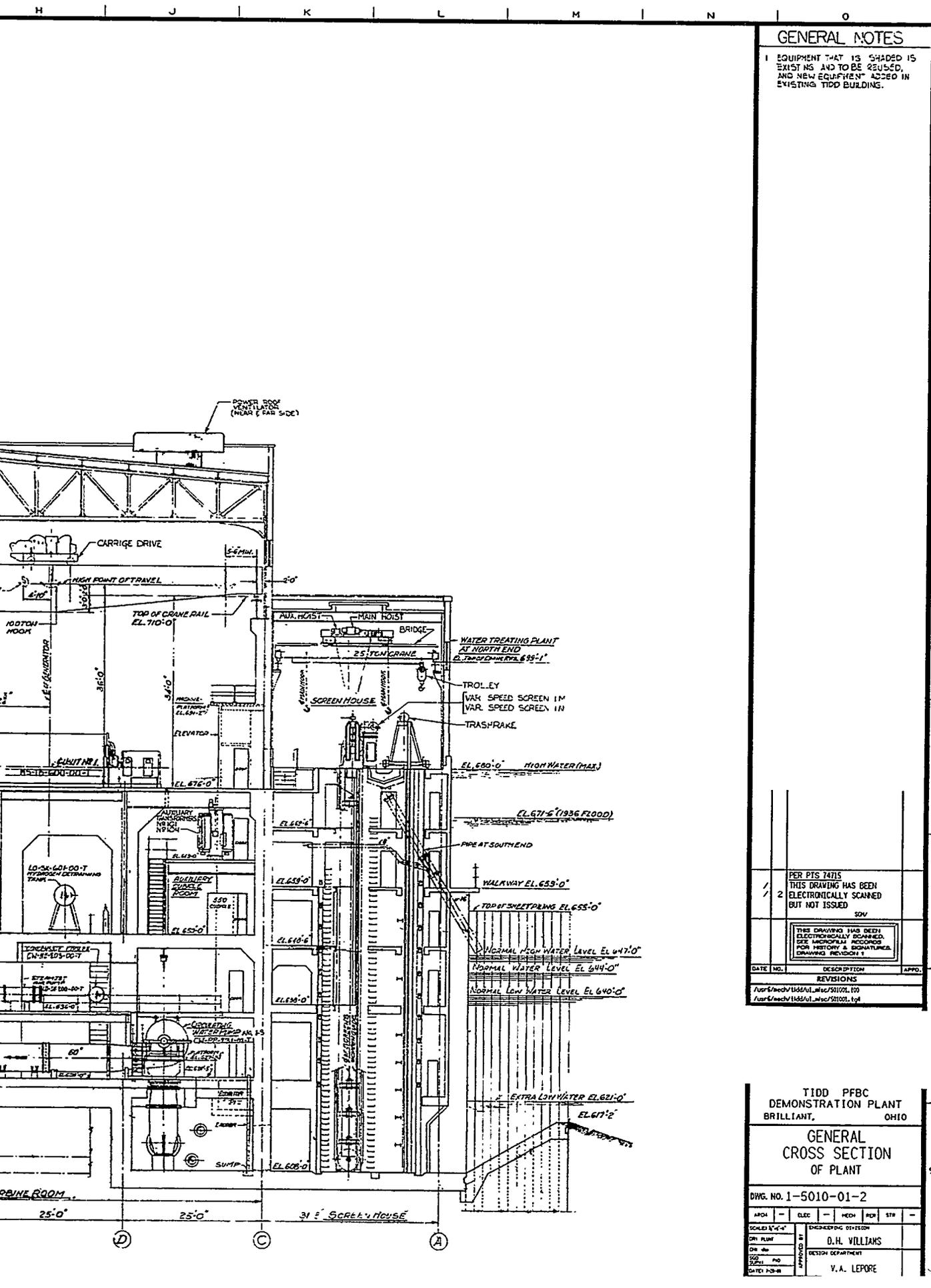


Figure A-IV.14



GENERAL NOTES

1 EQUIPMENT THAT IS SHADED IS EXISTING AND TO BE REUSED, AND NEW EQUIPMENT ADDED IN EXISTING TIDD BUILDING.

DATE	NO.	DESCRIPTION	APPRO.
7/25/81	1	PER PLS 74715 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED	SOV
THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED. SEE MICROFILM RECORDS FOR HISTORY & SIGNATURES. DRAWING REVISION 1			

TIDD PFBC DEMONSTRATION PLANT BRILLIANT, OHIO

GENERAL CROSS SECTION OF PLANT

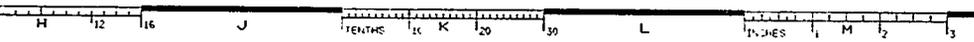
DRWG. NO. 1-5010-01-2

APPRO.	DESIGN	CHECK	REVISION	DATE

SCALE: 1/4" = 1'-0"

DRG. PLANT: O.H. WILLIAMS

DESIGN DEPARTMENT: V.A. LEPORE



20-0105-1 ON 5/10

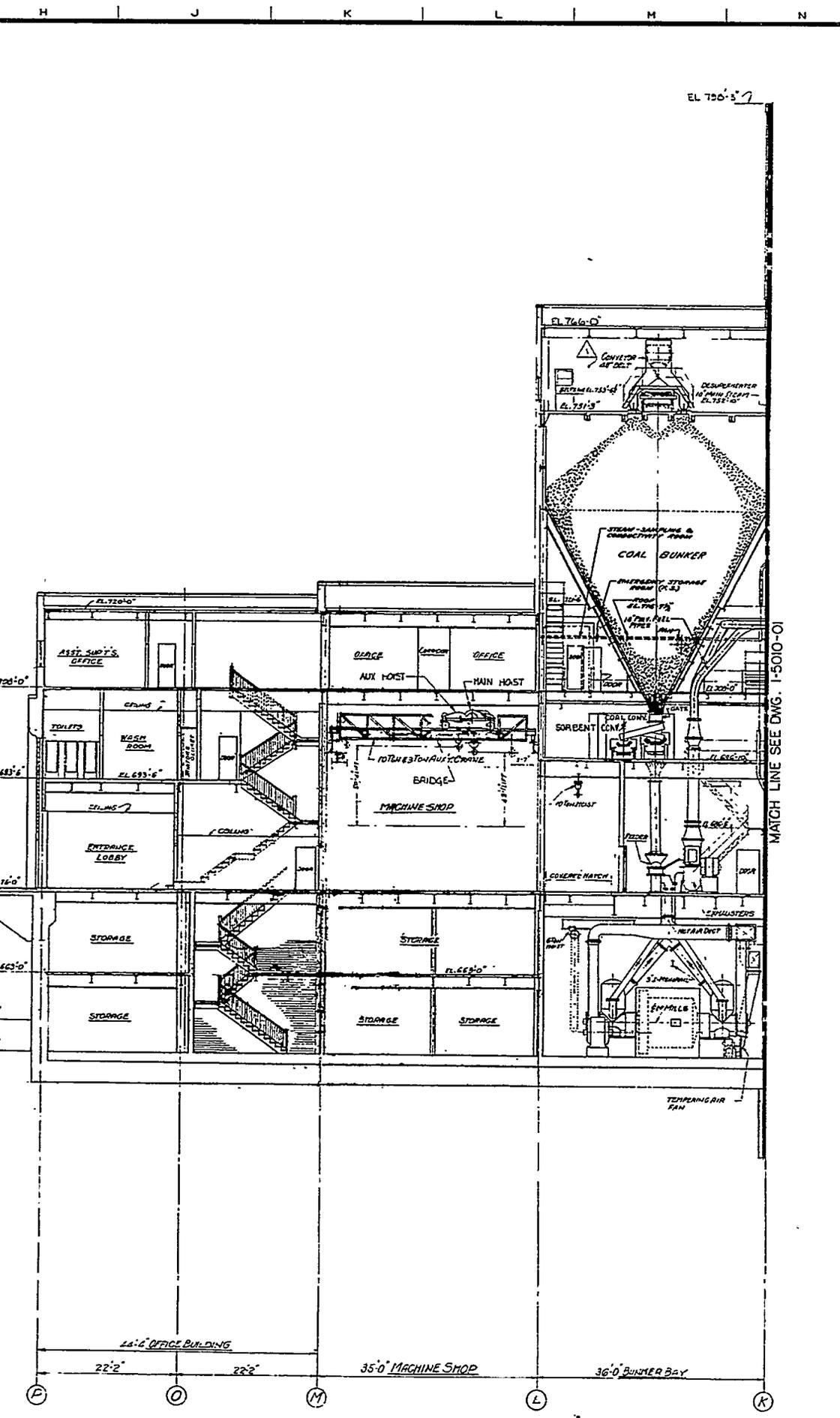


1
2
3
4
5
6
7
8
9

3RD FL.
2ND FL.
1ST FL.
CL. 675'-0" PRESENT GRADE
FILL
BASE
ORIGINAL GRADE EL. 6
SUB-BASEMENT EL. 6

Figure A-IV.16

1021932 A B C D E F G 13



NOTES
 1 FOR GENERAL NOTES SEE
 DWG. 1-5010-01

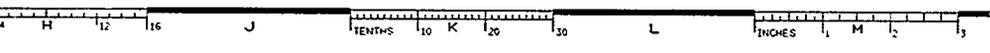
2	PER PIS 74715 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED SDV
THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED. SEE ARCHIVE FOR HISTORY & SIGNATURES. DRAWING REVISION 1	
DATE / NO.	DESCRIPTION
REVISIONS	
1/28/84	mech/1066/ul/202/100
1/28/84	mech/1066/ul/202/104

1100 PFBC
 DEMONSTRATION PLANT
 BRILLIANT, OHIO

**GENERAL
 CROSS SECTION
 OF PLANT**

DWG. NO. 1-5010-02-2

ARCH	ELEC	MECH	MIN	STR
SCALE: 1/4" = 1'-0"				
ENGINEERING DIVISION				
DRN: PLANT				
DRN: MECH				
DESIGN DEPARTMENT				
DATE: 1-28-84				
APPROVED BY: D.H. WILLIAMS				
V.A. LEPORE				



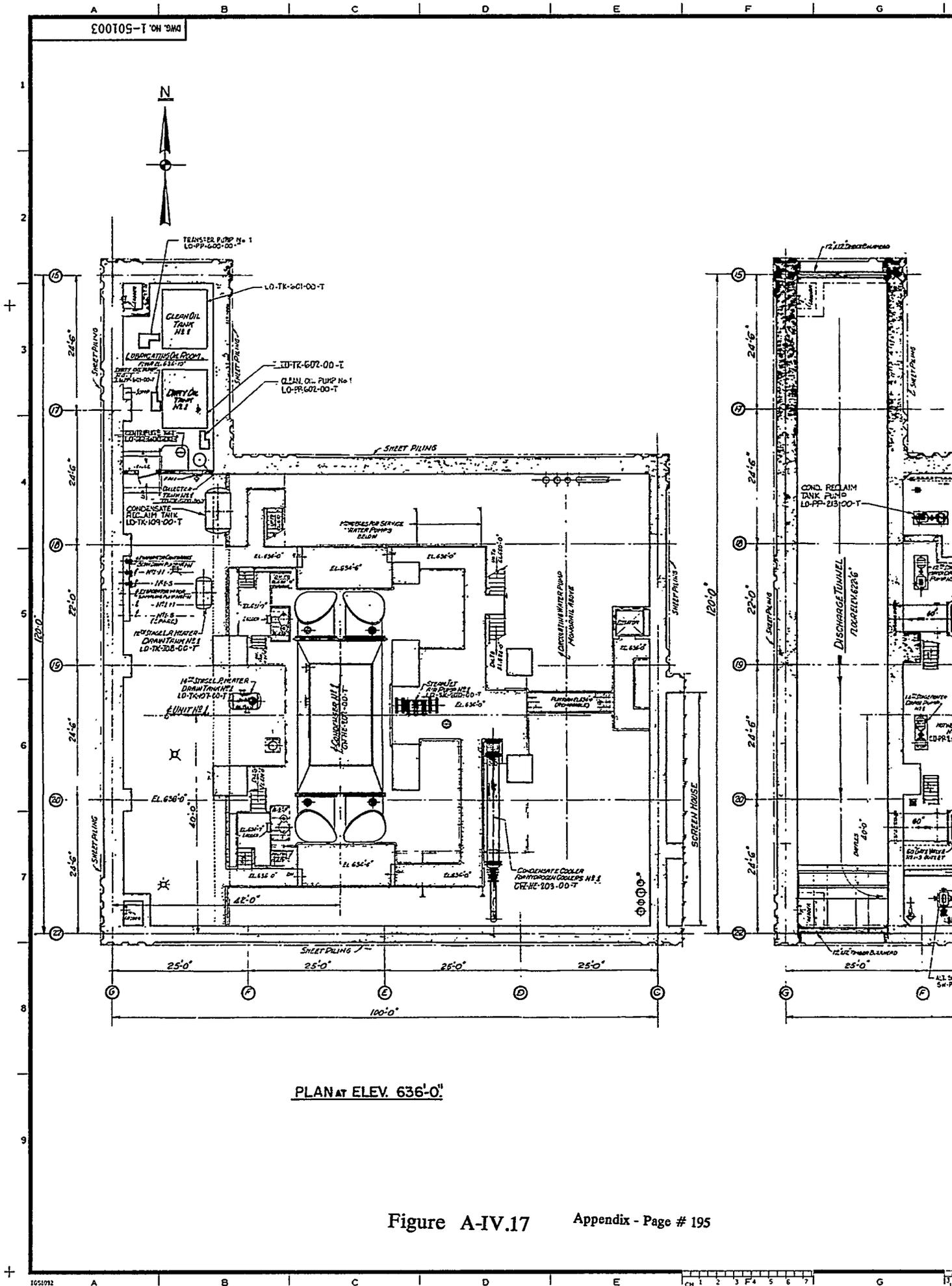


Figure A-IV.17

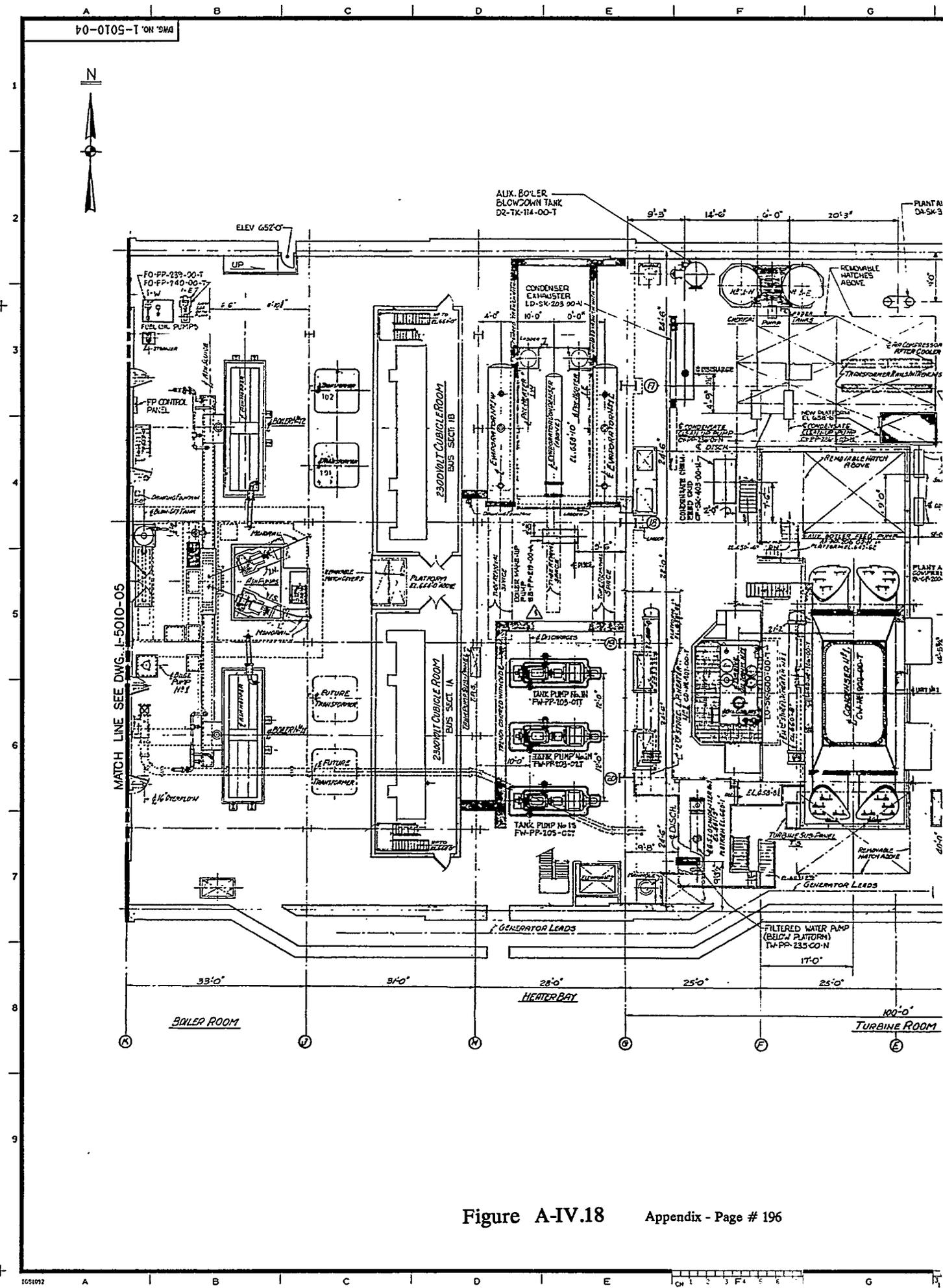
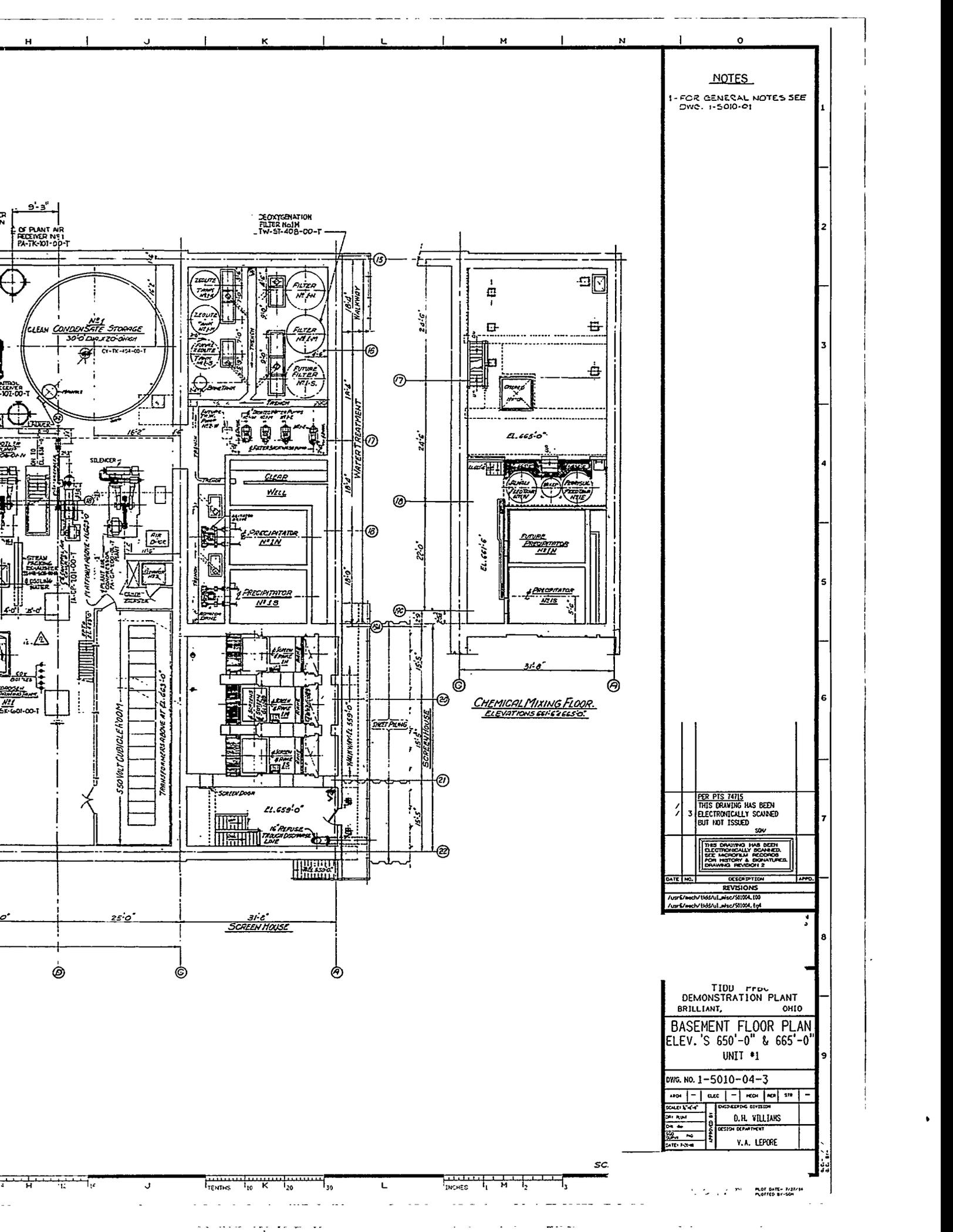


Figure A-IV.18 Appendix - Page # 196



NOTES

1- FOR GENERAL NOTES SEE
DWC. 1-5010-01

PER PIS 74715
THIS DRAWING HAS BEEN
ELECTRONICALLY SCANNED
BUT NOT ISSUED
SDW

THIS DRAWING HAS BEEN
ELECTRONICALLY SCANNED.
SEE MICROFILM RECORDS
FOR HISTORY & SIGNATURES.
DRAWING REVISION 2

DATE	NO.	DESCRIPTION	APPRO.
REVISIONS			
1/28/67	mech/1666/ul/ps2/911004.100		
1/28/67	mech/1666/ul/ps2/911004.104		

TIDU FFB
DEMONSTRATION PLANT
BRILLIANT, OHIO

BASEMENT FLOOR PLAN
ELEV. 'S 650'-0" & 665'-0"
UNIT #1

DWG. NO. 1-5010-04-3

ARCH	ELEC	MECH	PER	STR	
SCALE: 1/4" = 1'-0"					
DWT: PLM					
DATE: 4/67					
SHEET NO.					
DATE: 1-28-67					
DESIGNING DIVISION			APPROVED BY:		
O.H. WILLIAMS			V.A. LEPORE		
DESIGN DEPARTMENT					

SC.

90-105-1 ON '90

N



1

2

+

3

4

5

6

7

8

9

61'0" OFFICE BUILDING

Figure A-IV.19

1051092

A

B

C

D

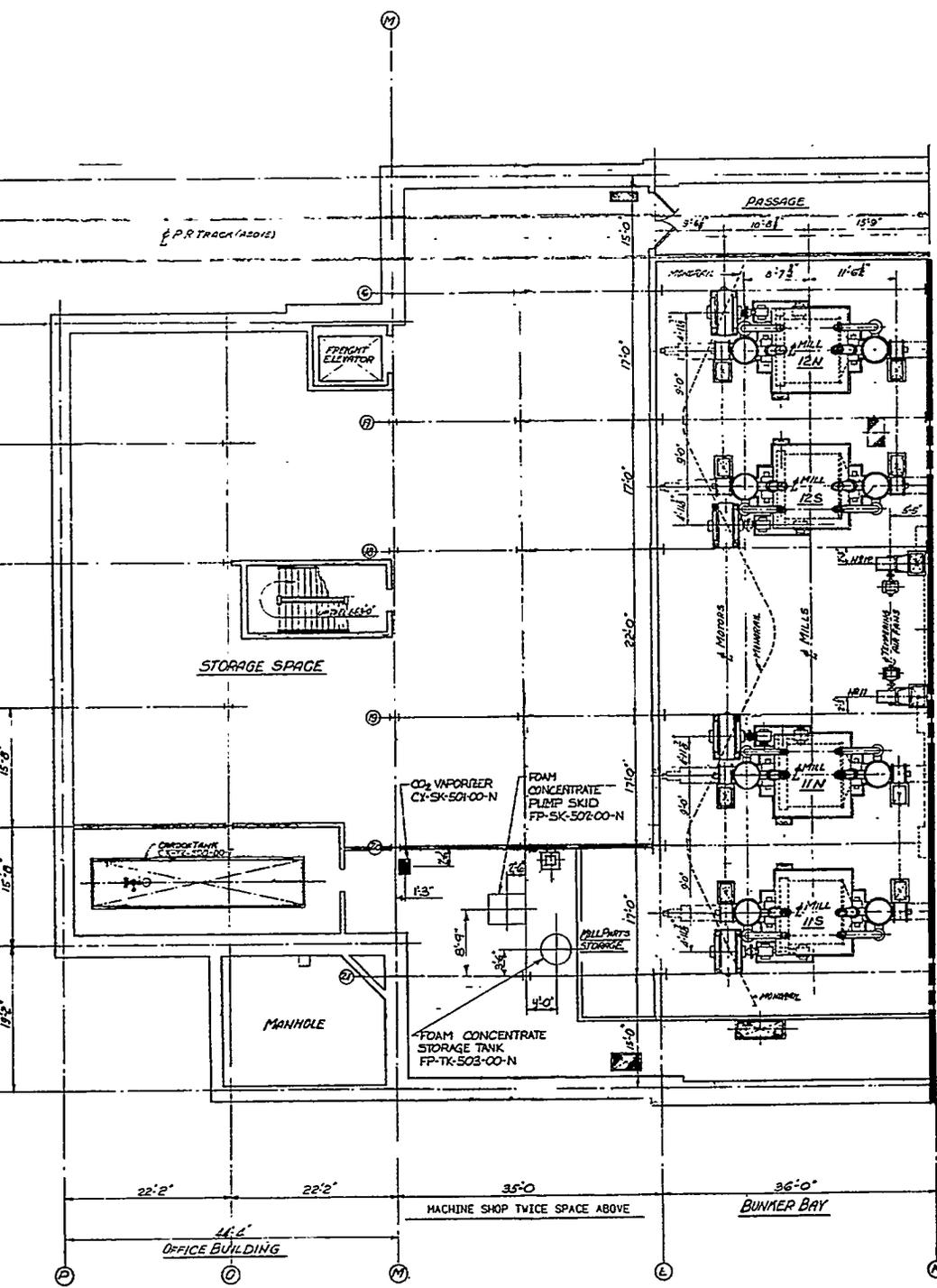
E

0 1 2 3 F4 5 6 7 1

G

NOTES

1- FOR GENERAL NOTES SEE DWG. 1-500-01



MATCH LINE SEE DWG. 1-5010-05

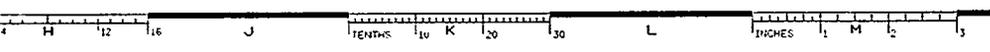
1	PER PIS 74715		
2	THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED		
	SOV		
THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED. SEE MICROFILM RECORDS FOR HISTORY & SIGNATURES. DRAWING DIVISION 3			
DATE	NO.	DESCRIPTION	APPD.
REVISIONS			
/usr/revch/1td/ul_aloc/501005.tbl /usr/revch/1td/ul_aloc/501005.tbl			

TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

BASEMENT FLOOR PLAN
ELEV. 650'-0"
UNIT NO. 1

DWG. NO. 1-5010-05-2

APPD.	DEC	MECH	MECH	STP	
SCALE 1/4" = 1'-0"					
ENGINEERING DIVISION					
D.H. WILLIAMS					
DESIGN DEPARTMENT					
V.A. LEPORE					
DATE: 1-20-88					



TIDD P.F.B.C. COMBUSTOR BLDG.

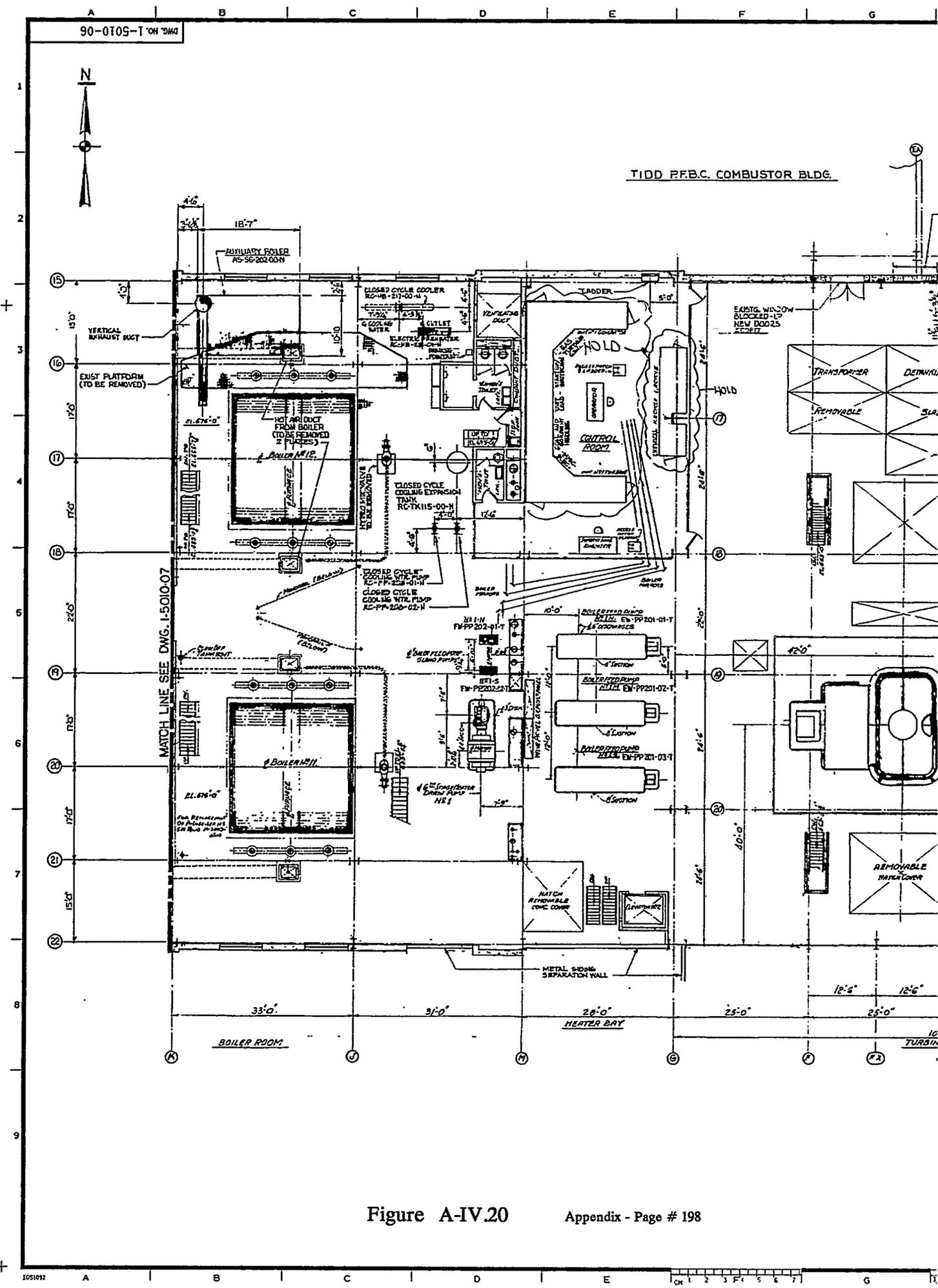
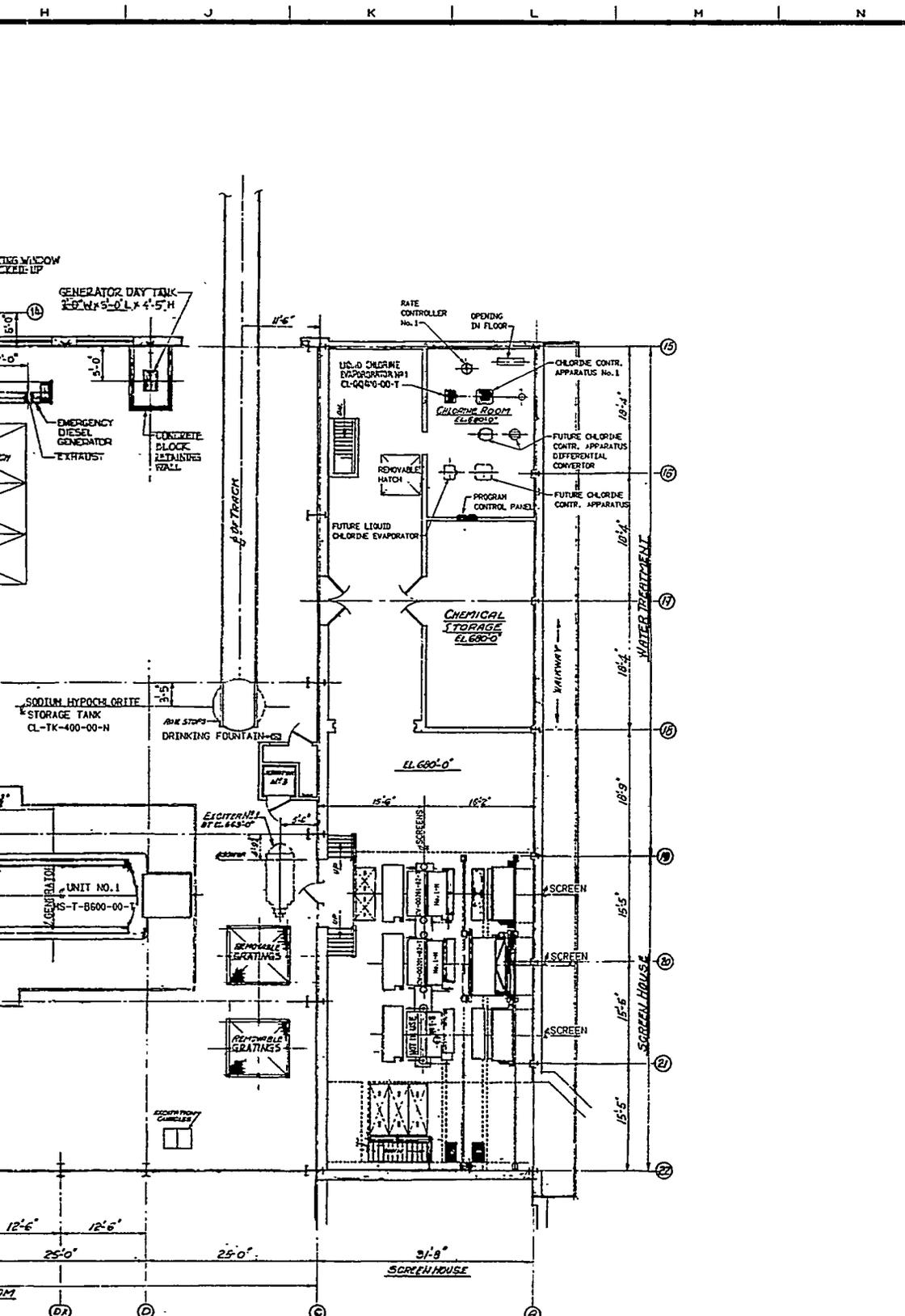


Figure A-IV.20



NOTES

1. FOR GENERAL NOTES SEE D.W.G. 1-5010-01

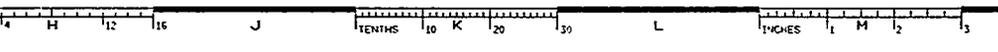
DATE	NO.	DESCRIPTION	APPROV.
	1	PER PIS 74715 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED	SDV
	2	THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED, SIZE MICROFILM RECORDS FOR HISTORY & SIGNATURES. DRAWING REVISION 1.	

TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

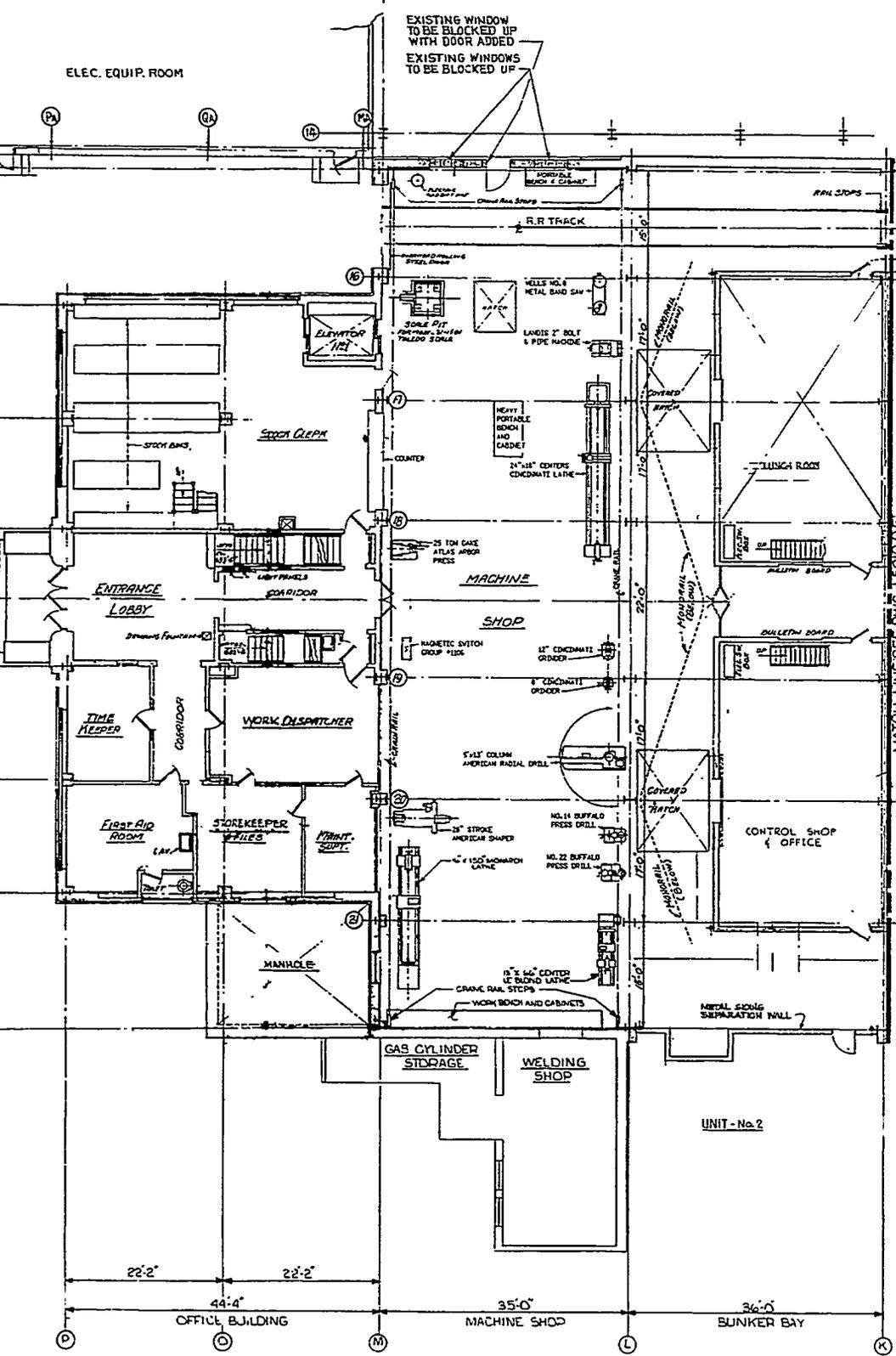
**MAIN FLOOR PLAN
ELEV. 676'-0"**
UNIT NO. 1

DWG. NO. 1-5010-06-2

APP'D	—	CHECK	—	MECH	NR	STR	—
SCALE	1/4" = 1'-0"	ENGINEERING DIVISION					
DRG. NO.	1-5010-06-2	DESIGNED BY D.H. WILLIAMS					
DATE	7-28-66	DESIGN DEPARTMENT					
APPROVED BY		V.A. LEPORE					



TIDD PFBC COMBUSTOR BLDG.



NOTES

FOR GENERAL NOTES SEE DWG. 1-5010-01

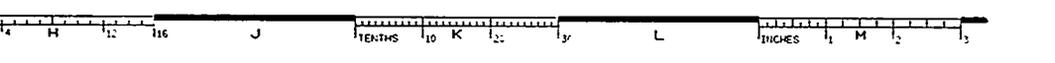
2	PER PTS 74715 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED		
7	THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED, PEG MICROFILM RECORDED FOR HISTORY & SIGNATURES. DRAWING REVISION 1		
DATE	NO.	DESCRIPTION	APPROV.
REVISIONS			
AUG 2 1974			
AUG 2 1974			

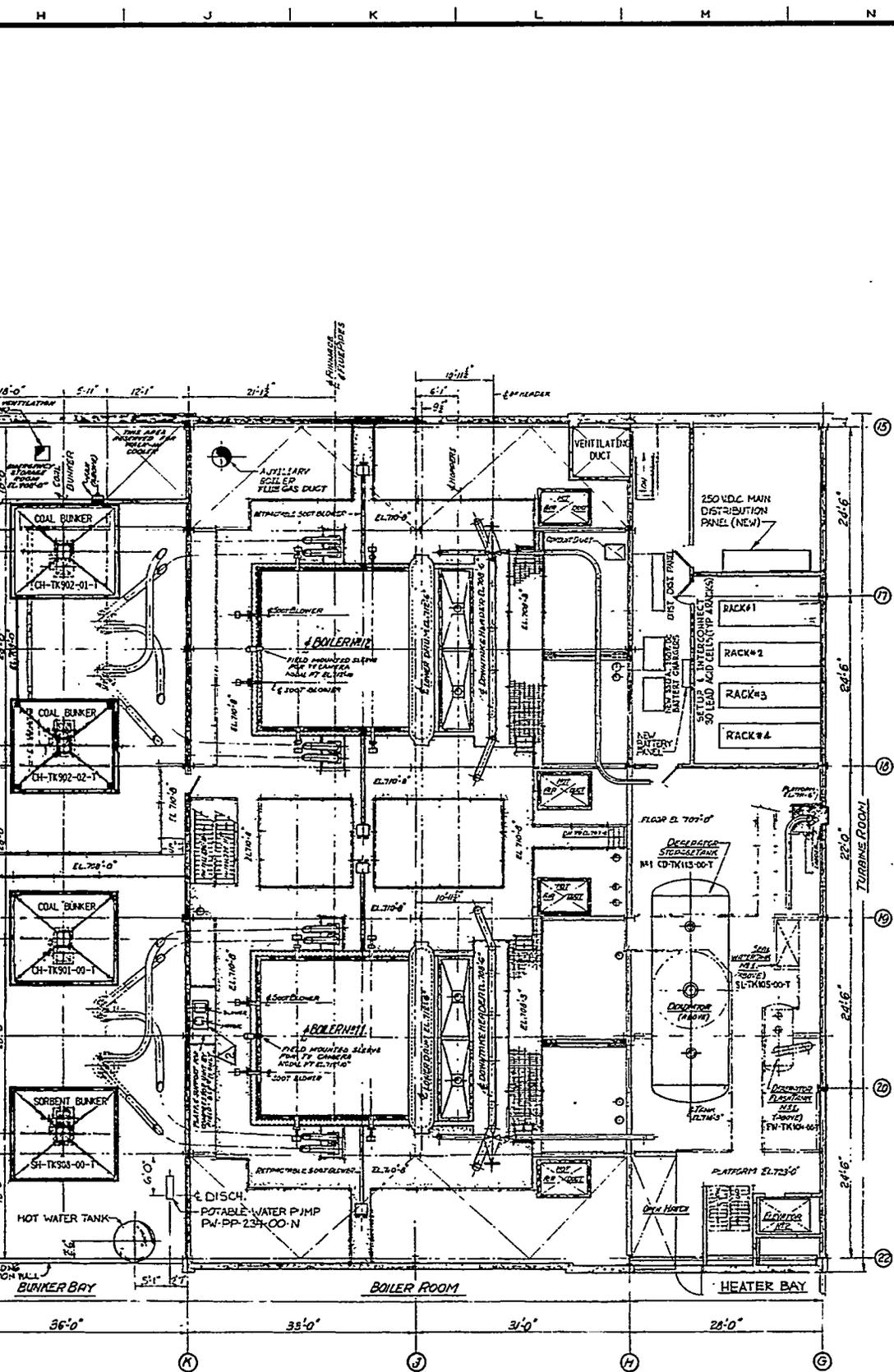
TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

MAIN FLOOR PLAN
ELEV. 676'-0"
UNIT NO. 1

DWG. NO. 1-5010-07-2

ARCH	ELEC	MECH	ROV	STR	
SCALE 1/4"=1'-0"	ENGINEERING DIVISION				
DR. FILED	D.H. WILLIAMS				
DATE	DESIGN DEPARTMENT				
APPROVED BY	V.A. LEFORE				
DATE 7-28-74					





PLAN OF BUNKER BAY, BOILER ROOM & HEATER BAY.

ELEV. 706'-0" ELEV. 710'-8" ELEV. 707'-0"

NOTES

FOR GENERAL NOTES SEE DWG. 1-5010-01

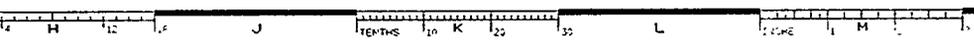
1	PER PTS. 74715 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED	SDV	
2	THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED FOR HISTORY & SIGNATURES. DRAWING REVISION 1.		
DATE	NO.	DESCRIPTION	APPROV.
REVISIONS			
1-10-74			
1-10-74			

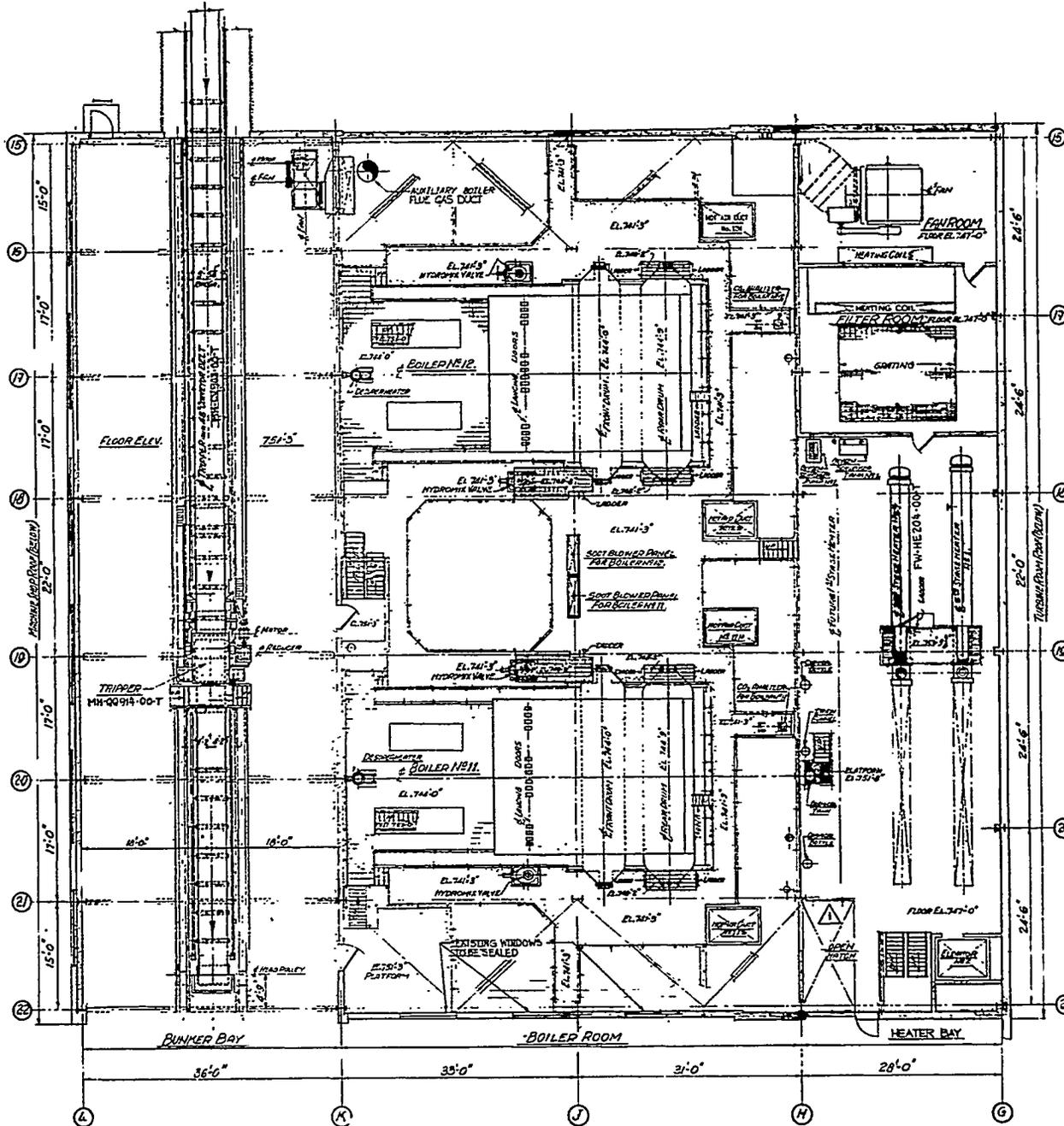
TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

**FLOOR PLANS OF
BOILER RM. & HEATER BAY**
ELEV'S. 707', 708', 710'-8"
727', 720'-11 3/4", & 732'

DWG. NO. 1-5010-08-2

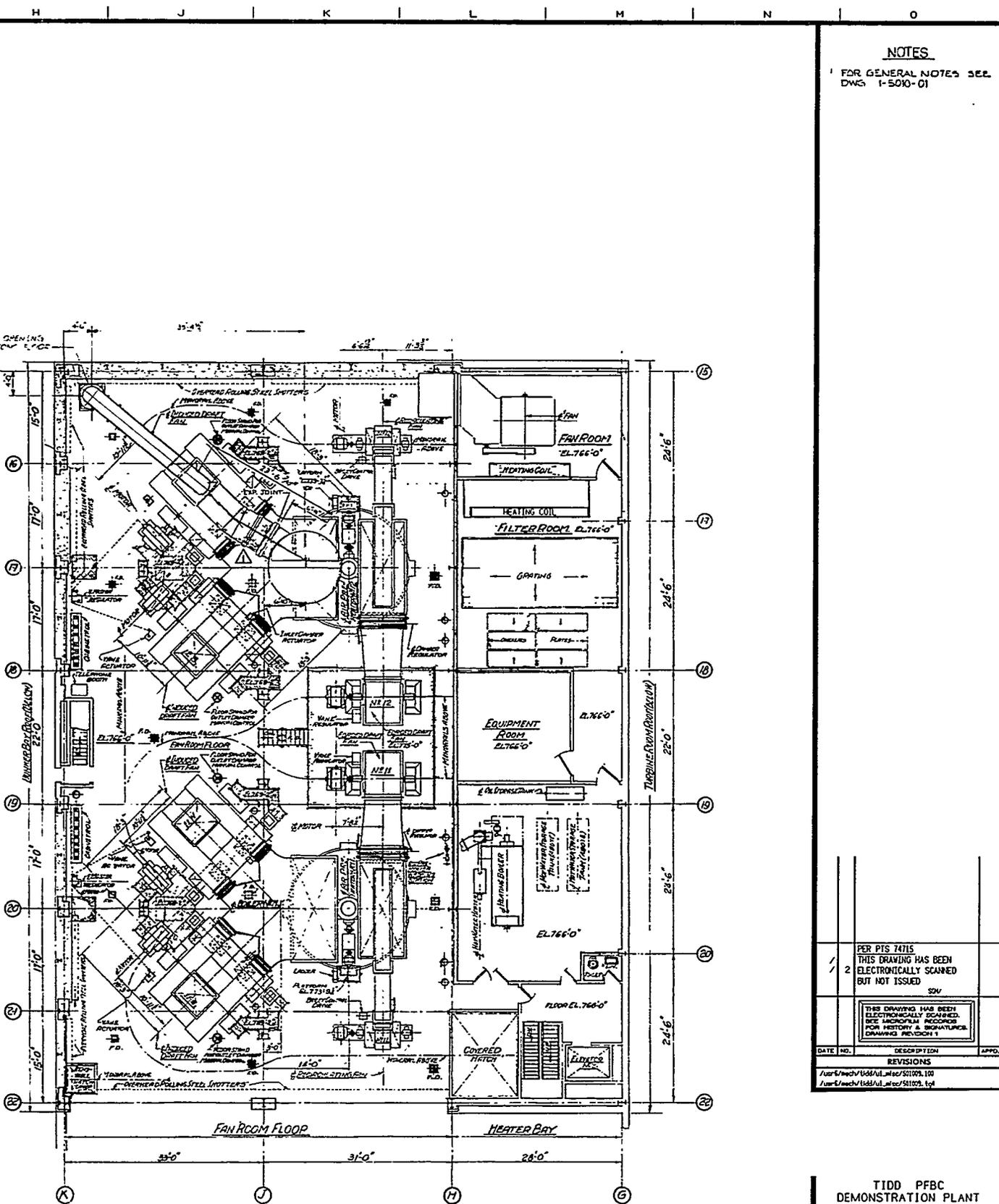
ARCH	ELEC	MECH	REC	STR	
SCALE 1/4" = 1'-0"	ENGINEERING DIVISION				
DATE	D.H. WILLIAMS				
APPROVED BY	DESIGN DEPARTMENT				
DATE: 7-3-74	V.A. LEPPOC				





PLAN of BUNKER BAY, BOILER ROOM & HEATER BAY.
 ELEV. 741'-3" ELEV. 741'-3" ELEV. 747'-0"

Figure A-IV.23



PLAN OF FAN FLOOR & HEATER BAY.
ELEV. 766'-0"

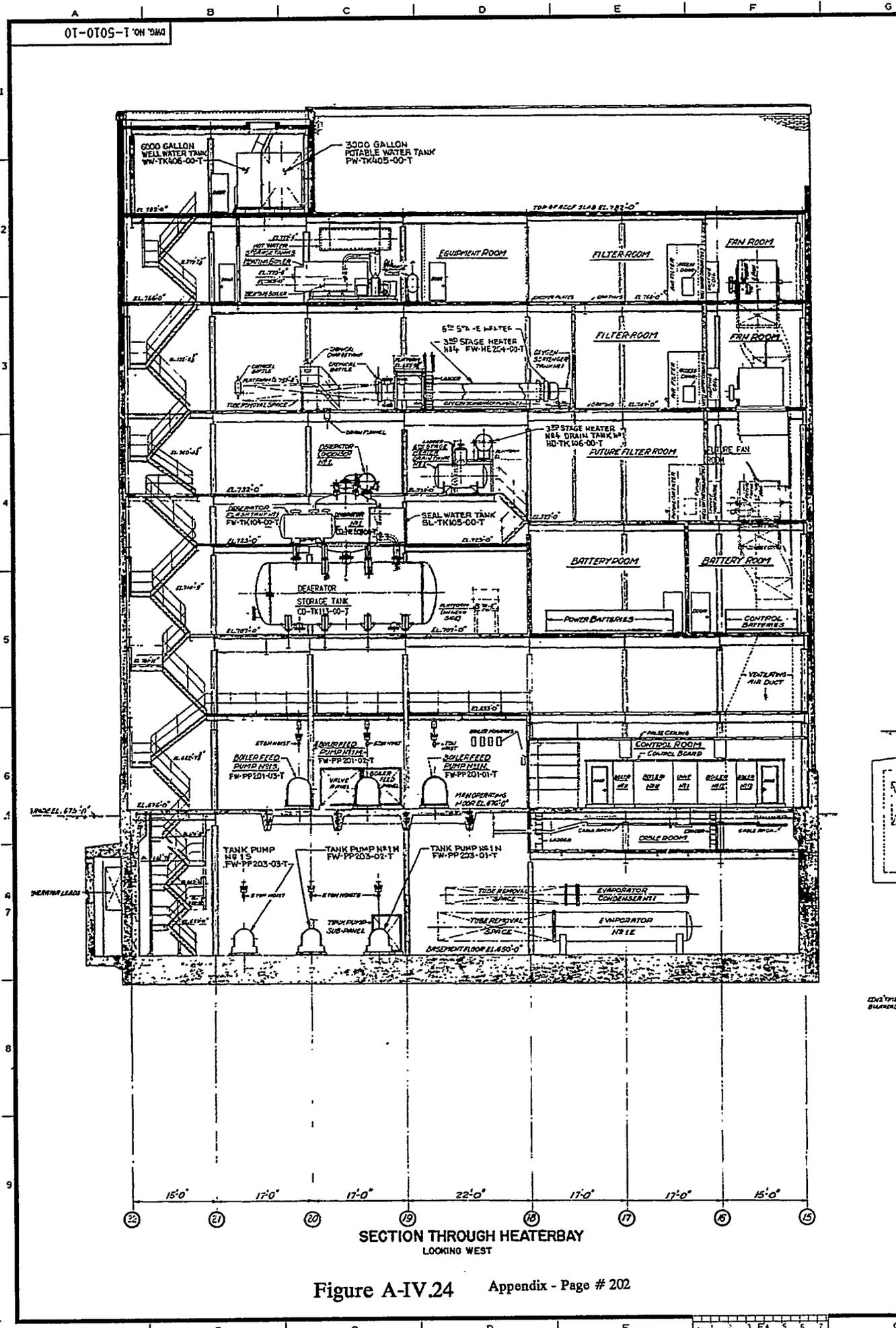
NOTES

FOR GENERAL NOTES SEE
DWG. 1-5010-01

1	PER PIS 74715	
2	THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED	
	SOV	
<p>THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED. SEE MICROFILM RECORDS FOR HISTORY & SIGNATURES. DRAWING NUMBER 1</p>		
DATE	NO.	APPRO.
REVISIONS		
7/28/87	mech/1066/AL/arc/51109.109	
7/28/87	mech/1066/AL/arc/51109.109	

TIDD PFBC DEMONSTRATION PLANT BRILLIANT, OHIO					
FLOOR PLANS OF BOILER RM. & HEATER BAY ELEV. 'S 741'-3", 747'-0", & 751'-3" FAN FLR. EL. 766'-0"					
DWG. NO. 1-5010-09-2					
ARCH	ELEC	MECH	RED	STR	
SCALE: 1/4" = 1'-0"					
ENGINEERING REVISION					
CHKD BY	D. H. WILLIAMS				
APP'D BY	DESIGN DEPARTMENT				
DATE: 7-28-87	V. A. LEPORE				

01-0105-T ON 0104



SECTION THROUGH HEATERBAY
LOOKING WEST

Figure A-IV.24 Appendix - Page # 202

1051072

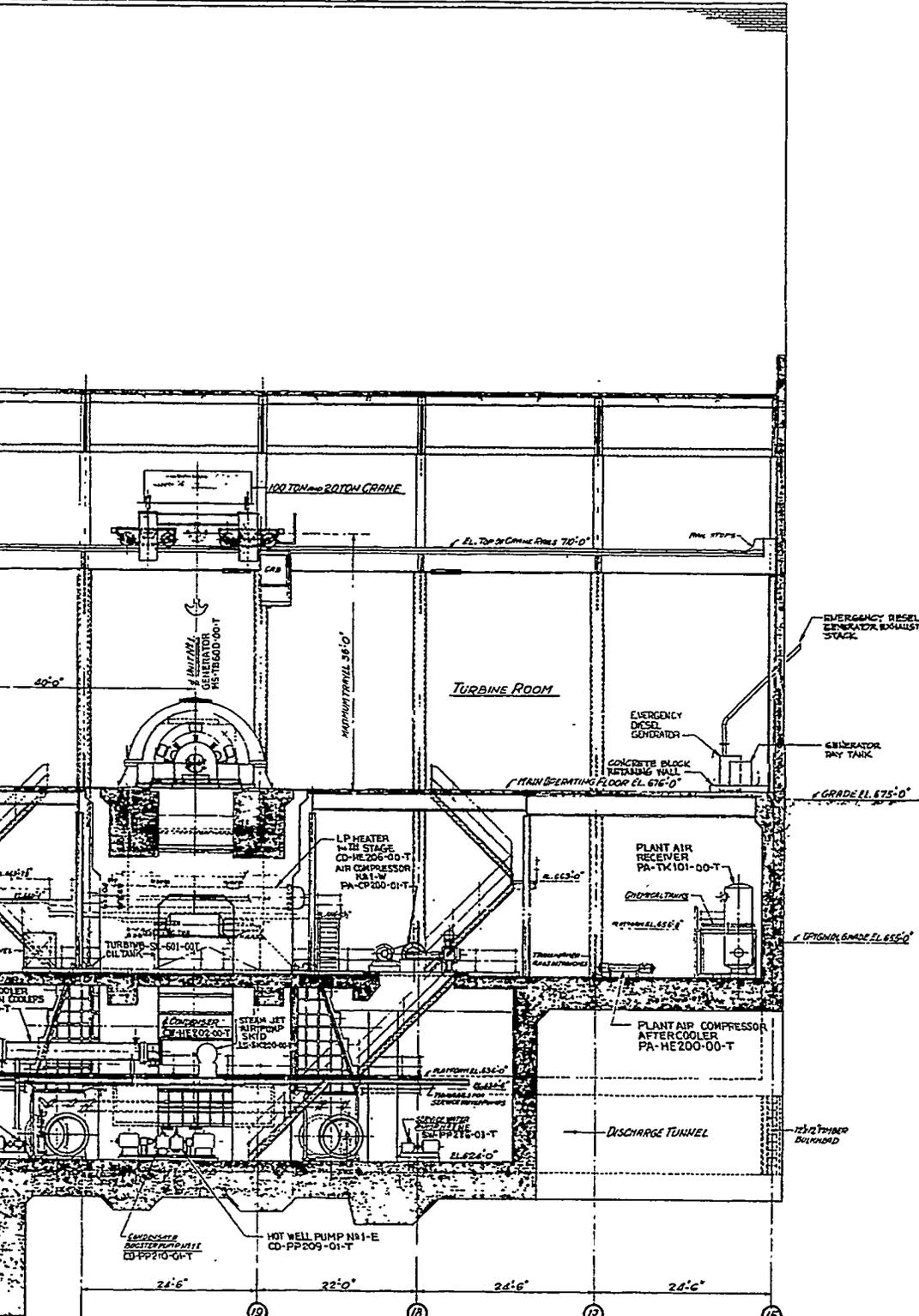
A B C D E F G

1 2 3 4 5 6 7

G

NOTES

1 FOR GENERAL NOTES SEE DWG. T-5010-01



SECTION THROUGH TURBINE ROOM
LOOKING WEST

1	2	PER PIS 74715 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED SDV	
<p>THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED. SEE MICROFILM RECORDS FOR HISTORY & SIGNATURES. DRAWING REVISION 1</p>			
DATE	NO.	DESCRIPTION	APPROV.
<p>REVISIONS</p>			
<p>1/20/68</p>			

TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO

LONGITUDINAL SECTION
HEATER BAY
AND TURBINE ROOM

DWG. NO. 1-5010-10-2

ARCH	ELEC	MED	MEP	STR
<p>SCALE: 1/4" = 1'-0"</p>				
<p>ENGINEERING DESIGN</p>				
<p>D.H. WILLIAMS</p>				
<p>DESIGN DEPARTMENT</p>				
<p>V.A. LEPORE</p>				

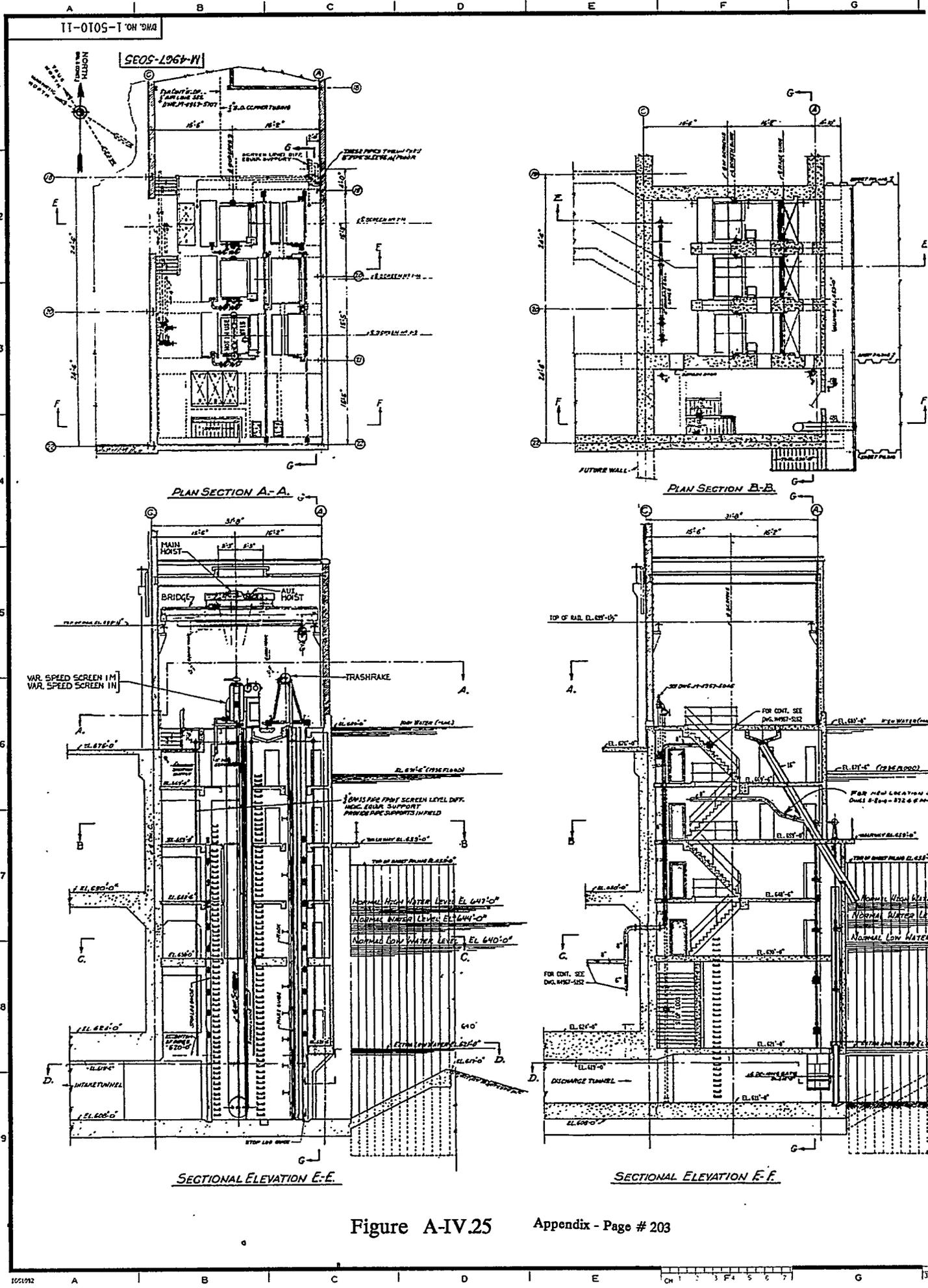
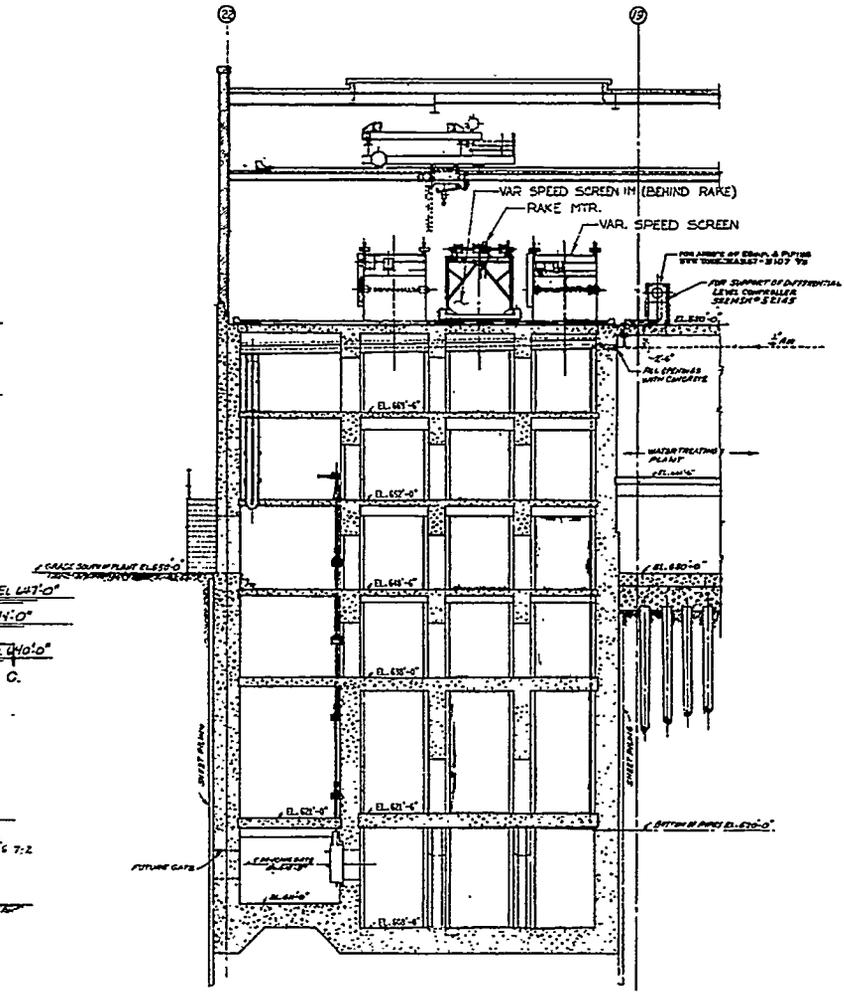
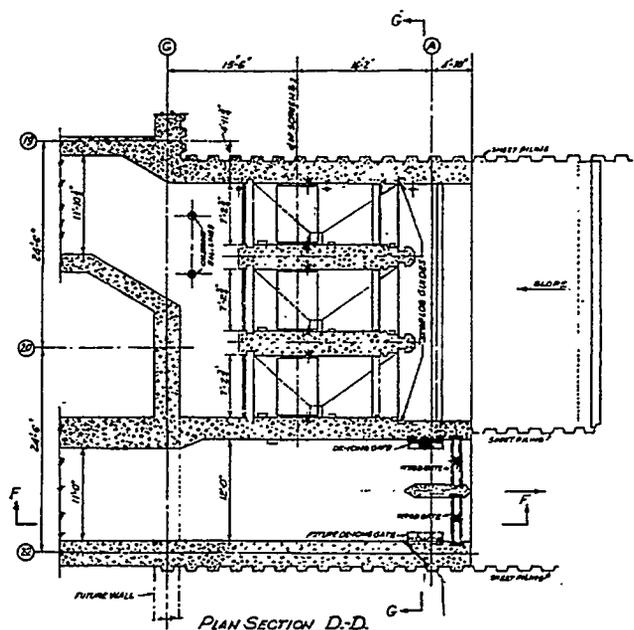
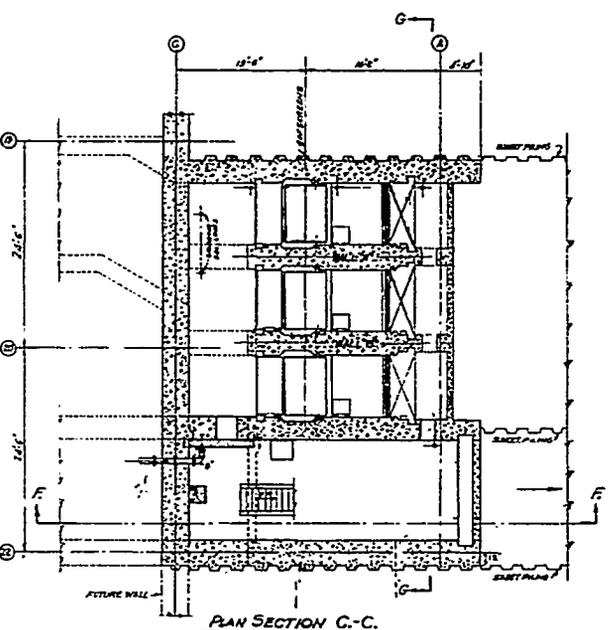


Figure A-IV.25

NOTES

7. FOR GENERAL NOTES SEE DWG. T-5010-01

1
2
3
4
5
6
7
9



PER PIS 74715 THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED BUT NOT ISSUED		
SDV		
THIS DRAWING HAS BEEN ELECTRONICALLY SCANNED. SEE MICROFILM RECORDS FOR HISTORY & SIGNATURES. DRAWING REVISION 1		
DATE	NO.	APPROV.
REVISIONS		
DATE	DESCRIPTION	APPROV.
1/28/88	1/18/88	1/18/88

**TIDD PFBC
DEMONSTRATION PLANT
BRILLIANT, OHIO**

**SCREEN HOUSE
GENERAL ARR'G'T**

DWG. NO. 1-5010-11-2

ARCH	ELEC	MECH	STR
SCALE: 1/4" = 1'-0"			
DESIGNED BY: D.H. VELLIANS			
CHECKED BY: Y.A. LEPORE			
DATE: 7-2-88			

