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Development and Testing of a High Efficiency Advanced Coal Combustor
Phase III Industrial Boiler Retrofit

Final Report
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Executive Summary

Economics and/or political intervention may one day dictate the conversion from oil or natural gas to coal in boilers that were originally designed to burn oil or gas. In recognition of this future possibility the U.S. Department of Energy, Federal Energy Technical Center (DOE-FETC) supported a program led by ABB Power Plant Laboratories with support from the Energy and Fuels Research Center of Penn State University with the goal of demonstrating the technical and economic feasibility of retrofitting a gas/oil designed boiler to burn micronized coal.

In support of the overall goal the following specific objectives were targeted:

- Develop a coal handling/preparation system that can meet the technical and operational requirements for retrofitting microfine coal on a boiler designed for burning oil or natural gas.
- Maintain boiler thermal performance in accordance with specifications when burning oil or natural gas.
- Maintain NOx emissions at or below 0.6 lb NO_2 per million Btu.
- Achieve combustion efficiencies of 98% or higher.
- Determine economic payback periods as a function of key variables.

The work was carried in five major Tasks as follows:

1.0) Review of current state-of-the-art coal firing system components.
2.0) Design and experimental testing of a prototype High Efficiency Advanced Coal Combustor (HEACC) burner.
3.0) Installation and testing of a HEACC system in a retrofit application.
4.0) Economic evaluation of the HEACC concept for retrofit applications.
5.0) Long term demonstration under user demand conditions.

This report summarizes the work done under Task 5, the final phase of this project, which involved the long term (~1000 hrs) demonstration testing of a microfine coal firing system in a 15,000 lb/hr package boiler at Penn State.

At the outset of Task 5 and after discussion/agreement with DOE-FETC, it was decided to use a new low NOx burner, termed the Radially Stratified Flame Core (RSFC) burner, that ABB had begun to develop in concert with the Massachusetts Institute of Technology (MIT). The primary reason for switching from the HEACC to the RSFC burner was to improve combustion efficiency without adversely affecting NOx. As stated above, the target for combustion efficiency was 98% while maintaining NOx emission at 0.6 lb/MBtu (~450 ppm at 3% O2) or lower. Task 3 results from testing the HEACC on micronized coal at Penn State had shown it to meet the NOx target, but to fall short of the combustion efficiency target. A value of about 95% combustion efficiency was routinely achieved with the HEACC while meeting the NOx target. All other technical goals were also met with the HEACC burner. Based on MIT's and ABB's experience with the RSFC burner when firing natural gas, oil and pulverized coal, it was believed that this burner could provide improved combustion efficiencies over that of the HEACC in the Penn Sate boiler, which has a very low bulk residence time on the order of 0.7 seconds. The outcome of detailed discussions with DOE-FETC was that the RSFC burner would be employed during the execution of Task 5 and that ABB would design and fabricate a properly sized RSFC burner at no cost to the Project.

The Penn State boiler is a D-type design and is rated for 15,000 lb/hr of saturated steam (at 300 psig), and is integrated into the University's steam distribution system. The boiler was designed to fire natural gas or fuel oil, but the overall system was modified to fire coal-based fuels for carrying out this program as well as other R&D project work.

The objective of Task 5 testing was to characterize the burner and boiler performance under long term operation (~1,000 hrs) at conditions that were representative of typical, industrial boiler operation. The RSFC burner was installed in the Penn State boiler in July 1995 and demonstration testing was initiated as per plan. By mid-February 1996, about 174 hours of natural gas, and 1003 hours of micronized coal firing were accumulated, under a variety of typical industrial boiler operational modes. Testing included a series of short term (4 to 12 hrs) tests and also several long term, around-the-clock tests to determine how long the boiler could operate before an ash-related constraint would prevent further operation.

Three coals: (1) Upper Freeport, (2) Middle Kittanning, and (3) Kentucky were fired during Task 5 testing. All of the coals selected were low ash and with respectably high fusibility temperatures, to minimize impacts of ash deposits on boiler operation. The TCS mill was able to successfully produce micronized coal during this entire demonstration. Regarding the particle size distribution, a typical value of $D_{(v,0.5)}$ (i.e., 50% less than) was in the range of 20 to 25 microns.

Overall, testing demonstrated that if the economics were favorable, it would be technically feasible to retrofit a gas/oil designed boiler to burn micronized coal. With the RSFC burner, it is possible to generate various types of flames (short or long) to more readily accommodate various boiler configurations.

Overall performance of the RSFC burner was very good. Carbon loss, the key performance parameter where improvement was sought, was significantly better than that achieved by the HEACC at comparable NOx levels. Lightoff on natural gas was consistent and reliable with a strong flame scanner signal. Transitioning from natural gas to coal typically began in 15 minutes with 100% coal firing usually being accomplished in one hour. Flame stability was very good, even during sootblowing operation when the furnace pressure was affected. The RSFC burner was able to operate at a lower pressure drop than the HEACC, about 5.5 inch H2O vs. 8.0 inch H2O for HEACC. Key conclusions drawn from Task 5 testing were as follows:

- The coal storage, handling, milling and transport systems operated reliably with an acceptable level of performance during the long-term coal testing period. The TCS mill typically produced a product having a mass mean particle size between 20 and 25 microns.

- NOx levels at full load when firing natural gas with the RSFC burner ranged from 45 to 55 ppm for a clean furnace and 60 to 70 ppm for a dirty furnace compared to values of 140 to 200 ppm for the HEACC under clean or dirty furnace conditions.

- Short term testing (less than 12 continuous hours) when firing micronized coal showed the RSFC burner to be able to achieve NOx levels in the Penn State boiler ranging from 350 to 450 ppm while achieving combustion efficiencies of 96.5% to 97.5%. The HEACC had comparable NOx values, 350 to 450 ppm, but lower combustion efficiencies of 94% to 95%.

- Long term testing, when firing micronized coal, showed a tendency toward increasing both NOx and combustion efficiency with time. It is believed that the growth of ash deposits on waterwall tubes causes temperatures to increase which adversely affects thermal NOx and works in favor of increasing combustion efficiency.

- The management of ash deposits and ash removal is a concern when burning coal in a boiler designed for oil and gas. About 8% to 20% of the ash in the as-fired coal was retained in the radiant section of the furnace with no means of removal other than manual removal when the boiler was taken off line. The amount of ash retained in the boiler seems to also depend on the mode of boiler operation, i.e. around-the-clock operation for several days vs. short term (8 to 12 hr/day) operation for several days before an ash-related constraint would prevent further operation. With short term tests, ash build up was lower due to some net ash removal during start-up periods when the furnace was operating on natural gas before transitioning to 100% coal firing.

- Based on long term, around-the-clock test results, when firing micronized coal, the Penn State boiler could be operated for about a week before it was required to be taken off line for ash removal. The longest, continuous around-the-clock test was when firing the Kentucky coal at full load (~15.5 Mbtu/hr) for 137 hours. With the coals tested, all being very low ash with high fusibility temperatures, the amount of coal fired and the ash content were the key fuel properties dictating the length of time the boiler could be operated before shutting down for ash-related reasons.

- When firing micronized coal the Penn State boiler must be operated at about 85% of its rated capacity to avoid producing excessively high gas temperatures entering the bag filter.

- Burner startup and shutdown as well as flame stability and flame scanner signal strength during long term testing when firing micronized coal were all excellent, as was the ability to transition from natural gas to coal and the reverse.

- The Penn State boiler with a volumetric heat release rate of 50,000 Btu/ft^3-hr, a bulk residence time of 0.7 seconds and a design steam production rate of 15,000 lb/hr represents the most challenging end of the spectrum for retrofitting coal in an oil/gas designed boiler, from the standpoint of both technical and economic feasibility.

1.0 Introduction/Background

Under U.S. Department of Energy, Federal Energy Technology Center (FETC) support, the development of a High Efficiency Advanced Coal Combustor (HEACC) was in progress since 1987 at the ABB Power Plant Laboratories (Rini, et al., 1987, 1988). As summarized in previous publications on the subject, the initial work produced an advanced coal firing system that was capable of firing both water-based and dry pulverized coal in an industrial boiler environment (Rini, et al., 1990).

In recognition of the future possibility, that economics may one day dictate that it makes sense to replace oil or natural gas with coal in boilers that were originally designed to burn oil or gas; U.S. Department of Energy, Federal Energy Technical Center (FETC) continued to support the next phase of this program, "Development and Testing of a High Efficiency Advanced Coal Combustor (HEACC), Phase III - Industrial Boiler Retrofit". ABB Power Plant Laboratories led this program with support from the Energy and Fuels Research Center of Penn State University. The earlier HEACC concept was used as the basis for development of the major component in a system intended for industrial-scale, coal fired retrofit applications. The overall objective of the project was to demonstrate the technical and economic feasibility of retrofitting a gas/oil-designed industrial boiler to burn micronized coal. In this respect, the key technical goals for the burner and over all firing system design were:

- A compact, easy to retrofit burner design
- Low NOx generation, while maintaining high combustion efficiency (targets were 0.6 lb/MBtu or lower and 98% or higher; respectively)
- Commercially acceptable burner pressure drop and turndown ratio
- Integration of coal preparation/firing system controls into the boiler control system

In general, a critical consideration when firing coal in an oil/natural gas designed boiler is the limited residence time; burner design and the use of micro-fine coal represent two important factors in compensating for this decreased residence time.

The work carried out in this program consists of five major tasks:

1) A review of current state-of-the-art coal firing system components.
2) Design and experimental testing of a prototype HEACC burner.
3) Installation and testing of a HEACC system in a commercial retrofit application.
4) Economic evaluation of the HEACC concept for retrofit applications.
5) Long term demonstration under commercial user demand conditions.

Tasks 1 through 4 have been previously completed and results have been summarized in individual Task reports (Rini, et al., 1993, Jennings, et al., 1993, Patel, et al. 1995). Task 5 is the final phase of this project, which involved the long term (~1000 hrs) demonstration testing of the HEACC system in a gas/oil - designed package boiler at Penn State, and is the subject of this report.

Under Task 3, the proof-of concept testing, approximately 400 hours of testing was done with the HEACC in a 15,000 lb/hr package boiler at Penn State. During Task 3 all of the performance related goals were met except carbon conversion efficiency. As previously noted the target for combustion efficiency was 98%, while maintaining NOx at or below 0.6 lb/MBtu (~450 ppm) at 3%O2. Combustion efficiencies of ~95% were met on a daily average basis with the HEACC while meeting the 0.6 lb/MBtu NOx target. The Task 3 Report (Patel, et al., 1995) summarized all the results obtained with the HEACC. The design of the HEACC is similar to ABB's commercial RO II burner design.

During 1994 ABB PPL began working, as part of an internally-funded project, to scale up the low NOx, RSFC burner in partnership with MIT; the initial focus was on firing natural gas and No. 6 fuel oil. Earlier results (Task 3) from testing the HEACC on microfine coal at Penn State had shown it to meet the NOx target, but to fall short of the combustion efficiency target. Given the knowledge base that both MIT and ABB PPL had collectively compiled when firing natural gas, oil and pulverized coal coupled with the operating principle of the RSFC burner, it was believed that it could provide improved combustion efficiencies over that of the HEACC in the Penn State boiler while maintaining the target NOx levels when firing microfine coal. During MIT's previous testing of the RSFC burner on pulverized coal, excellent results were achieved, which further indicated that improvements in combustion efficiency should be possible if the RSFC burner were installed in the Penn State boiler. It should be noted that the bulk residence time in the MIT Combustion Research Facility (CRF), where the RSFC burner was tested, was significantly greater, at about 2.5 seconds, than the residence time in the Penn State boiler, which is on the order of 0.7 seconds.

Based on the above experience at MIT and ABB PPL, it was decided to use the RSFC burner during the Task 5 long-term demonstration testing instead of HEACC (results reported in Task 3) to improve the combustion efficiency while maintaining the NOx in the Penn State Boiler. ABB PPL designed, built and provided the properly sized RSFC burner at no cost to the DOE-FETC project. The RSFC burner was sized to satisfy the geometric constraints of the host boiler: i.e.; windbox, burner openings, mounting plate sizes, fuel pipe locations, etc. Also, natural gas firing capability was added to make this a dual fuel burner, similar to the HEACC. The schematics of both the previously used HEACC and the RSFC burner are shown in Figure 1-1 & 1-2.

Many conventional burners employ swirling flows to enhance mixing in the near-burner flow field. The RSFC burner is, however, different in that swirling flow is used to create the opposite effect, namely delay of mixing in the near-burner zone (Borio, et. al., 1995). It is this combination of a near-burner, high temperature, fuel rich core followed by a downstream, fuel lean combustion zone that are responsible for the low NOx generated by the RSFC burner.

A typical low NOx, RSFC flow field is depicted in Figure 1-3 The concept of radial stratification originated with the work of Rayleigh (Beér and Chigier, 1972), and was brought to practical application by Beér, et al. (1970). This phenomena has been applied at MIT to design the radially stratified flame core burner now known as the RSFC burner (Toqan, et al., 1992).

The RSFC burner that was designed and built for testing in the Penn State boiler is, operationally, similar to the MIT burner, but with different swirlers and the ability to co-fire or fire independently natural gas and pulverized coal at firing rates of about 18 x 10^{6} Btu/hr and 16 x 10^{6} Btu/hr, respectively (Patel, et. al., 1996). Figure 1-2 shows a schematic representation of the RSFC burner

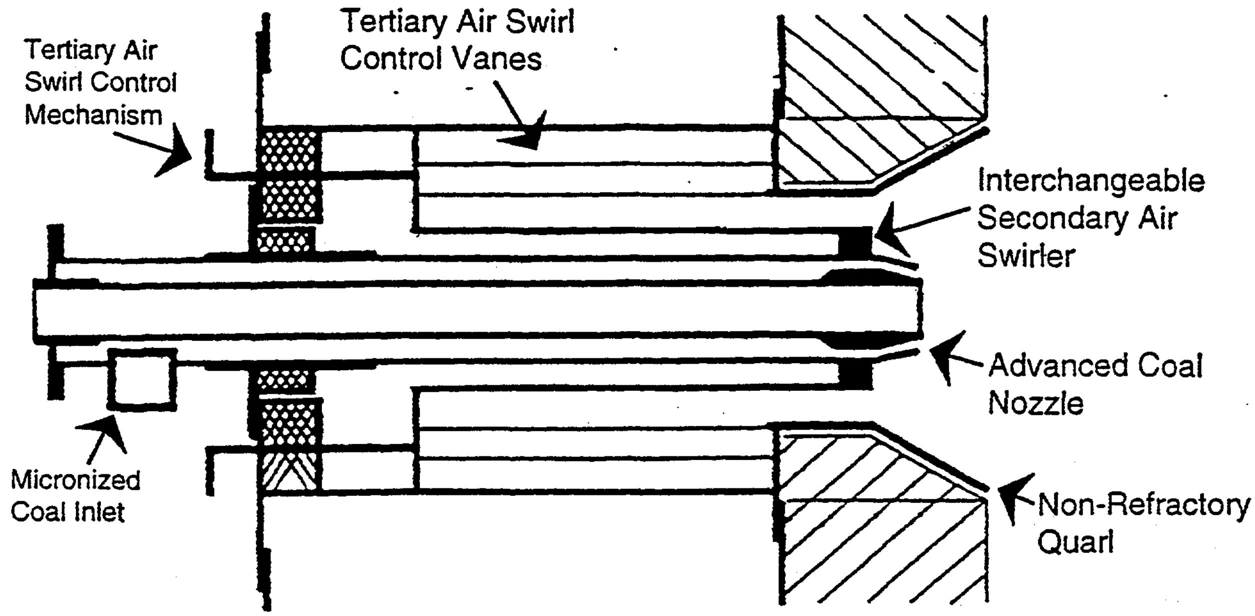


Figure 1-1 Schematic of HEACC Burner Tested During (Task 3)

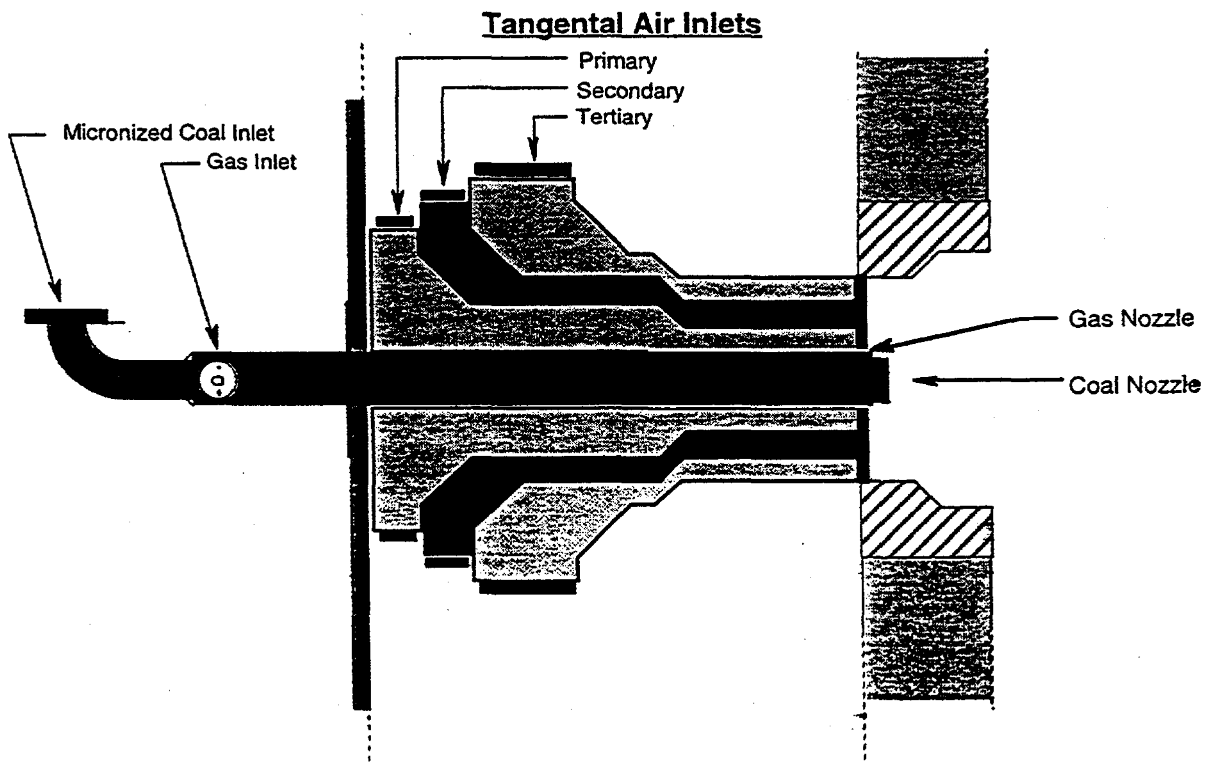


Figure 1-2 Schematic of RSFC Burner Tested During Task 5

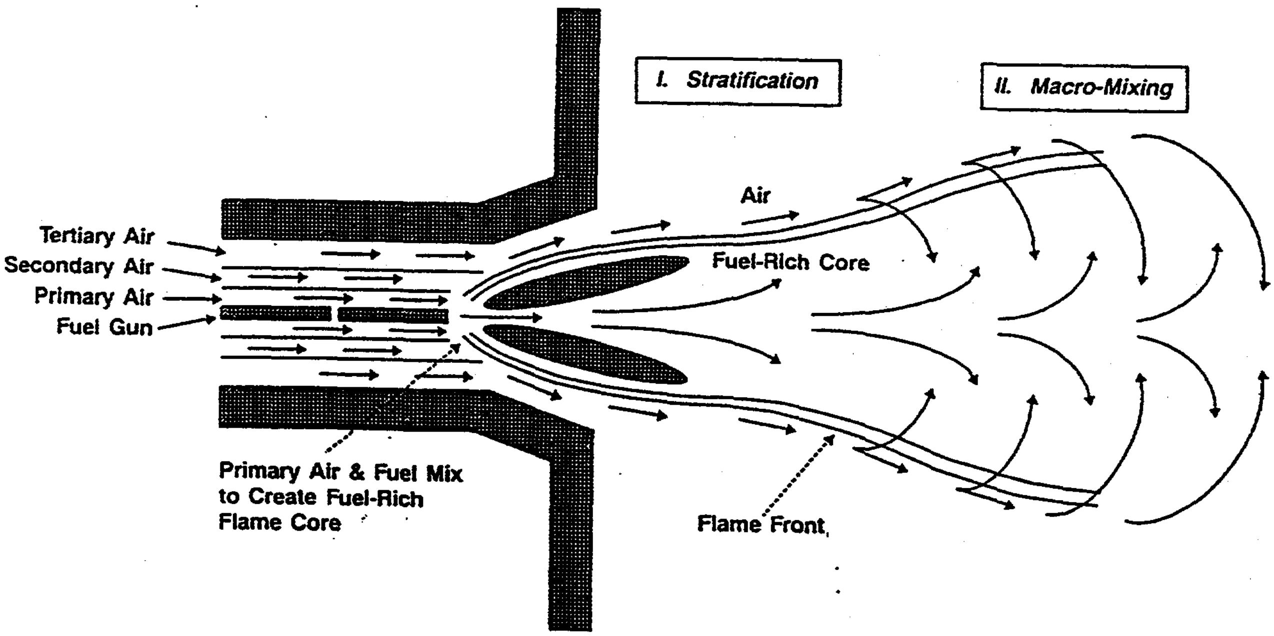


Figure 1-3 Typical Low NOx RSFC Flow Field

tested at Penn State. Natural gas is fired from an annulus around the coal nozzle. Dampers in the tangential air inlet scoops can be used to control air flow and swirl number.

A schematic of the micronized coal preparation/firing system at Penn State is shown in Figure 1-4. As can be seen, the cleaned coal comes on site and is stored in a large hopper. The coal is crushed and sent via a screw feeder to the micronized coal mill. The coal is then micronized to 80% through 325 mesh (18 microns MMD) and pneumatically conveyed to the burner where it is then burned in the demonstration boiler. This boiler is an oil/gas designed Tampella Keeler Model DS-15; a package D-type watertube boiler capable of producing 15,000 lb/hr of saturated steam at 300 psig. It represents a typical gas/oil - designed system with a furnace volumetric heat release rate of 50,000 Btu/hr ft^3, standard for this class of boiler. Furthermore, its design is similar to that of many other manufacturers' (including ABB Combustion Engineering) models.

The objective of Task 5 of the project was to characterize burner and boiler performance under long term testing conditions that were representative of typical industrial boiler operation.

The following report and associated Appendices summarizes results of Task 5, a 1000 hr demonstration of microfine coal firing with ABB's RSFC burner in Penn State's oil and gas designed industrial boiler.

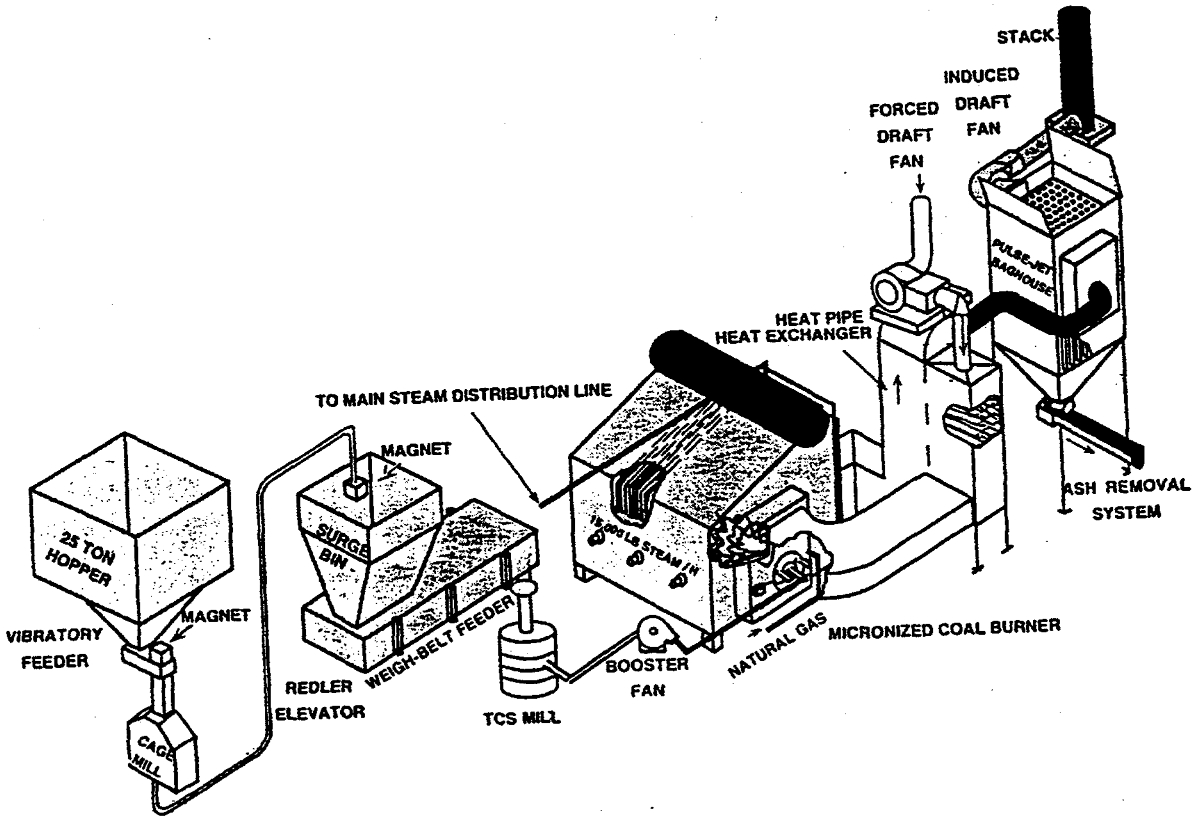


Figure 1-4 Micronized Coal Combustion System at Penn State

2.0 Summary of Task 3 "Proof of Concept Testing" with the HEACC

During Task 3, the proof-of-concept test period, the retrofit system (coal preparation and burner) was operated for approximately 400 hours over a range of operating conditions to determine overall system performance. All of the performance-related goals were met except carbon conversion efficiency. The target for combustion efficiency was 98%, while maintaining NOx at or below 0.6 lb/MBtu (450 ppm) at 3% O_2. Values of 92 - 95% combustion efficiencies were routinely achieved while meeting the NOx with the HEACC.

As mentioned in the previous section, based on the experimental results and scale up work with the RSFC burners at MIT and ABB PPL, it was felt that improvement in combustion efficiency should be possible if the RSFC burner were to be used instead of the HEACC. Therefore, it was decided to employ the RSFC burner during the Task 5 long-term demonstration testing instead of HEACC. ABB PPL designed, built and provided the properly sized RSFC burner at no cost to this project. Key results and findings of Task 3 with the HEACC are summarized in this section and provide a frame of reference to evaluate the RSFC burner and boiler performance during Task 5 demonstration testing.

Testing in Task 3 included operating the Penn State boiler over a variety of load ranges, excess air, combustion air damper settings and burner configurations. In addition, for selected conditions, a second coal was tested to compare the system performance with the first coal. During the test period, boiler performance data, emissions data, electric parasitic power and house compressed air consumption data as well as other data required for the technical and economical analysis of the system were obtained. As stated above specific performance-related objectives were to obtain steady state operation on 100% coal while achieving a carbon conversion efficiency of 98%, without increasing NOx emissions above 0.6 lb/MBtu (450 PPM). The testing was also designed to show that consistent, reliable operation of the integrated coal handling, preparation and firing system could be maintained; this was considered to be a prerequisite for conducting the long-term demonstration phase (Task 5) of the project. In addition, information generated from Task 3, and previous Tasks was used to complete Task 4 which addressed the economic evaluation of the HEACC for a variety of retrofit applications.

Two different coals, Brookville and Kentucky, were evaluated during Task 3 testing. The period of testing was approximately 400 hours. A typical summary of microfine coal firing test results (both coals) was as follows:

Typical Microfine Coal Firing Test Results (Task 3) with the HEACC

<u>Boiler Operation:</u>	
Steam Flow Rate (lb/hr)	13,240
Boiler Efficiency (%)	84.1 (3% O_2)
<u>Combustion Performance</u>	
Carbon Conversion Efficiency (%)	92 - 95%
NOx at 3% O_2 (ppm)	400 - 450
Burner Pressure Drop (in H_2O)	8

A summary of the key results from Task 3 were as follows:

Coal Handling/Preparation

- A coal handling/preparation system was able to meet the technical requirements for retrofitting microfine coal in an oil or gas designed boiler.

Some coal handling problems were experienced during the execution of Task 3. The problems were mainly due to a combination of extreme weather conditions, i.e. the winter of '93/'94, and the design of some of the equipment used at the Penn State site. Raw coal was stored outside. Because of extreme snowfall, considerable quantities of ice and/or snow were contained in the coal shipments that were received in the raw coal hopper at the Penn State site. Those components in the coal handling system that were most sensitive to coal moisture were the surge hopper and the screw feeder. There were times when Penn State personnel had to break up large coal/ice chunks to get them through the grate above the raw coal receiving hopper. The surge hopper was prone to plugging when the crushed coal was wet and operation of the screw feeder was also adversely affected by coal that had a high moisture content. Since the coal preparation/feed system was of a direct fired type, i.e. coal was fed to the microfine coal pulverizer and then directly to the burner, any hang-ups in the feed system to the mill caused interruptions in the coal feed to the burner.

Based on Task 3 results of coal handling/preparation experience, two changes to the components most affected by the wet coal were recommended prior to conducting Task 5. They were: (1) conversion of the surge bin bottom to a mass-flow design, and (2) the replacement of the volumetric screw feeder with a gravimetric feeder. It was believed that these two changes could prevent many of the problems due to "normally" wet coal, the point being that some of the conditions experienced were beyond the normal realm of expected weather-related conditions. Under such adverse conditions even those who routinely handle coal would have and did have problems during the winter of '93/'94. It was acknowledged that better (covered) storage of the raw coal before shipping would have gone a long way toward alleviating the problems experienced.

The aforementioned changes to the most affected coal handling components were completed prior to Task 5, 1000 hour demonstration test.

Boiler Thermal Performance

- Boiler thermal performance when firing microfine coal was essentially comparable to that achieved when firing natural gas.

During the relatively short operating periods, usually less than 16 hours, ash deposits did not cause significant changes to the boiler thermal performance. It was recognized, however, that longer term operation might result in greater build-up of ash deposits which could impact heat transfer. Because of the relatively short duration of the tests, any build-up of ash deposits on boiler water walls would slough off when the boiler was shut down. A better test of the possible impact of ash deposits was planned for evaluation during the long term demonstration phase of the work (Task 5.0).

NOx Emissions and Combustion Efficiency

The NOx emissions target was 0.6 lb NOx per million Btu fired; this translates to about 450 ppm. Testing with 100% microfine coal showed that this target was met while meeting nearly all other required conditions except combustion efficiency. The target for combustion efficiency was 98%. The highest combustion efficiency obtained during the test program was slightly over 95%. However, this value was not compatible with meeting the NOx target, and was not able to be routinely repeated. Values of 92 - 95% combustion efficiency were able to be routinely achieved, and were compatible with meeting the NOx target. Figure 2-1 shows the values of NOx and combustion efficiencies that were achieved during Task 3, the ~400 hour proof-of-concept test period which consisted of several 8 to 12 hour short-term tests.

Results obtained from Task 1 through 4 have shown that the HEACC concept is technically viable (albeit combustion efficiencies were slightly lower than the target value) if economics were favorable (i.e., price differential between coal vs. gas and/or oil is high enough to have a reasonable payback period). To address the ash handling and deposition issues it was decided to conduct a long-term 1000 hr demonstration (Task 5) of this program. However, a decision was made to switch from testing the HEACC to ABB's RSFC burner during Task 5, to improve carbon conversion values over those attained with the HEACC while maintaining NOx at or below 0.6 lb/MBtu.

It should also be noted that with the HEACC, during Task 3 testing, Penn State had observed some flame shape change phenomena without any apparent changes in operating conditions. Burner pressure drop of 8" (H_2O) was acceptable for the Penn State boiler but it is considered to be at the high end of the range for many industrial gas/oil boiler retrofit applications with typical fan heads.

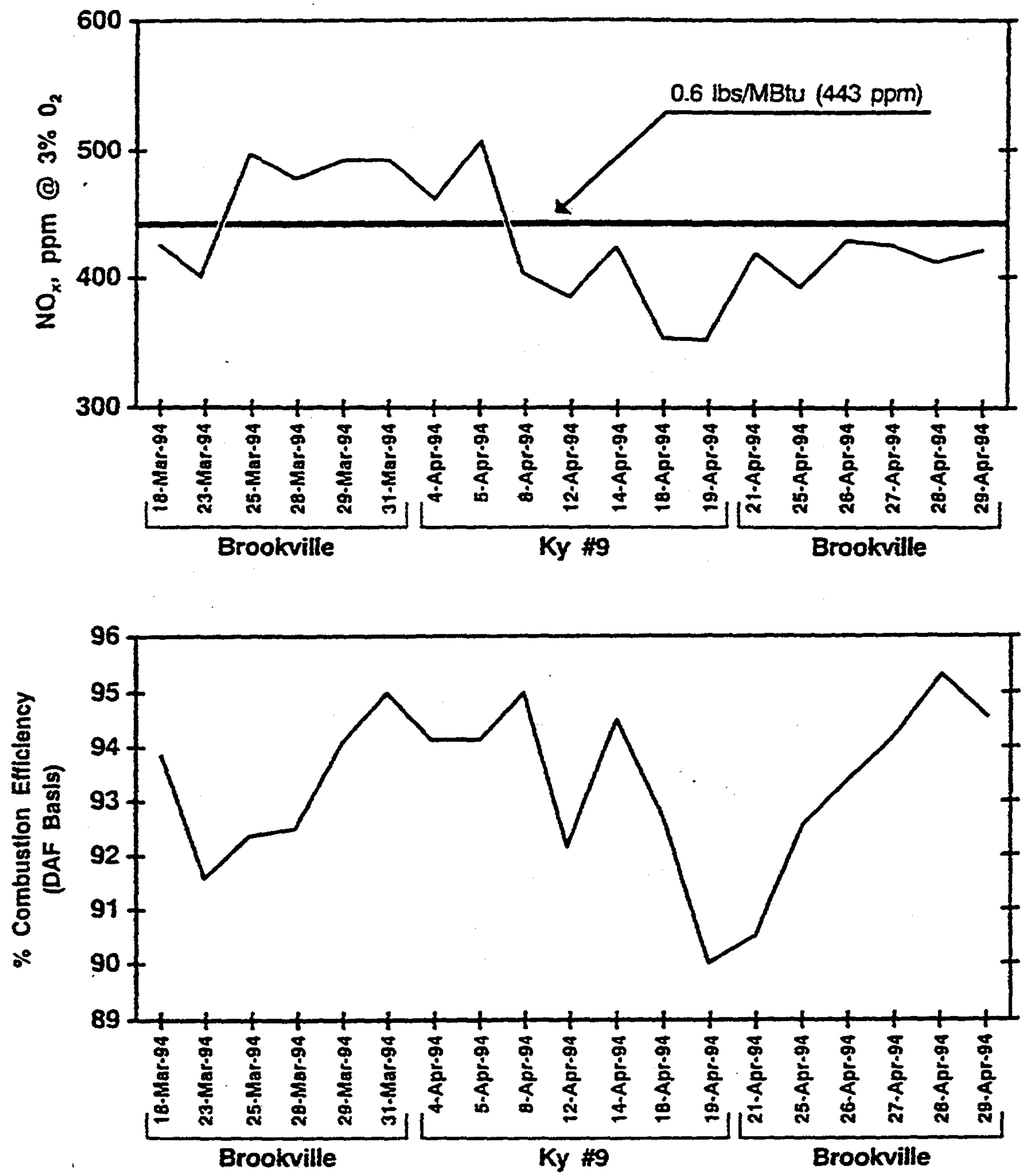


Figure 2-1 NOx Emissions and Combustion Efficiencies During Task 3 Proof of Concept Testing with the HEACC

3.0 Demonstration Test Plan

The objective of Task 5 was to characterize burner and boiler performance under long term testing conditions that were representative of typical industrial boiler operation. A test plan comprising about 1000 hours, under typical industrial boiler load demands was designed to demonstrate the technical viability of the entire system (microfine coal firing in a gas/oil designed boiler) and to allow refinement of the economic evaluation, if required. Data were collected to evaluate combustion and boiler thermal efficiency, ash deposition impacts, gaseous and particulate emissions, micronized coal preparation and handling characteristics, and operability including turndown. Management of ash and it's impact on boiler performance was a major focus of the demonstration task.

3.1 Coals Selected

Three different coals were tested as part of the Task 5 demonstration testing period. Upper Freeport was used exclusively during the beginning of the demonstration testing for purposes of assessing the effect of changing and optimizing burner operational parameters. Middle Kittanning and Kentucky coals were used during around-the-clock-testing periods when ash deposition effects were the focus of the testing. Table 3-1 shows the analysis of the coals mentioned as well as the coals that had been tested under Task 3 earlier in the project with the HEACC. All of the coals are low ash with respectably high fusibility temperatures, the idea being to minimize impacts of ash deposits on boiler operation.

3.2 Test Plan

As noted earlier, a decision was made to conduct demonstration testing with the RSFC burner instead of the HEACC. The test plan consisted of four (4) key areas as follows:

1. Establishing the effect of burner operational parameters within the envelope of the Penn State boiler.

2. Establishing the effect of boiler operational parameters on burner performance.

3. Characterizing burner and boiler operation under startup and shutdown operation and switching from natural gas to coal and the reverse.

4. Establishing the effects of ash deposition on burner and boiler performance and assessment of ash management.

Figure 3-1 depicts the areas identified above in a schedular fashion.

Since a new burner (RSFC) was installed in the Penn State furnace it seemed reasonable to devote some time toward characterizing it's performance within the boundary conditions described by this furnace. For example the bulk residence time within the combustion chamber is on the order of 0.7 seconds, a very significant decrease over that which would be available in most coal fired boilers. It would be important to establish some relationship between NOx and combustion efficiency within this boiler. Key burner parameters were mass flow distribution of air through the various annuli, swirl number and fuel gun position.

The second key area within the test plan concerned itself with boiler and/or other system related parameters such as excess air, boiler load, transport air/coal ratio, cleanliness of the waterwalls, and fuel fineness.

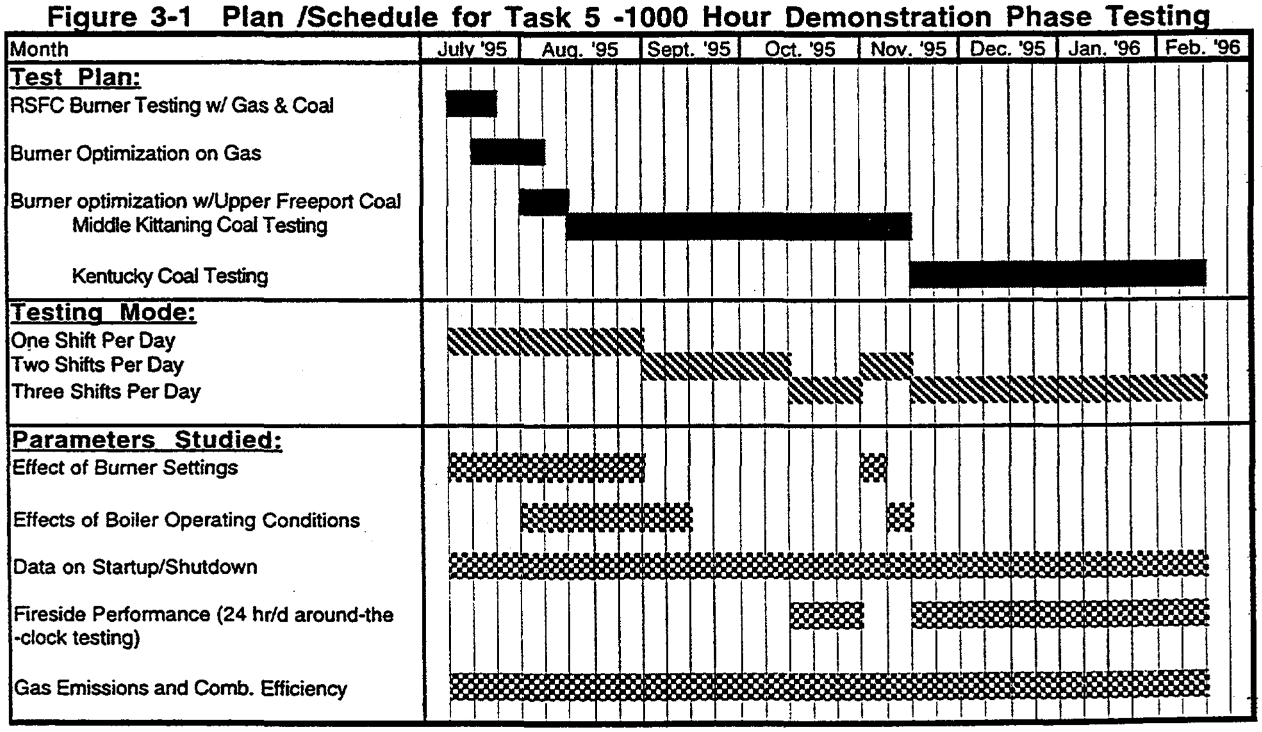
The third key area dealt with startup and shutdown sequences with attention being paid to the ignitor, scanner and associated controls. The burner is a dual fuel (natural gas and coal) burner and the normal startup sequence involves lighting off on natural gas at about 6×10^6 Btu/hr and then transitioning to coal firing. Shutdown is the reverse of this operation meaning that there is a transition from 100% coal firing to co-firing coal and natural gas and then to 100% natural gas before shutting sown the boiler.

The fourth area involved around-the-clock-testing, the primary purpose being to determine the effects of ash deposition on boiler operation and burner performance and, in particular, to determine conditions that would ultimately dictate that testing must be terminated.

Table 3-1 Selected Analysis of the Coals

Analysis	HEACC (Task 3) Used for 400 hr Testing		RSFC (Task 5) Used for 1,000 hrs Testing		
	Brookville	Kentucky	Upper Freeport	Middle Kittanning	Kentucky
Proximate, Wt%					
Moisture	8.2	6.3	4.3	3.8	4.5
Volatile Matter	33.1	33.3	30.6	29.8	33.4
Fixed Carbon	55.8	55.4	58.9	62.2	58.8
Ash	2.9	4.5	6.2	4.2	3.3
HHV, Btu/lb	13,250	13,010	13,430	14,010	13,700
Ash Fusion Temp. °F					
IDT	2,820	2,803	-	2,432	2,544
ST	+3,000	+3,000	-	2,506	2,800
FT	+3,000	+3,000	-	+2,800	+2,800

Figure 3-1 Plan /Schedule for Task 5 -1000 Hour Demonstration Phase Testing



A total of approximately 600 tons of coal over 1000 hours was fired during this demonstration. A series of around-the-clock tests were carried out to evaluate the ash deposit effects.

Management of Ash

Management of ash was one of the key elements of this demonstration testing. Two primary issues that evaluated were: (1) the effect of ash deposits on heat transfer in the boiler and (2) the ability to successfully remove ash from the boiler. To provide useful information in both of the above categories it was essential to run the boiler 24 hours per day for a number of consecutive days. Figure 3-1 shows that some of the weeks during the demonstration were designated as 24-hour-per-day segments.

Based on observations from earlier tasks it was observed that ash which accumulates in the radiant section of the boiler could come from two sources: (1) from ash particles which drop to the floor from the flames, and (2) from deposits which slough off the water walls. The effects of each type of ash could be different. Deposits which form on water walls would have a greater impact on heat transfer than material which fall out of suspension to the hearth. If deposits on the walls do slough and fall to the floor, their sintered nature will make resuspension and removal much more difficult than the "dust" which falls directly to the hearth. Material which falls directly to the floor will not have a significant effect on heat transfer and, as noted above, will be easier to resuspend and remove. It was very important during long term testing to establish whether steady state conditions have been reached. It could be argued, for example, that material which falls directly to the floor might eventually "fill in" relatively stagnant areas and reach a condition where no more material is dropped out, but, rather all gets carried out in suspension. It is probably less likely that ash deposits which form on furnace walls would reach a similar steady state condition.

The Penn State boiler was fitted with a soot blower (steam-operated) for cleaning the convective pass; this is a commercially-supplied device. Penn State personnel have designed, fabricated and installed an air sparge system which is located on the hearth of the radiant section of the boiler with the intent that it resuspends floor material and allows it to pass out through the boiler.

The objectives of long-term tests, relative to ash management, were to characterize the impact of ash on long term boiler operation (for two different coals), to assess the performance of the two cleaning devices (convective pass soot blower, and radiant section air sparge), and finally to make recommendations for what would be needed to successfully manage the ash in a commercial situation.

4.0 System Modifications Prior to Task 5 Testing

Prior to conducting Task 5 (1000 hours of long-term demonstration) it was decided to modify some of the system components as discussed in the earlier sections to improve the overall performance of the system. They included: (1) modifications of coal handling/preparation system by replacing the existing surge bin and screw feeder with a new hopper and weigh-belt feeder; (2) installation of a new soot blower in the convective pass which extends to convective pass entrance; and (3) design and construction of the RSFC burner for improving combustion efficiency while maintaining the required NOx emissions (0.6 lbs/MBtu) during the Task 5 demonstration.

4.1 Coal Handling Modifications

The coal storage and handling facilities were modified prior to beginning the testing in Task 5. The modifications were made in conjunction with another DOE program (DE-FC22-92PC92162). The coal feed system, shown in Figure 4-1, was modified by replacing the existing surge bin and screw feeder with a new hopper and weigh-belt feeder. The system was modified because of severe coal handling problems encountered during the Task 3 testing that was conducted during the winter months of December 1993 to March 1994. Because of the relatively small quantities of low ash coal required for the testing, coal was cleaned in a batch mode by heavy media cyclones and stored in a local coal yard. During testing in the winter, snow and ice were included in the shipments. The wet coal (often with moisture contents in excess of 12%) tended to bridge and rathole in the hoppers, especially the surge bin. This required constant operator attention and corrective action and resulted in erratic coal feed. This inconsistent coal feed, coupled with the variability introduced by varying coal size and moisture content, made it difficult to maintain a constant feed to the burner. The moisture content was inconsistent because of variability due to drying in the heated building and by an air sparge system that was installed on the surge bin.

Since most of the coal feed problems occurred in the surge bin, the design of this component was evaluated and it was found that the bin outlet dimensions and hopper sidewall angle should be modified to a mass flow design to improve

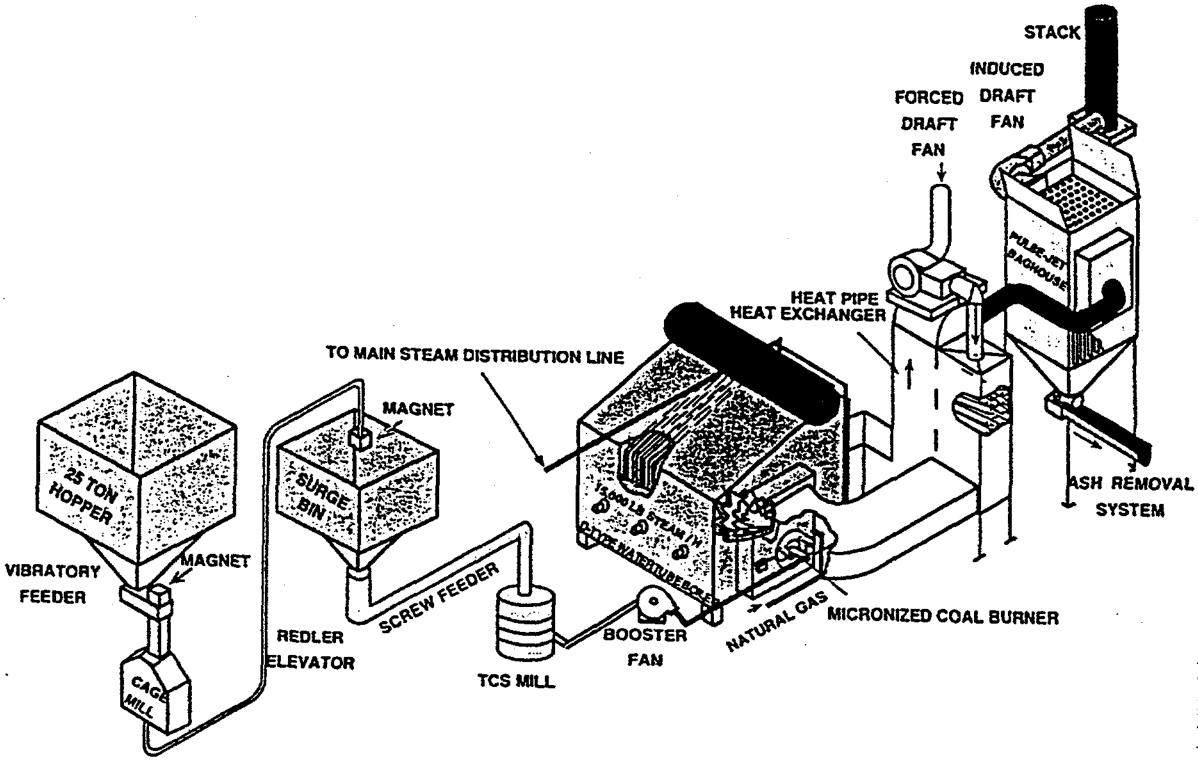


Figure 4-1 Micronized Coal-Fired Boiler System During Task 3

coal handling. The original surge bin had a circular opening with a bin angle of 60°. It was recommended that the bin outlet should be pyramidal with a length to width ratio of 3:1 and the bin angle should be 70°.

A test hopper was fabricated based on the recommended design criteria and tested with the as-received coal at various moisture levels (in DOE program DE-FC22-92PC92162). This was done to test the flowability of the coal in a new hopper before re-engineering the coal handling and feeding system. Descriptions of the test hopper and flowability tests are contained elsewhere (Miller et al. 1995).

As a result of the system design evaluation and flowability study, a new coal storage and handling system was engineered. A pyramidal bin with a length to width discharge outlet of 3:1 and an angle of 70° was designed and installed. An isometric view of the new hopper is shown in Figure 4-2. The new surge bin is constructed of stainless steel to eliminate scaling. In addition, the screw feeder was replaced with a weigh-belt feeder to eliminate fuel feed oscillations. Figure 4-3 is a schematic diagram of the new coal storage and handling system. Figure 4-4 is a schematic diagram of the micronized coal-fired boiler system with the new coal storage and handling system.

4.2 System Operability

The coal handling system was modified to improve coal flowability from the surge bin to the mill, and to provide an instantaneous and constant coal feed rate to the mill and burner. Basically a volumetric feed system was converted to a mass flow system.

During the testing in Task 3, some of the burner instability was attributed to coal handling problems. Figures 4-5 and 4-6 are graphs of O_2 and CO emissions as a function of time during two steady-state tests conducted in December 1993 and April 1994, respectively, in which the coal combustion efficiency ranged from 92 - 95%. The data were plotted in this manner to determine if CO excursions and burner instability were a function of coal slugging and hence, O_2 variability. In Figure 4-5, O_2 varied from 2.4 to 3.8% and CO varied from 100 to 500 ppm with excursions. Figure 4-6 exhibited similar trends with O_2 varying from 2.5 to

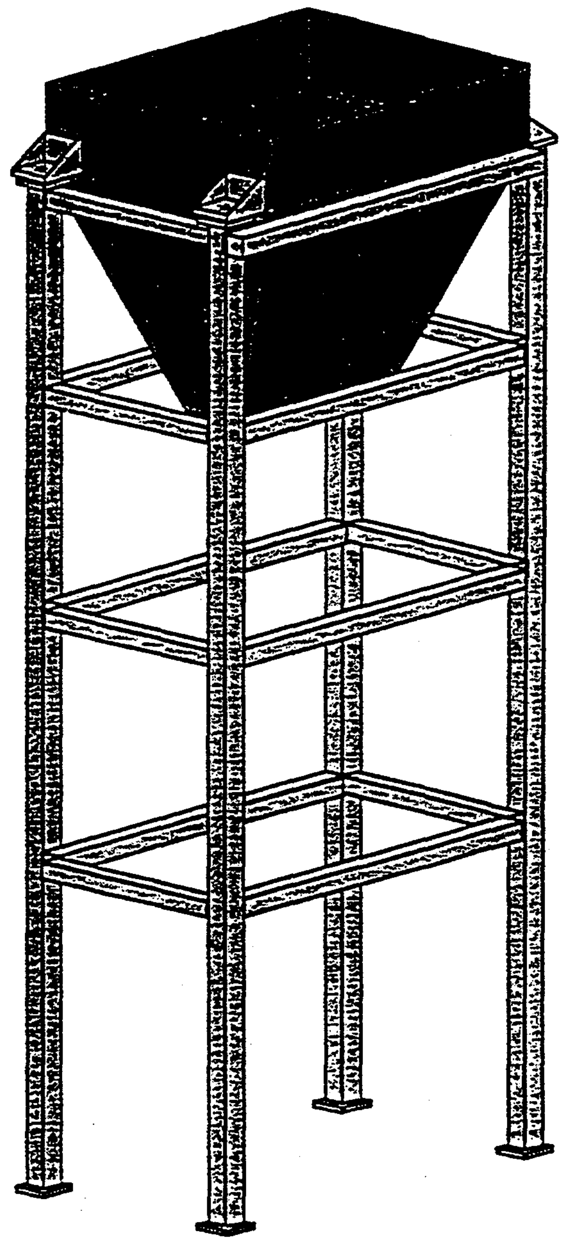


Figure 4-2 Isometric View of New Surge Bin

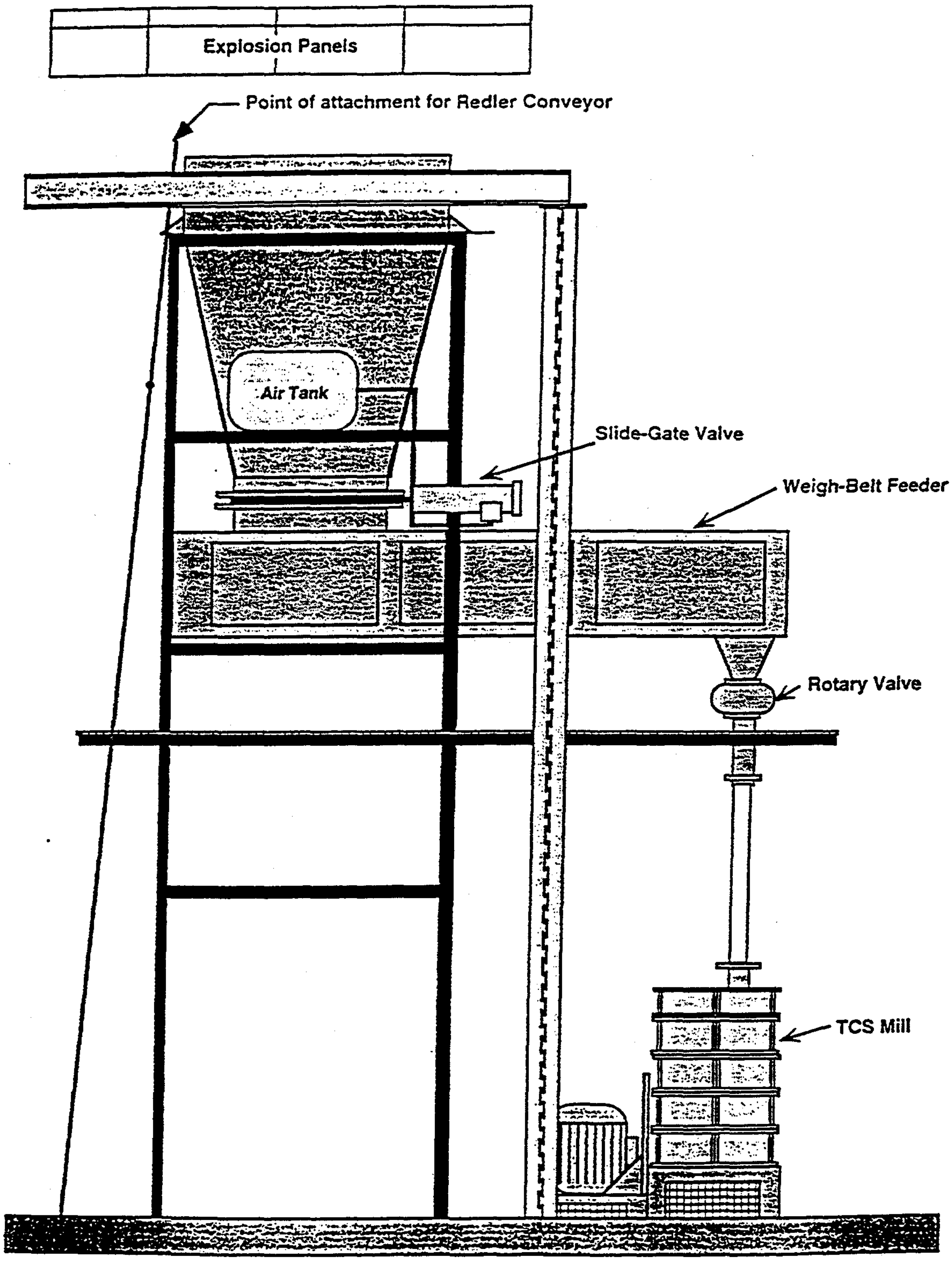


Figure 4-3 Schematic Diagram of New Coal Handling System

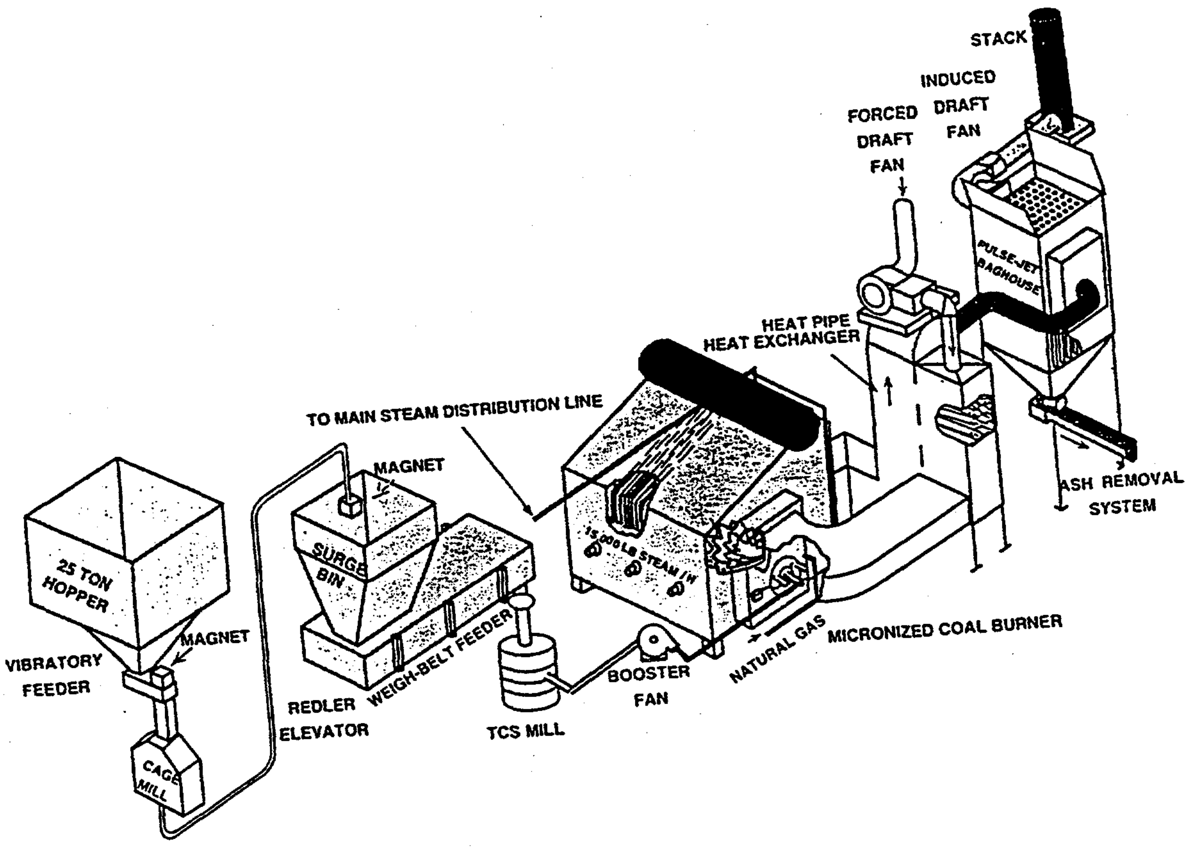


Figure 4-4 Micronized Coal-Fired Boiler System With Coal Handling Modifications

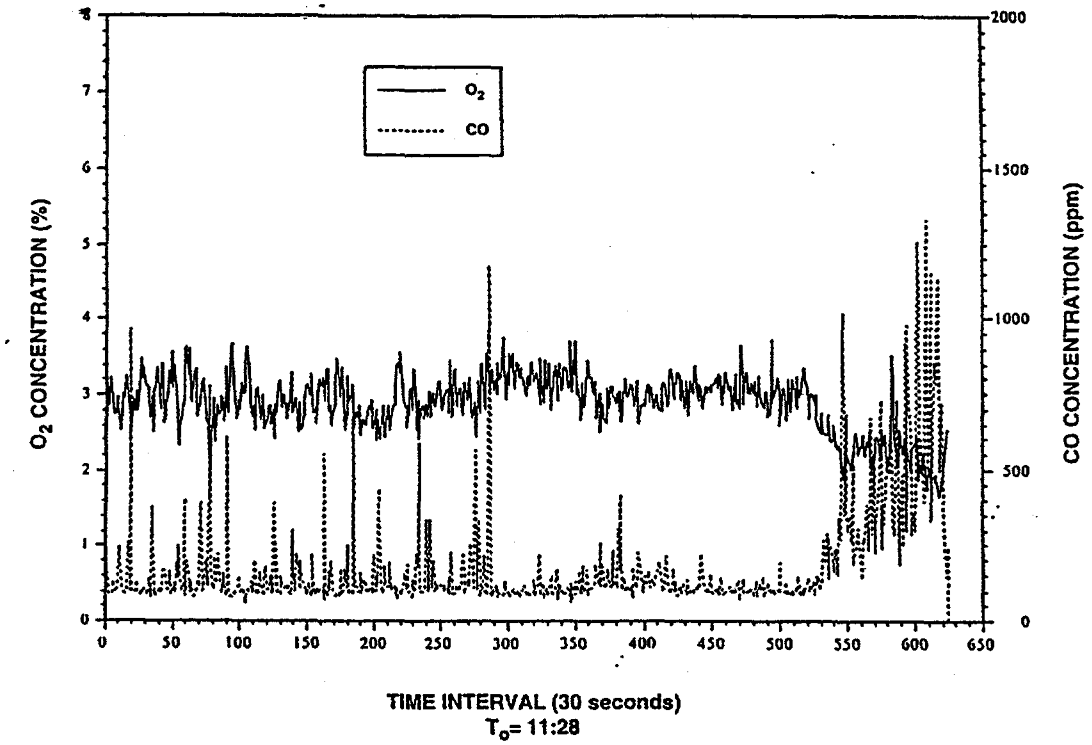


Figure 4-5 O2 and CO Concentration vs. Time for Testing Conducted on 12/07/93 (Task 3)

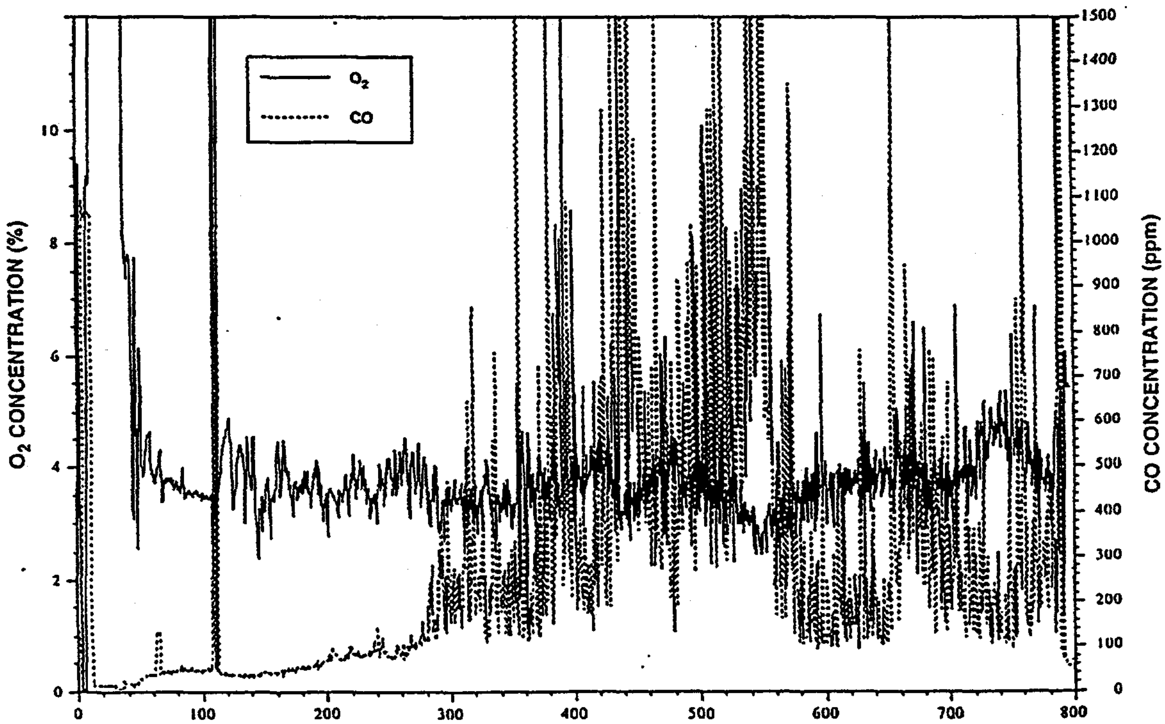


Figure 4-6 O2 and CO Concentration vs. Time for Testing Conducted on 4/28/94 (Task 3)

4.5%. However, CO emissions varied significantly ranging from 100 to >1,500 ppm.

A similar plot was prepared from testing conducted after the coal feed system was modified with the gravimetric feeder. Testing conducted during Task 5, RSFC burner characterization, is shown in Figure 4-7. Results show fairly constant CO emissions and small O_2 fluctuations compared to those with the original volumetric feed system during Task 3 testing. The burner stability during the Task 5 testing was good. Pressure readings in the boiler were constant and the flame shape remained constant with certain burner /boiler operating conditions.

The overall coal handling operability met expectations during the Task 5 testing. The coal feed was consistent, flowability from the surge bin was excellent, and stable flames were obtained. No ratholing or bridging was encountered in the surge bin and minimal operator attention was required. The major coal handling problem encountered was plugging of the main coal hopper outlet when transferring coal from the main hopper to the surge bin during continuous operation/deposition tests (Section 4.0) conducted in December 1995 to February 1996. This occurred when wet coal plugged the area of the hopper discharge/vibratory feeder and resulted in the loss of coal feed in three instances. The solution was to periodically inspect the vibratory feeder during coal transfer.

4.3 RSFC Burner for Task 5 Demonstration Testing

ABB PPL designed, built and provided the properly sized RSFC burner at no cost to the DOE-FETC project for Task 5 demonstration phase testing. The RSFC burner was sized to satisfy the geometric constraints of the host boiler: i.e., windbox, burner openings, mounting plate sizes, fuel pipe locations, etc. Also, natural gas firing capability was added to make this a dual fuel burner, similar to the HEACC. A schematic of the RSFC burner tested at Penn State is shown in Figure 4-8. This RSFC burner is, operationally, similar to the MIT burner (Figure 4-9), but with different designed swirlers and the ability to co-fire or fire independently natural gas and pulverized coal at firing rates of about 18 x 10^6 Btu/hr and 16 x 10^6 Btu/hr, respectively (Patel, et. al., 1996).

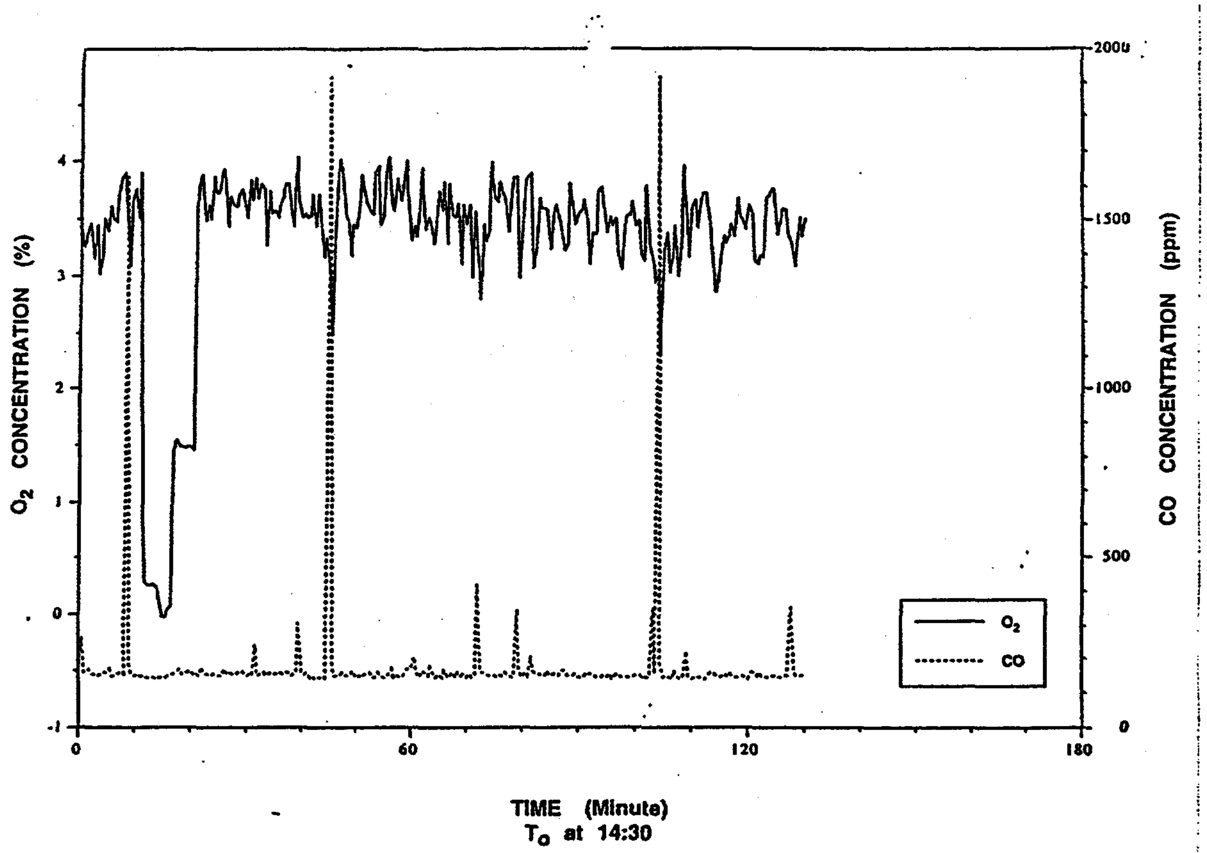


Figure 4-7 O2 and CO Concentration vs. Time For Testing Conducted on 8/25/95 (Task 5)

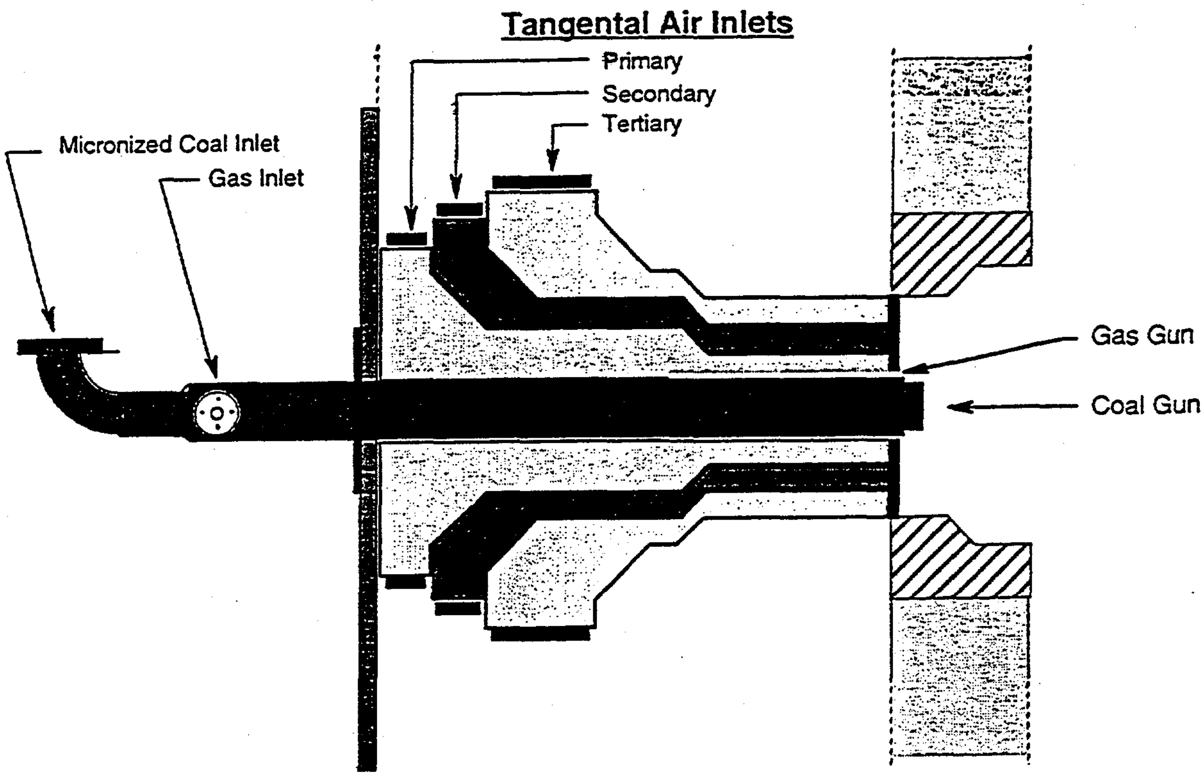


Figure 4-8 Schematic of RSFC Burner Tested at Penn State

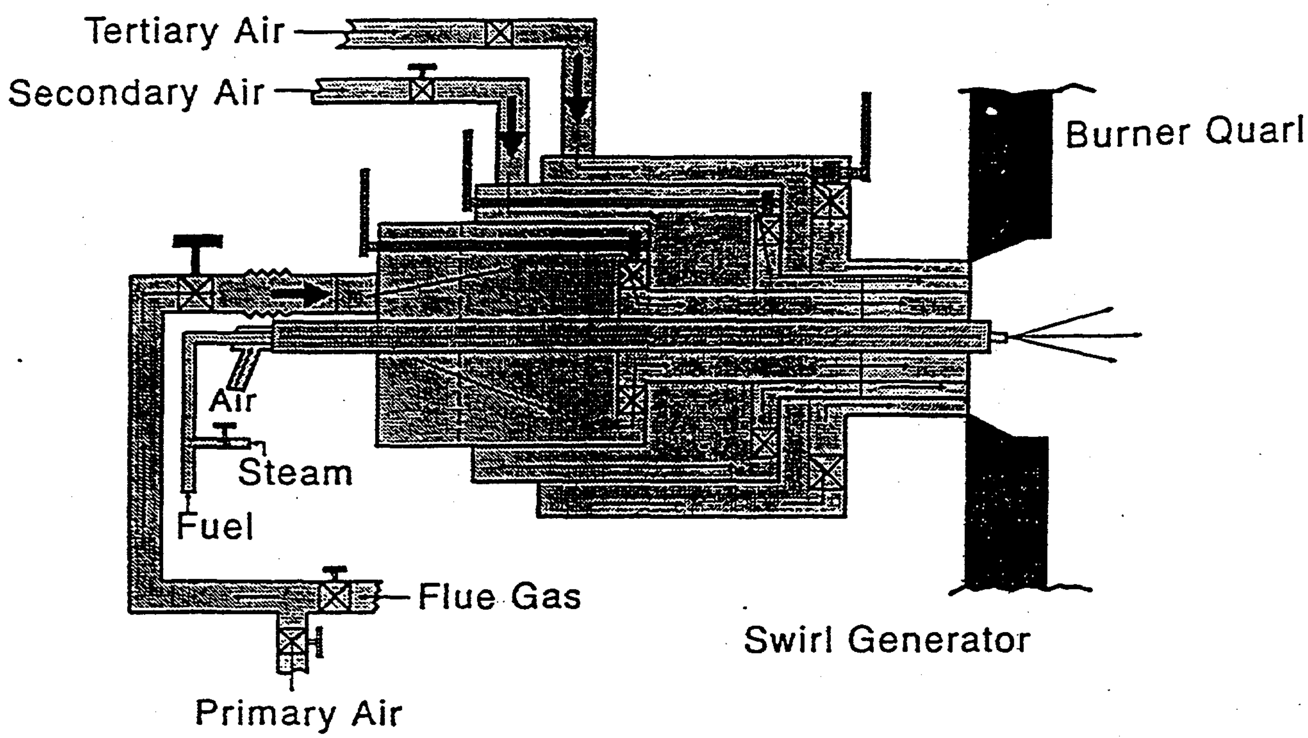
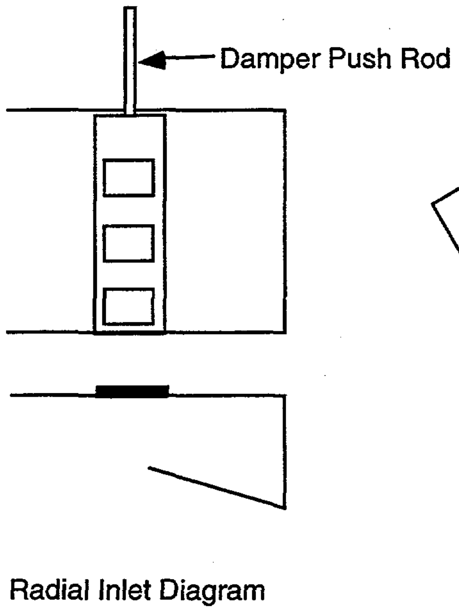


Figure 4-9 Schematic of M.I.T. Laboratory Prototype Low Nox RSFC Burner

The RSFC burner tested at Penn State was configured with three T-inlet swirlers, one each for the primary, secondary, and tertiary air annuli. Radial inlets were also added to three of the tertiary tangential inlets (as shown in Figure 4-10). The radial inlets/damper blades for the burner were mounted on the outside of the T-inlet to allow swirl modulation while minimizing mass air flow variation. Figure 4-10 also shows the damper arrangement that was used to control the amount air that was axially introduced. This design allowed a wide range of tertiary air swirl with the combination of T-inlet and radial-inlet damper settings.



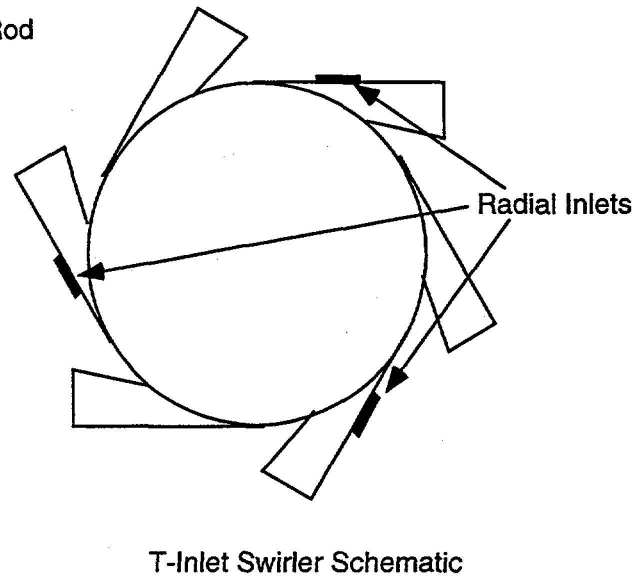


Figure 4-10 Axial Air Inlets in Tertiary Tangential Swirler

5.0 Demonstration (Task 5) Testing With ABB/CE's RSFC Burner

As discussed in Section 3 "Demonstration Test Plan", ABB's new RSFC burner was installed in the Penn State boiler in July 1995 and Task 5 testing started immediately. By mid-February 1996 about 174 hours of natural gas testing and 1003 hours of micronized coal firing were logged during this demonstration phase (Task 5) under a variety of typical industrial boiler operational modes. Initially, testing included a series of short term (4 to 12 hr. during July '95 through October '95) and then several long term (around-the-clock during November '95 through February '96) tests at the conditions that were representative of typical industrial boilers. Appendix A contains a summary of the daily activities during the July 1995 through February 1996 timeframe. Overall performance of the RSFC burner was excellent and showed improvements in several areas when compared with the HEACC. Higher combustion efficiencies, lower burner pressure drops and more stable and adjustable flames were achieved with the RSFC burner compared to the HEACC, during Task 3 testing. Results obtained during the demonstration tests are summarized in this and the next section.

Detailed break-down of hours accumulated firing natural gas, cofiring natural gas and micronized coal, and firing micronized each month were:

Date	Hours Firing Natural Gas	Hours Cofiring Natural Gas and Micronized Coal	Hours Firing Micronized Coal
July 1995	55.7	4.0	8.7
August 1995	46.0	9.0	74.7
September 1995	2.9	1.8	31.6
October 1995	27.4	6.5	182.6
November 1995	11.1	3.2	219.3
December 1995	2.8	0.3	136.9
January 1996	4.9	2.5	192.3
February 1996	23.3	3.3	156.4
TOTAL	174.1	30.6	1,002.5

A summary of all results from the execution of Task 5 is contained in Appendix B. Selected data were recorded either every half hour or whenever operational changes (e.g., burner settings, O_2 concentration, firing rate, etc.) were made. Whenever testing was conducted for an extended period of time without making operational changes, data collected by the computerized data acquisition were averaged and are summarized in tables presented in Sections 5.1, 5.2, and 6.0.

Initially, a series of short term (4 to 12 hrs) tests were conducted first with natural gas and then with coal (Upper Freeport and Middle Kittanning). The goal during the short term testing was to address the first three areas identified in the Test Plan, namely (1) assessment of burner settings on NOx and CO, (2) determine the effect of boiler operating conditions on NOx and CO and (3) establish reliable startup and shut down procedures and assess the performance of ignitor and flame scanner operation. Also to evaluate the RSFC burner performance compared to the HEACC (Task 3).

For natural gas firing optimum excess oxygen levels were found to be on the order of 1.5% to 2.5%. For coal firing optimum excess oxygen levels were found to be on the order of 3.0% to 4.0%. Table 5-1 summarizes results of natural gas-fired testing conducted with the RSFC burner during Task 5.

5.1 Comparison of HEACC vs RSFC Burner Performance in the Penn State Boiler

When firing natural gas with the RSFC burner the condition of the boiler tube walls was important. With clean tubes NOx levels ranged from 45 to 55 ppm, while NOx values of 60 to 70 ppm were achieved at the same conditions when the tubes were dirty from previously firing coal. This was not observed when testing the HEACC which gave NOx levels of 140 to 190 ppm under clean or dirty conditions. It was a reproducible phenomena with the RSFC burner. Table 5-2 summarizes selected emissions and burner information for the RSFC burner and the HEACC when firing gas and coal. As summarized in Table 5-1, with the RSFC burner five tests were conducted firing natural gas, three at 75% load (13.2 million (MM) Btu/h), one at full load (17.1 MM Btu/h), and one at 50% load (8.6 MM Btu/h) with boiler efficiencies ranging from 82.8 to 83.6%. The boiler efficiencies were similar, approximately, 83%, for both HEACC (Task 3) and RSFC (Task5) testing.

Table 5-1. Summary of Natural Gas-Fired Testing

	BASELINE NATURAL GAS TESTS SUMMARY				
TEST/DESCRIPTION:	**7/25/95**	**7/25/95**	**7/25/95**	**7/26/95**	**8/1/95**
Excess Air	3% O2	2% O2	1% O2	1% O2	1.5% O2
Prim. Air Damper Position	Prim. Open	Prim. Open	Prim. Open	Prim. Open	Prim. Open
Sec. Air Damper Position	Sec. Open	Sec. Open	Sec. Open	Sec. Open	Sec. Open
Tert. Air Damper Position	Tert. 25% Op	Tert. 25% Op	Tert. 25% Op	Tert. Open	Tert.75% Op
Gas Gun Position	Gas Gun -4"	Gas Gun -4"	Gas Gun -4"	Gas Gun +4"	Gas Gun +4"
Coal Gun Position	Coal Gun Out	Coal Gun Out	Coal Gun Out	Coal Gun Out	Coal Gun Out
WATER/STEAM SIDE					
Steam flow rate; lb/h	12,404	12,387	12,411	15,659	8,609
Water temperature into boiler; °F	206	207	207	217	217
Drum pressure; psig	199	200	200	204	194
Calorimeter temperature; °F	304	304	304	317	313
Steam temperature; °F	378	379	379	391	387
Steam quality; %	99.48	99.50	99.50	100.23	99.37
Blowdown rate; lb/h	3,093	3,099	3,099	3,128	3,054
AIR,FUEL, FLUE GAS SIDE					
Natural gas flow rate; lb/h, MMBtu/h	567, 13.2	567, 13.2	567, 13.2	732, 17.1	367, 8.6
Coal flow rate; lb/h, MMBtu/h	Not Applicable (NA)	NA	NA	NA	NA
Furnace outlet temperature; °F	525	520	517	576	477
Gas temperature leaving air heater; °F	354	351	349	390	337
Air temperature entering air heater; °F	175	179	182	173	211
Air temperature leaving air heater; °F	383	384	384	409	385
Air temperature into boiler; °F	363	364	365	391	363
Ash content of particulate; %	NA	NA	NA	NA	NA
Carbon content of furnace ash; %	NA	NA	NA	NA	NA
HHV of fly ash; Btu/lb	NA	NA	NA	NA	NA
HHV of furnace ash; Btu/lb	NA	NA	NA	NA	NA
Combustion air flow; lb/h	11,112	10,577	10,092	13,279	6,765
Boiler draft; in H2O	-0.07	-0.07	-0.07	-0.08	-0.07
Boiler efficiency; %	82.84	82.94	83.14	83.03	83.61
Relative humidity, %	60	60	60	60	60
Mill air flow rate; lb/h	0	0	0	0	0
Mill outlet temperature; °F	77	77	72	115	80
Natural gas temperature; °F	80	80	80	85	98
EMISSIONS					
O2; %	3.1	2.1	1.1	1.5	1.8
CO; ppm	45	49	108	37	73
CO2; %	9.6	10.2	10.6	11.0	11.2
SO2; ppm	NA	NA	NA	NA	NA
NOx; ppm	44	44	43	26	48
Particulates; gr/SCF	NA	NA	NA	NA	NA
O2 before and after air heater; %,%	3.1, Not Measured(NM)	2.1, NM	1.1, NM	1.5, NM	1.8,NM
ECONOMIC ANALYSIS DATA					
ID fan power consumption; w/h	NM	NM	NM	NM	NM
FD fan power consumption; w/h	NM	NM	NM	NM	NM
Pulverizer power consumption; w/h	NA	NA	NA	NA	NA
Booster fan power consumption; w/h	NM	NM	NM	NM	NM
Ash collection power consumption; w/h	NA	NA	NA	NA	NA
Crusher power consumption; w/h	NA	NA	NA	NA	NA
Reddler conveyor power consumption; w/h	NA	NA	NA	NA	NA
Feed screw power consumption; w/h	NA	NA	NA	NA	NA
Feedwater pump power comsumption; w/h	NM	NM	NM	NM	NM
Total air usage; scfm (Pilot burner)	NM	NM	NM	NM	NM
Maximum load (based on 14,700 lb steam/h); %	84.38	84.27	84.43	106.52	58.56
Coal related downtime	NA	NA	NA	NA	NA

Table 5-2 Comparison of HEACC vs. RSFC Burner

Short Term Test Results	HEACC (Task 3)	RSFC (Task 5)
• Natural Gas Testing		
w/clean walls		
NOx (ppm)	140 - 200	45 – 55
CO (ppm)	10 – 40	40 – 60
w/dirty walls (ash deposit)		
NOx (ppm)	140 – 200	60 – 70
CO (ppm)	10 – 40	45 – 60
• Coal Firing Results		
% Comb. Efficiency	90 – 95	93 – 97.8
NOx (ppm)	300 – 600	300 – 600
Burner Pressure Drop (inches H_2O)	~ 8	4 – 6.5
• Flame Shape	Fixed	Adjustable
• Flame Stability	Moderate	Excellent

NOx and CO values are expressed @ 3% O_2

When firing coal NOx levels ranged from roughly 300 to 600 ppm (depending on burner settings) for both the RSFC burner and the HEACC. The RSFC burner has shown a slightly greater variation in NOx, perhaps owing to it's greater adjustability. It seems reasonable to conclude that based on the short term data (which is all that exists on the HEACC) NOx levels for the two burners are comparable in the Penn State boiler. Differences in combustion efficiency are more apparent, however. Figure 5-1 is a plot of NOx for each of the burners, for short term and long term tests with all data points taken at full load. The RSFC burner is seen to have combustion efficiencies ranging from slightly over 93% to almost 98% while the HEACC shows combustion efficiencies ranging from 90% to slightly over 95%. The highest combustion efficiency attained for the highest acceptable NOx level (450 ppm) for the RSFC burner was slightly over 97% while for the HEACC the comparable value is somewhat over 95%. Given that the combustion efficiency target (98%) was missed during previous testing (Task 3) the increase in combustion efficiency for the RSFC burner was considered a significant improvement. Results from both short and long term tests are discussed in detail in the following sub sections.

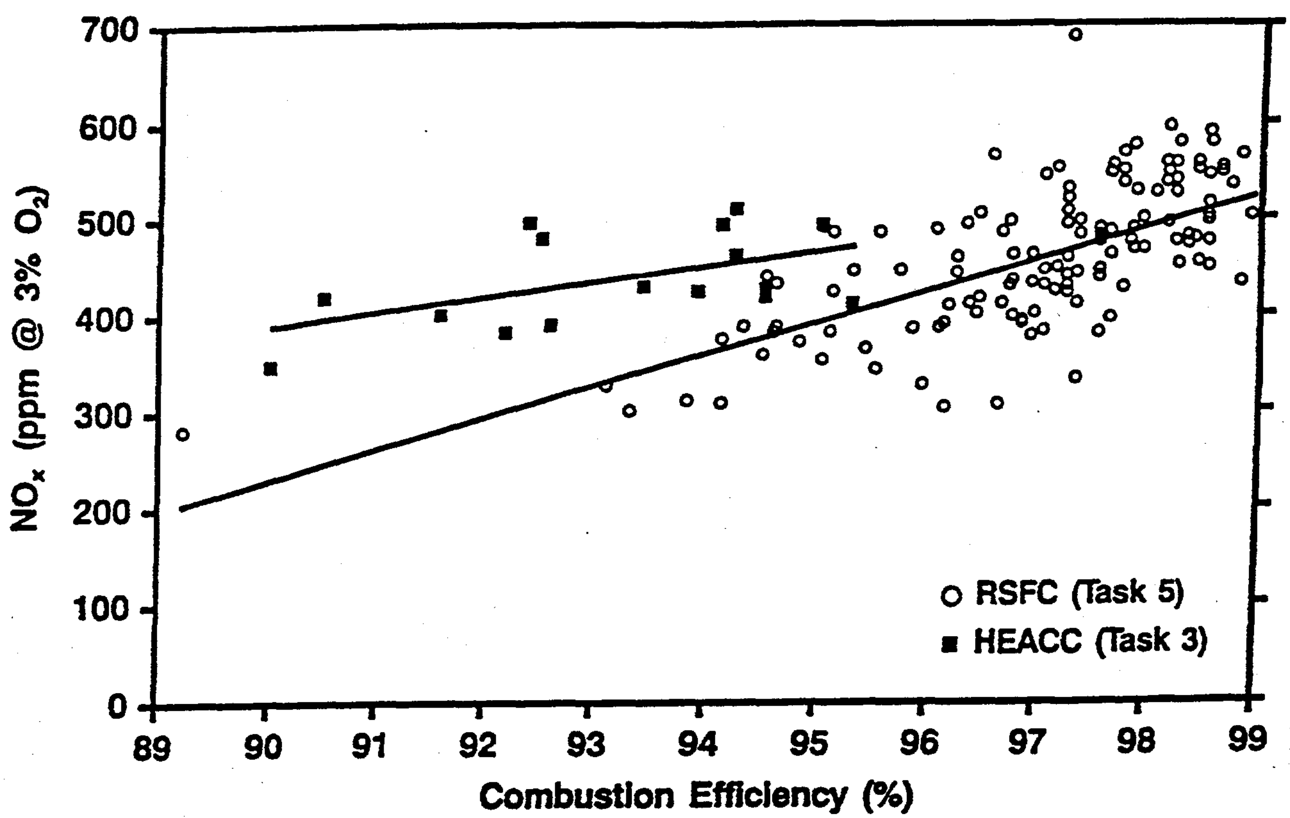


Figure 5-1 NOx vs. Combustion Efficiency for HEACC and RSFC Burner in Penn State Boiler Firing Microfine Coal at Full Load

5.2 Short Term Testing

Detailed summaries of the entire micronized coal testing campaign conducted during Task 5 demonstration are given in Appendices B and C. Table B-1 is a summary of test results where selected data were recorded either every half hour or whenever operational changes (e.g., burner settings, O_2 concentration, firing rate, etc.) were made. Whenever testing was conducted for an extended period of time without making operational changes, data collected by the computerized data acquisition system were averaged and are summarized in Table C-1. Boiler efficiencies were determined for the steady-state test periods listed in Table C-1.

Three coals, as planned, were used during this demonstration testing. Two were from Pennsylvania: the Upper Freeport and Middle Kittanning seams. One coal was from Kentucky. The average analyses of the coal samples collected on various dates during the demonstration are given in Table 5-3.

All the short term tests were conducted during the timeframe from July 95 through October 95. Since the demonstration testing was conducted with the new RSFC burner instead of the HEACC, some time was used to optimize its performance while continuing effort towards meeting 1,000 hour goal and covering wide rage of typical industrial boiler operation to address the ash management problems and to demonstrate technical viability of the entire retrofit systems.

Combustion Performance/Emissions

The combustion performance and emissions from the micronized coal testing are presented as three subsections: (1) burner characterization from July through September 1995; (2) parametric/optimization testing during October 1995; and (3) continuous (around-the-clock) operation/deposition testing during November 1995 through February 1996.

Table 5-3 Coal Analysis

Date	Coal	Moisture Values		Full Proximate Analysis			Ultimate Analysis					Cal Value (Dry)
		% Moist As Received	% Moist Prepped	% V.M. (Dry)	% Ash (Dry)	% F.C. (Dry)	% C (Dry)	% H (Dry)	% N (Dry)	% S (Dry)	% O (Dry)	
24Jul95- 28/Jul/95	Upp. Freeport Seam (UF)	3.32 *5	2.38 ± 0.04	31.48 ± 0.06	6.97 ± 0.03	61.55	79.51 ± 0.16	5.18 ± 0.02	1.55 ± 0.01	0.59 ± 0.01	6.19	13926 ± 10
31Jul95- 04/Aug/95	UF	4.08 *19	2.19 ± 0.01	31.54 ± 0.05	6.64 ± 0.01	61.82	79.75 ± 0.02	5.21 ± 0.01	1.53 ± 0.00	0.60 ± 0.01	6.27	13970 ± 13
07Aug95- 11/Aug/95	Mid Kittanning Seam (MK)	4.53 *8	1.99 ± 0.04	31.32 ± 0.05	4.57 ± 0.03	64.11	82.32 ± 0.21	5.29 ± 0.01	1.41 ± 0.00	0.77 ± 0.01	5.64	14414 ± 7
21Aug95- 25/Aug/95	MK	6.58 *3	1.87 ± 0.01	30.82 ± 0.02	4.36 ± 0.01	64.82	82.41 ± 0.19	5.04 ± 0.01	1.40 ± 0.00	0.81 ± 0.02	5.98	14444 ± 2
28Aug95- 01/Sep/95	MK	4.40 *5	1.79 ± 0.01	30.94 ± 0.06	4.31 ± 0.02	64.75	82.78 ± 0.01	5.16 ± 0.02	1.41 ± 0.02	0.85 ± 0.01	5.49	14490 ± 10
04Sep95- 08/Sep/95	MK	4.60 *3	2.40 ± 0.03	30.80 ± 0.17	4.34 ± 0.03	64.86	82.05 ± 0.74	5.21 ± 0.07	1.41 ± 0.00	0.84 ± 0.01	6.15	14533 ± 12
09Oct95- 13/Oct/95	MK	4.06 *4	1.53 ± 0.01	30.82 ± 0.03	4.34 ± 0.02	64.84	82.70 ± 0.09	5.23 ± 0.04	1.14 ± 0.01	0.82 ± 0.00	5.78	14453 ±7
16Oct95- 20/Oct/95	MK	3.84 *11	1.46 ± 0.02	31.33 ± 0.03	4.01 ± 0.02	64.66	82.70 ± 0.04	5.17 ± 0.01	1.35 ± 0.01	0.78 ± 0.01	5.99	14560 ± 12
23Oct95- 29/Oct/95	MK	4.19 *4	1.31 ± 0.01	31.44 ± 0.01	3.68 ± 0.01	64.88	83.13 ± 0.15	5.17 ± 0.00	1.42 ± 0.01	0.76 ± 0.01	5.84	14596 ± 9
30Oct95- 05/Nov/95	MK	4.44 *17	1.46 ± 0.03	31.22 ± 0.06	3.86 ± 0.01	64.92	82.92 ± 0.26	5.10 ± 0.02	1.42 ± 0.02	0.77 ± 0.01	5.93	14565 ±13
06Nov95- 12/Nov/95	MK	4.33 *2	2.34 ± 0.12	31.74 ± 0.19	4.04 ± 0.09	64.22	84.05 ± 0.05	5.04 ± 0.02	1.42 ± 0.01	0.77 ± 0.01	4.68	14563 ±10
13Nov95- 19/Nov/95	MK/UF mixture	4.19 *10	1.24 ± 0.03	31.12 ± 0.05	3.82 ± 0.08	65.06	83.57 ± 0.04	5.30 ± 0.01	1.40 ± 0.01	0.80 ± 0.02	5.11	14645 ±7
20Nov95- 26/Nov/96	MK/UF mixture	4.69 *2	1.31 ± 0.04	31.33 ± 0.01	3.91 ± 0.02	64.76	83.26 ± 0.04	5.30 ± 0.03	1.38 ± 0.01	0.78 ± 0.00	5.37	14589 ±5
27Nov95- 03/Dec/95	MK/UF/ Kentucky mix	4.37 *3	1.20 ± 0.01	31.34 ± 0.04	3.68 ± 0.01	64.98	83.54 ± 0.09	5.40 ± 0.01	1.40 ± 0.00	0.77 ± 0.01	5.21	14655 ±8
11Dec95- 17/Dec/95	Kentucky (K)	5.48 *11	1.35 ± 0.02	33.66 ± 0.02	3.65 ± 0.01	62.69	82.05 ± 0.04	5.31 ± 0.02	1.58 ± 0.01	0.80 ± 0.00	6.61	14380 ± 14
18Dec95- 21/Dec/95	K	6.32 *3	1.20 ± 0.01	36.12 ± 0.04	2.95 ± 0.02	60.93	82.25 ± 0.02	5.23 ± 0.01	1.52 ± 0.01	0.82 ± 0.00	7.24	14355 ± 2
8Jan96- 14/Jan/96	K	6.42 *17	2.97 ± 0.03	35.96 ± 0.01	2.81 ± 0.00	61.23	82.58 ± 0.28	5.42 ± 0.02	1.50 ± 0.01	0.80 ± 0.01	6.89	14400 ± 13
15Jan96- 21/Jan/96	K	7.07 *4	2.80 ± 0.02	35.86 ± 0.07	2.27 ± 0.01	61.87	82.54 ± 0.02	5.39 ± 0.01	1.54 ± 0.02	0.83 ± 0.01	7.43	14443 ± 5
22Jan96- 28/Jan/96	K	7.49 *2	3.01 ± 0.03	35.67 ± 0.05	2.35 ± 0.01	61.98	82.58 ± 0.06	5.68 ± 0.08	1.54 ± 0.04	0.83 ± 0.01	7.02	14377 ± 15
05Feb96- 11/Feb/96	K	7.31 *2	2.40 ± 0.02	36.22 ± 0.07	2.29 ± 0.03	61.49	82.21 ± 0.05	5.64 ± 0.03	1.52 ± 0.02	0.78 ± 0.00	7.57	14408 ± 1
12Feb96- 18/Feb/96	K	6.70 *17	2.48 ± 0.01	36.15 ± 0.01	2.42 ± 0.00	61.43	83.70 ± 0.04	5.38 ± 0.09	1.41 ± 0.03	0.79 ± 0.00	6.30	14349 ± 0
19Feb96- 25/Feb/96	K	7.10 *2	3.27 ± 0.01	35.72 ± 0.12	2.57 ± 0.3	61.71	83.65 ± 0.02	5.61 ± 0.05	1.43 ± 0.01	0.81 ± 0.00	5.93	14324 ± 16

* Number of samples used to determine composite value. Coal samples are collected on a daily basis from the weigh-belt feeder outlet to make composites.

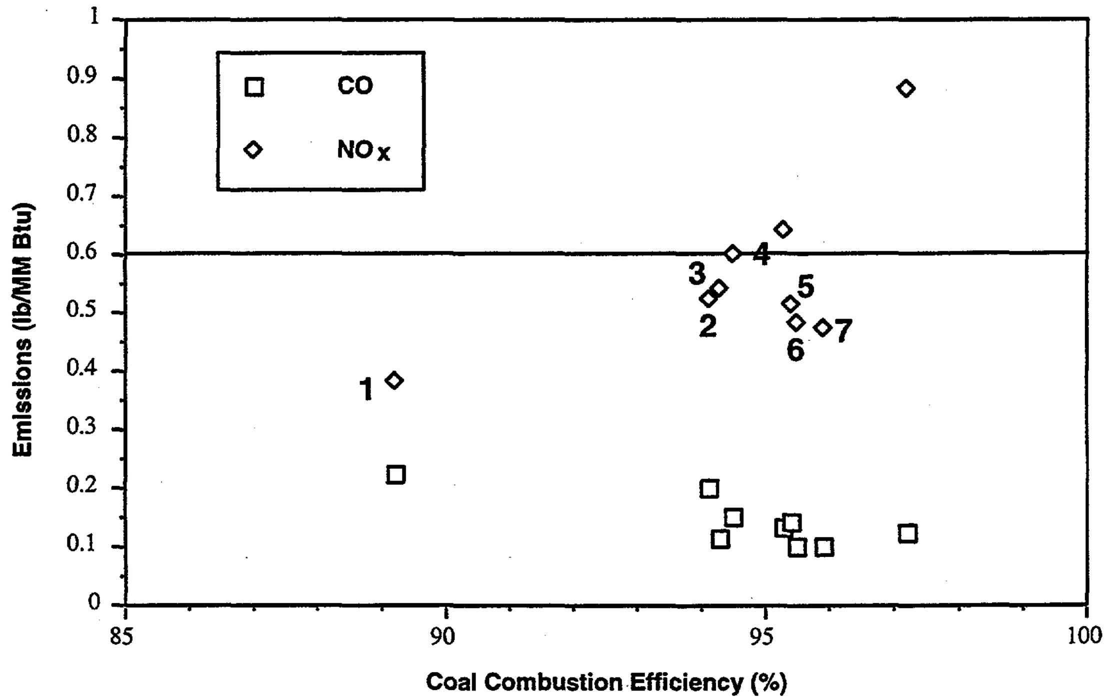
Burner Characterization (July, August, and September 1995)

Two different coals were fired during this burner characterization period, from 7/24/95 to 8/4/95: Upper Freeport (UF) and from 8/7/95 to 9/30/95 Middle Kittanning (Table 5-3). Particulate samples from the flue gas were collected at two locations and analyzed for ash content to determine coal combustion efficiency. Samples were collected prior to the baghouse using a cyclone sampler located in the duct, and from the baghouse discharge (ash screw conveyor). Calculated combustion efficiencies, as a function of sample collection time, are shown in Appendix D as Figures D-1 through D-12. The graphs also show when sootblowing occurred. Sootblowing includes cleaning the boiler convective pass (with a steam sootblower), boiler floor (with a compressed air floor ash blowdown system) and cleaning the heat-pipe heat exchanger (with compressed air). In Figures D-2 through D-12, periods identified by the 'blowdown' refer to sootblowing at all three locations. In Figure D-1 (08/03/95), the convective pass sootblow and floor ash blowdown were conducted at two different times.

During this burner optimization period, coal combustion efficiencies (based on the baghouse samples) ranged from the mid to high 80's to 98%. Flame shape /stability with the RSFC burner was significantly improved compared to the HEACC during Task 3 testing. Combustion and emissions performance of the Upper Freeport and Middle Kittanning coals were similar.

Emissions data, NO_X and CO, as a function of time are also included in Figures D-1 through D-12 to compare them with combustion efficiency. NO_X and CO emissions varied from 131 to 701 and from 74 to 515 ppm, respectively; this range includes partial boiler load as well as full load tests.

Figure 5-2 shows the relationship between NO_X and CO emissions and coal combustion efficiency for the steady-state testing listed in Table C-1. NO_X and CO emissions varied from 0.38 to 0.88 and from 0.10 to 0.22 lb/MM Btu, respectively. For this data set the NO_X emissions target of <0.6 lb/MM Btu was achieved with coal combustion efficiencies of about 96%. The tests where the



Tests Meeting Target of 0.6 lb NO_X / MM Btu

1 - 08/23/95
2 - 08/09/95 - Low NO_X
3 - 08/28/95
4 - 08/25/95
5 - 08/29/95
6 - 08/31/95
7 - 08/30/95

Figure 5-2. RELATIONSHIP BETWEEN COAL COMBUSTION EFFICIENCY AND CO AND NO_X EMISSIONS FOR THE STEADY-STATE TESTING IN AUGUST AND SEPTEMBER 1995 WITH MIDDLE KITTANNING COAL

NOx target was met are listed in Figure 5-2 for cross-referencing with operating conditions in Table 5-4. CO emissions of 0.1 lb/MM Btu were achieved.

Targeted SO_2 emissions of <1.2 lb/MM Btu were also met. All SO_2 emissions throughout the Task 5 testing were less than 1.2 lb/MM Btu as a result of using low sulfur coals.

Parametric/Optimization Testing (October 1995)

In October, parametric testing was conducted while firing Middle Kittanning coal, to further optimize the burner to achieve 98% combustion efficiency target and to get ready for the long term around-the-clock tests to address the ash management issues. A matrix of tests was developed to determine the effect of burner swirl settings, gas and coal gun positions, mill air flow, excess air, and turndown ratio on combustion performance and flame characteristics. The test matrix that was developed is contained in Appendix E.

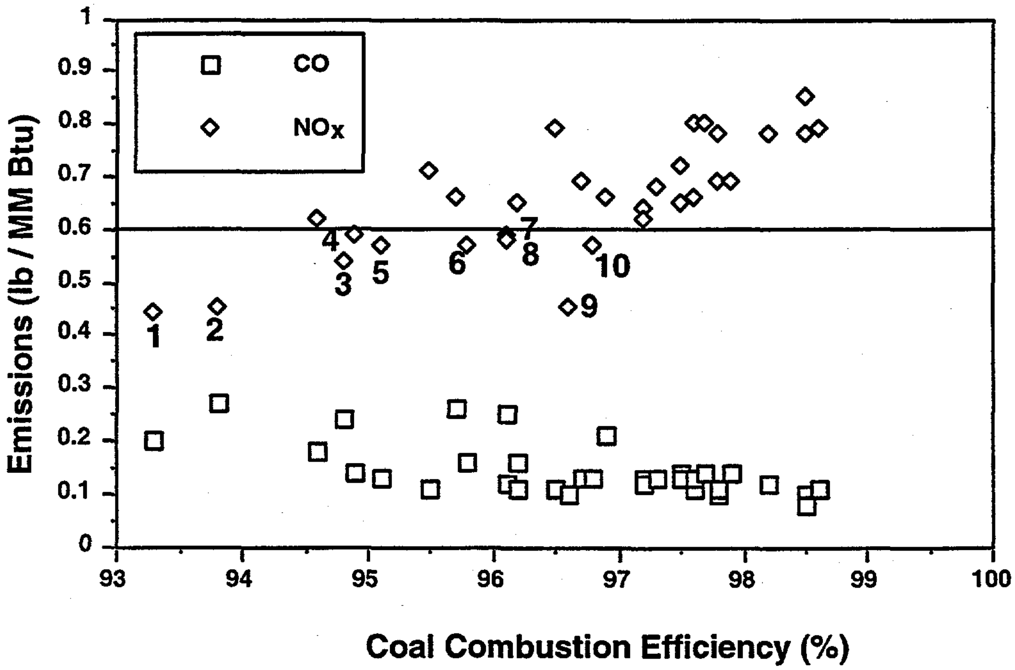
The entire matrix was not implemented. Tests 20, 23, 24, 26, 27, 28, 31, and 32 were not conducted because the flame impinged on the back wall. The dampers were set but when it was observed that the flame was too long the tests were terminated. Tests 37 through 40 were not conducted because of insufficient combustion air through the burner and Tests 35 and 36 were not conducted in order to begin the continuous operation/deposition testing.

The results from optimization testing are presented in this section. Plots of the coal combustion efficiency and NO_X and CO emissions as a function of time when collected for each day of operation in October are contained in Appendix D as Figures D-13 through D-25. Flame observations from the sightports were recorded by the boiler operators during each test and are contained in Appendix F.

Figure 5-3 shows the relationship between NO_X and CO emissions and coal combustion efficiency for the steady-state averages listed in Table C-1. NO_X and CO emissions varied from 0.44 to 0.85 and from 0.08 to 0.27 lb/MM Btu, respectively. The NO_X emissions target of <0.6 lb/MM Btu was achieved with

Table 5-4. Selected Results for the Parametric/Optimization Testing

Test Number	Primary Damper (% Open)	Secondary Damper (% Open)	Tertiary Damper (% Open)	Radial Scoop (% Open)	Coal Comb. Eff. (%)	% O2	NOx Emissions (ppm at test conditions)	NOx Emissions (lb/MBtu)	Comments
(1) Determine the effect of closing the primary damper on combustion performance and flame characteristics									
1	100	100	50	0	96.6	3.7	301	0.45	Tests 1 and 2 conducted on one day
2	100	100	50	100	93.8	3.4	309	0.45	
3	100	100	50	25	95.5	3.5	482	0.71	Tests 3 and 4 conducted on one day
4	100	100	50	50	94.9	3.7	390	0.59	
5	50	100	50	0	96.2	3.6	441	0.65	Tests 5 through 14 conducted while continuously operating the boiler
6	50	100	50	100	94.6	3.5	430	0.62	
7	50	100	50	25	96.5	3.3	559	0.79	
8	50	100	50	50	96.7	3.8	459	0.69	
9	0	100	50	0	97.6	3.6	543	0.80	
10	0	100	50	100	96.1	3.7	389	0.58	
11A	0	100	50	75	95.7	3.7	443	0.66	
11B	0	100	50	25	96.2	3.4	454	0.65	
(2) Determine the effect of secondary air damper position on combustion performance and flame characteristics									
13	100	100	50	0	97.5	3.8	484	0.72	Test 13 is a repeat of Test 1
14	100	100	50	100	96.9	3.5	458	0.66	Test 14 is a repeat of Test 2; boiler down to unplug cage mill
15	100	100	50	25	95.8	3.7	383	0.57	Test 15 is a repeat of Test 3; Tests 15 through 21 conducted while continuously operating the boiler
16	100	100	50	50	94.8	3.6	369	0.54	Test 16 is a repeat of Test 4
17	100	50	50	0	97.3	3.4	479	0.68	
18	100	50	50	100	97.9	3.8	463	0.69	
19	100	50	50	25	96.8	3.6	390	0.57	
21	100	0	50	0	98.2	3.5	534	0.78	Boiler down while changing ash hoppers
22	100	0	50	100	97.2	3.5	436	0.64	Tests 22 through 34 conducted while continuously operating the boiler
(3) Determine the effect of reducing tertiary air on combustion performance and flame characteristics									
25	100	0	100	0	97.6	3.5	456	0.66	
29	100	0	75	0	97.8	3.6	468	0.69	
30	100	0	75	100	97.5	3.7	442	0.65	
33	100	0	25	0	98.5	3.6	582	0.85	
34	100	0	25	100	98.6	3.4	543	0.79	
Determine the effect of mill air flow on combustion performance and flame characteristics									
10/24/95	100	100	50	0	97.2	3.5	426	0.62	385 acfm mill air
10/24/95	100	100	50	0	97.8	3.7	522	0.78	345 acfm mill air
10/25/95	100	100	50	0	97.7	3.7	534	0.80	305 acfm mill air
10/25/95	100	100	50	0	98.5	3.5	538	0.78	395 acfm mill air



Tests Meeting Target of 0.6 lb NO_X / MM Btu

1 - 10/09/95
2 - 10/12/95; Test #2
3 - 10/18/95; Test #16
4 - 10/13/95; Test #4
5 - 10/11/95; Damper settings of 100/100/50/0
6 - 10/18/95; Test #15
7 - 10/11/95; Damper settings of 100/100/50/25
8 - 10/17/95; Test #10
9 - 10/12/95; Test #1
10 - 10/18/95; Test #19

Figure 5-3. RELATIONSHIP BETWEEN COAL COMBUSTION EFFICIENCY AND CO AND NO_X EMISSIONS FOR THE PARAMETRIC/OPTIMIZATION TESTING IN OCTOBER 1995 WITH MIDDLE KITTANING COAL

coal combustion efficiencies up to about 97%. The tests where the NOx target was met are listed in Figure 5-3 for cross-referencing with operating conditions shown in Table C-1. CO emissions of 0.1 lb/MM Btu were achieved.

Effect of <u>Primary Air Damper</u> Position on Combustion Performance and Flame Characteristics

Selected results investigating the effect of damper position on combustion performance and flame characteristics are contained in Table 5-4. The first twelve tests, Tests 1 through 11B, were conducted to determine the effect of closing the primary air damper and radial scoop (while keeping secondary 100% and tertiary 50% open) on combustion performance.

In Tests 1 through 4, the primary and secondary dampers were 100% open, the tertiary damper was 50% open, and the position of the radial scoop was varied. As the radial scoop was closed, the coal combustion efficiency increased from 93.8 to 96.6%. NO_X emissions were variable.

In Tests 5 through 8, the primary and tertiary dampers were 50% open, the secondary damper was 100% open, and the position of the radial scoop was varied. The coal combustion efficiency was 94.6% with the radial scoop 100% open and increased to 96.7% when the radial scope was completely closed. NO_X emissions were variable.

In Tests 9 through 11B, the primary damper was closed, the secondary damper was 100% open, the tertiary damper was 50% open, and the position of the radial scoop was varied. In this set of tests, the coal combustion efficiency varied from 95.7 to 97.6%; however, NO_X emissions decreased as the radial scoop was opened.

In Tests 1, 5, and 9, the secondary air damper was 100% open, the tertiary air damper was 50% open, and the radial scoop was closed. As the primary air damper was closed, NO_X emissions increased and the coal combustion efficiency was variable.

In Tests 2, 6, and 10, the secondary air damper was 100% open, the tertiary air damper was 50% open, and the radial scoop was 100% open. As the primary air damper was closed, coal combustion efficiency increased from 93.8 to 96.1%. NO_X emissions increased as the primary air damper was closed to 50% open then decreased as the primary air damper was completely closed.

In Tests 3, 7, and 11B, the secondary air damper was 100% open, the tertiary air damper was 50% open, and the radial scoop was 25% open. As the primary air damper was closed, no trends were evident.

Tests 4 and 8 were conducted with the secondary air damper 100% open, the tertiary air damper 50% open, and the radial scoop 50% open. As the primary air damper was closed, the coal combustion efficiency and NO_X emissions increased.

The different type of flame shapes (long or short) can be achieved and maintained with the RSFC burner with the several combination damper positions.

Effect of the Secondary Air Damper Position on Combustion Performance and Flame Characteristics

Referring to Table 5-4 nine tests, Tests 13 through 22 (except for Test 20 where the flame impinged on the back wall), were conducted to determine the effect of the secondary air damper position and radial scoop on combustion performance.

In Tests 13 through 16, the primary and secondary dampers were 100% open, the tertiary damper was 50% open, and the position of the radial scoop was varied. In this set of the tests, the coal combustion efficiency and the NO_X emissions were variable. These results appear to be inconsistent with Tests 1 through 4 which were conducted under identical conditions (The test matrix had tests built into it to check reproducibility). In Tests 1 through 4, the NO_X emissions were variable; however, the coal combustion efficiency exhibited a decreasing trend as the radial scoop was opened.

Upon closer examination, it can be seen that the two sets of tests were not conducted under strictly identical conditions. Tests 1 and 2 were conducted on one day with the boiler operated for two shifts. Similarly, Tests 3 and 4 were conducted on one day with the boiler operated for two shifts (12 h/day). Tests 13 and 14 were the last two tests conducted when operating the boiler continuously (24 h/day). Test 14 was terminated because a coal plug in the cage mill resulted in a loss of coal feed. After the plug was removed, the boiler was brought back on line and testing resumed. Tests 15 and 16 were then conducted after the boiler was brought back on line. Subsequent continuous testing that was conducted primarily to investigate deposition (see below) shows that the coal combustion efficiency tends to be lower when first starting up.

When comparing Tests 1 and 2 with Tests 13 and 14, the coal combustion efficiency decreased for both cases when the radial scoop was opened. Likewise, when comparing Tests 3 and 4 with Tests 15 and 16, the coal combustion efficiency again decreased for both cases when the radial scoop was opened.

In Tests 17 through 19, the primary and tertiary dampers were 50% open, the secondary damper was 100% open, and the position of the radial scoop was varied. No trends were observed for these tests.

Tests 21 and 22 were conducted with the primary damper 100% open, the secondary damper closed, the tertiary damper 50% open, and the radial scoop at either fully closed or fully open. The results indicate that the coal combustion efficiency and NO_X emissions decreased, from 98.2 to 97.2% and from 0.78 to 0.64 lb/MM Btu, respectively, as the radial scoop was opened. However, Test 21 (radial scoop closed) was the last of a continuous group of tests conducted before the boiler was shut down to replace the full ash storage bin, below the baghouse, with an empty bin. Test 22 (radial scoop open) was then conducted after the boiler was brought back on line. It cannot be definitively stated that the combustion efficiency trend is the result of the opening the radial scoop or the break in testing.

In Tests 13, 17, and 21, the primary air damper was 100% open, the tertiary air damper was 50% open, and the radial scoop was closed. Coal combustion efficiency and NO_X emissions were variable during these tests.

In Tests 14, 18, and 22, the primary air damper was 100% open, the tertiary air damper was 50% open, and the radial scoop was 100% open. As the secondary air damper was closed, coal combustion efficiency and NO_X emissions remained relatively constant.

In Tests 15 and 19, the primary air damper was 100% open, the tertiary air damper was 50% open, and the radial scoop was 25% open. As the secondary air damper was closed, the coal combustion efficiency increased while the NO_X emissions remained constant.

Effect of Reducing Tertiary Air on Combustion Performance and Flame Characteristics

Five tests, Tests 25, 29, 30, 33, and 34 were conducted to determine the effect of reducing tertiary air on combustion performance. Selected results from these tests are contained in Table 5-4. Most of the tests planned for this group were not conducted due to flame impinging on the back wall or termination of the matrix testing in order to proceed with continuous operation/ash deposition testing.

In Tests 25, 29, and 33, the primary air damper was 100% open, the secondary air damper was closed, and the radial scoop was closed. As the tertiary air damper was closed, coal combustion efficiency and NO_X emissions increased.

In Tests 30 and 34, the primary air damper was 100% open, the secondary air damper was closed, and the radial scoop was 100% open. As the tertiary air damper was closed, coal combustion efficiency and NO_X emissions increased.

Effect of Gas and Coal Gun Position on Combustion Performance and Flame Characteristics

The effect of natural gas and coal gun position, at optimum primary, secondary, and tertiary air damper settings, on combustion performance and flame characteristics was not determined through the parametric test program. The optimum positions were determined based on flame observations and NO_X emissions while adjusting the positions. The natural gas and coal gun positions selected for the matrix testing, and subsequent operation, were -9 and 39.5", respectively.

Effect of Mill Air Flow (300, 360, and 400 acfm) on Combustion Performance and Flame Characteristics

Four tests were conducted to investigate the effect of mill air flow on combustion performance. The tests, summarized in Table 5-4, did not exhibit any trends in coal combustion efficiency and NO_X emissions with mill air flow.

Effect of Turndown on Combustion Performance and Flame Characteristics

The effect of turndown on combustion performance and flame characteristics was not determined during the parametric/optimization testing. This was investigated during the February 1996 continuous/ash deposition test.

5.3 Long Term Testing

As shown in the "Test Plan", a significant part of the demonstration testing was devoted to around-the-clock trials with the focus on the effects of ash deposition. The goal during this phase of the testing was to determine how long the boiler could operate before ash-related constraints would prevent further operation. During November 1995 to February 1996, testing was focused on long term, around-the-clock testing with the Middle Kittanning and the Kentucky coals. Combustion and emissions performance during these tests are discussed in the following sub-sections while ash deposition and management of ash is discussed in the Section 6.

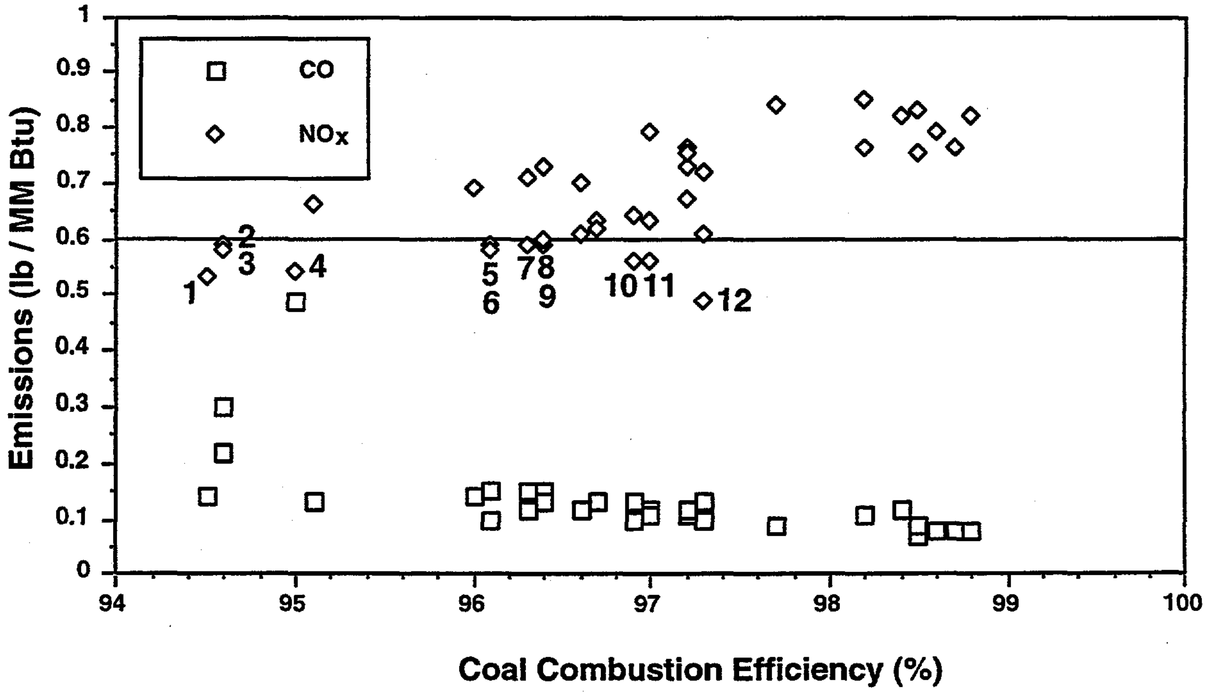
November 1995 Testing (Test #1)

In November, during the first around-the-clock test three types of testing were conducted. The first type, continuous operation/deposition Test #1, was conducted from 10/30/95 through 11/06/95 with the Middle Kittanning coal. This was followed with continuous operation for combustion performance and emissions evaluations with testing from 11/13/95 through 11/22/95 with the mixture of the Middle Kittanning and Upper Freeport coals (this is because the coal piles of these coals were stored next to each other at the enclosed storage and the last remaining coal shipment of the coal supply was received during this time of testing). Finally, tests were conducted from 11/28/95 through 11/30/95 investigating the effect of mill air flow and coal gun position on combustion performance and emissions (additional matrix testing) in continuing efforts to reduce emissions and increase burnout if possible.

Plots of the coal combustion efficiency and NO_X and CO emissions as a function of time for each day of operation in November are contained in Appendix D as Figures D-26 through D-39. Flame observations recorded by the boiler operators are contained in Appendix F.

Figure 5-4 shows the relationship between NO_X and CO emissions and coal combustion efficiency for the steady-state averages listed in Table C-1. NO_X and CO emissions varied from 0.49 to 0.85 and from 0.07 to 0.15 lb/MM Btu/h, respectively. Target CO emissions of 0.1 lb/MM Btu were met. The NO_X emissions target of 0.6 lb/MM Btu or less was achieved with coal combustion efficiencies up to 97%. The test periods (from continuous operation) where the NOx target was met are listed in Figure 5-4 for cross-referencing with operation conditions in Table C-1. During November the boiler was shut down to repair the feedwater line, repair the ash screw, replace bags in the baghouse, and perform a yearly boiler inspection (See Appendix A for a detailed chronological history of the boiler operation.).

In order to meet the 98% combustion efficiency target while maintaining all the emissions (NOx and CO) targets during the continuous long term testing, tests were conducted on 11/28/95 through 11/30/95 to verify and investigate the effect of mill air flow rate and coal gun position on combustion performance and emissions. Similar to the October 1995 matrix testing, no trends were evident in coal combustion efficiency and emissions with mill air flow. Also, no trends in combustion performance and emissions were observed over the range the coal gun was positioned.



Tests and Test Periods Meeting Target of 0.6 lb NO_X / MM Btu

1 - 10/30/95; 0600-0800h; Continuous/Deposition Test #1
2 - 11/28/95; 400 acfm; coal gun 39.5"
3 - 11/29/95; 320 acfm; coal gun 36.5"
4 - 11/30/95; 320 acfm; coal gun 39.5"
5 - 11/03/95; 0000-1200h; Continuous/Deposition Test #1
6 - 11/13/95; 1635-2230h; Continuous/Deposition Test #1
7 - Avg. of 11/02/95 1030h to 11/03/95 1200h; Continuous/Deposition Test #1
8 - 11/02/95; 1030-1300h; Continuous/Deposition Test #1
9 - 11/02/95; 1330-2300h; Continuous/Deposition Test #1
10 - 11/16/95; 0310-1203h; Continuous/Deposition Test #1
11 - Avg. of 11/13/95 1330h to 11/14/95 2230h; Continuous/Deposition Test #1
12 - 11/14/95; 1513-2319h; Continuous/Deposition Test #1

Figure 5-4. RELATIONSHIP BETWEEN COAL COMBUSTION EFFICIENCY AND CO AND NO_X EMISSIONS FOR THE TESTING CONDUCTED IN NOVEMBER 1995 (Including 10/30/95, the first day of the Continuous / Deposition Test #1)

December 1995 Continuous Operation/Ash Deposition Test #2

During December 1995, test #2 (continuous operation/ash deposition) was conducted from 12/13/95 to 12/19/95. The boiler was continuously operated for 137 hours firing Kentucky coal at full load at the optimum burner settings. This was the longest continuous around-the-clock test at full load.

Plots of the coal combustion efficiency and NO_X and CO emissions as a function of time for each day of operation in December are contained in Appendix D as Figures D-40 through D-46. Flame observations recorded by the boiler operators are contained in Appendix F.

Figure 5-5 shows a plot of NOx and combustion efficiency over the entire 137 hours of testing. It is particularly interesting to observe that NOx dropped to roughly the target level of 450 ppm (0.6 lb/MBtu) after about 90 hours of operation; this occurred without purposely making any changes to the burner or operating conditions. CO emissions varied between 0.07 to 0.4 lb/MM Btu. This long term test clearly shows the potential of the RSFC burner to meet both the NOx and combustion efficiency targets. Earlier testing with the HEACC gave combustion efficiencies on the order of 95% under short term (no longer than 12 hours) testing.

January 1996 Continuous Operation/Deposition Test #3

During January, two types of testing were conducted. Most of the testing conducted in January was the continuous operation/ash deposition Test #3 which was conducted from 01/08/96 through 01/16/96. Testing was conducted on 01/22/96, 01/23/96, and 01/24/96 as the start of the fourth continuous operation/deposition test. However, the operation was not continuous over these three days due to coal plugging the cage mill and bag filter problems.

Plots of the coal combustion efficiency and NO_X and CO emissions as a function of time for each day of operation in January are contained in Appendix D as Figures D-47 through D-56. Flame observations recorded by the boiler operators are contained in Appendix F.

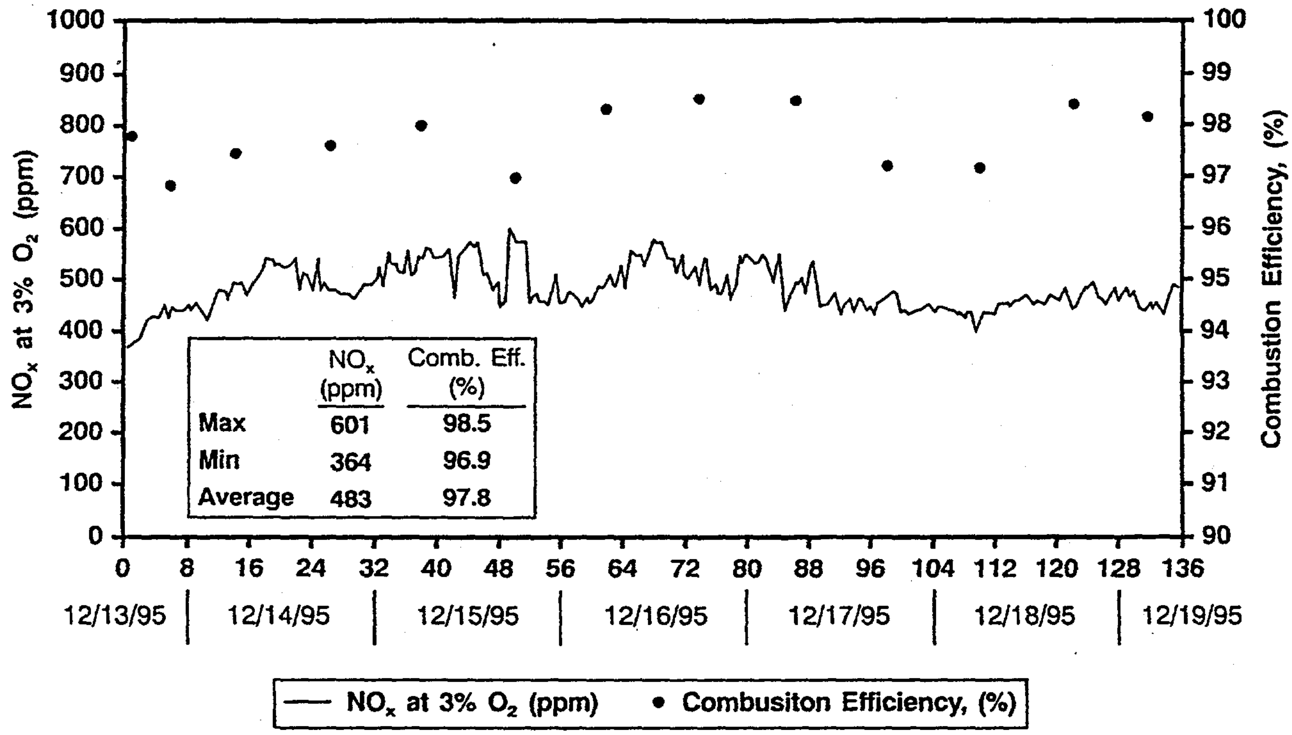


Figure 5-5 Combustion Efficiency and NOx During the 136 hr Continuous Test on Kentucky Coal (12/13/95 to 12/19/95)

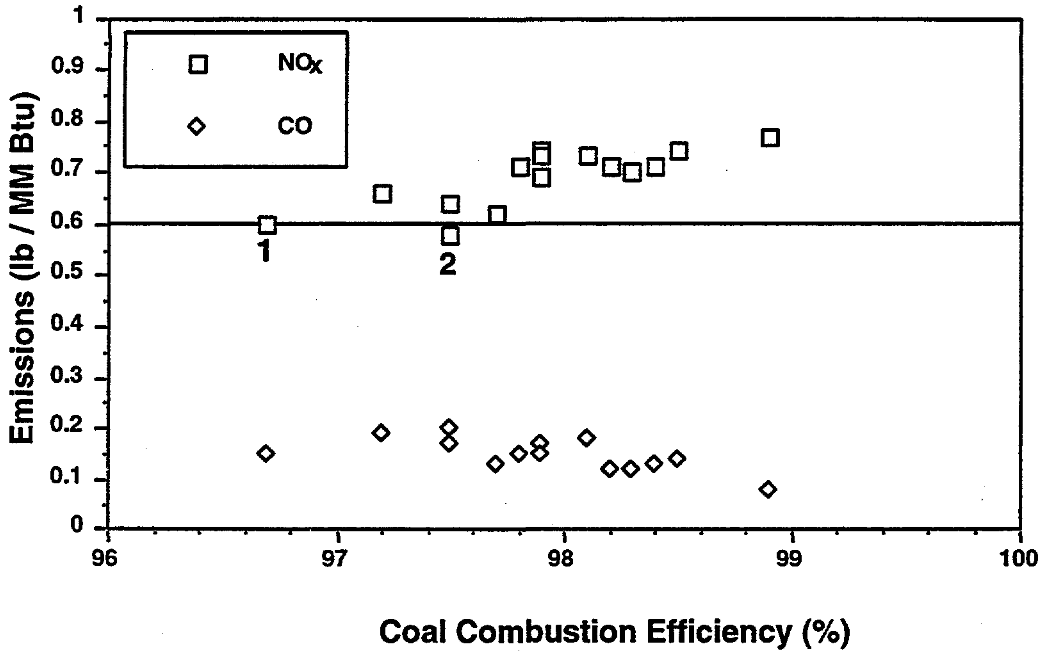
Figure 5-6 shows the relationship between NO_X and CO emissions and coal combustion efficiency for the steady-state averages listed in Table C-1. NO_X and CO emissions varied from 0.58 to 0.77 and from 0.08 to 0.20 lb/MM Btu/h, respectively. In January testing, for the most part, CO emissions were slightly greater than the target of 0.1 lb/MM Btu. The NO_X emissions target of 0.6 lb/MM Btu was achieved for two test periods with coal combustion efficiencies up to 97.5% (only 0.5% lower than the 98% target). The two periods were on 01/12/96 and 01/13/96 which were days one and two of continuous operation. The outlet of the main coal storage hopper plugged causing the boiler to be shut down for approximately one hour on 01/12/96.

February 1996 Testing (Test #4)

The last test (# 4) was conducted from 02/12/96 to 02/19/96 with Kentucky coal. The test was conducted with 12 hrs on full load and 12 hrs at part load (~75%).

Plots of the coal combustion efficiency and NO_X and CO emissions as a function of time for each day of operation in February are contained in Appendix D as Figures D-57 through D-63. Flame observations recorded by the boiler operators are contained in Appendix F.

Figure 5-7 shows the relationship between NO_X and CO emissions and coal combustion efficiency for the steady-state averages listed in Table C-1. NO_X and CO emissions varied from 0.48 to 1.08 and from 0.12 to 0.69 lb/MM Btu/h, respectively. CO emissions tended to be greater than the target of 0.1 lb/MM Btu. The NO_X emissions target of 0.6 lb/MM Btu was achieved with coal combustion efficiencies up to 97.5%. The test periods where the target was met are listed in Figure 5-7 for cross-referencing with operational conditions in Table C-1. The NO_X target was met during the first two days of continuous operation after the boiler was shut down. The NO_X emissions target was met on 02/12/96 and 02/13/96 (days one and two of continuous operation), and on 02/18/96 and 02/19/96 (days one and two of continuous operation).

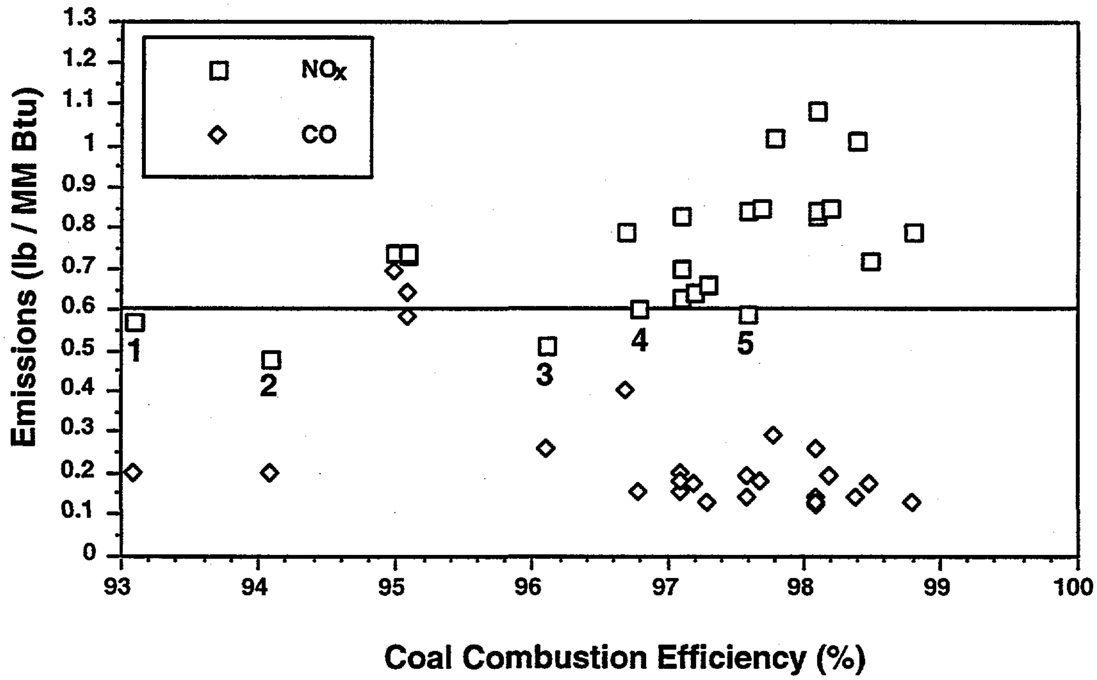


Test Periods Meeting Target of 0.6 lb NO_x / MM Btu

1 - 01/12/96; 1209-0001h; Continuous / Deposition Test #3

2 - 01/13/96; 0006-1233h; Continuous / Deposition Test #3

Figure 5-6 . RELATIONSHIP BETWEEN COAL COMBUSTION EFFICIENCY AND CO AND NO_x EMISSIONS FOR CONTINUOUS / DEPOSITION TEST #3 CONDUCTED DURING JANUARY 1996 WITH KENTUCKY COAL



Test Periods Meeting Target of 0.6 lb NO_x / 10^6 Btu

1 - 02/18/96; 2300-0130; 16.3 MM Btu/h; 100/100/28/0
2 - 02/19/96; 0200-0700; 15.2 MM Btu/h; 100/100/28/0
3 - 02/19/96; 0730-1630; 12.0 MM Btu/h; 100/100/28/0
4 - 02/12/96; 0530-1149; 15.3 MM Btu/h; 100/100/50/0
5 - 02/13/96; 0830-1630; 12.0 MM Btu/h; 100/100/50/0

Figure 5-7. RELATIONSHIP BETWEEN COAL COMBUSTION EFFICIENCY AND CO AND NO_x EMISSIONS FOR TESTING CONDUCTED IN FEBRUARY 1996. All test periods were from the Continuous / Deposition Test #4 except for periods 1, 2, and 3 which were from continuous operation.

Effect of Load and Excess Air on Combustion Performance and Emissions

The primary goal of the February Test #4 was to determine the effect of varying load on ash accumulation and deposition. A secondary goal was to determine the effect of load and excess air on combustion and emissions performance.

Table 5-5 lists selected results from the February testing and includes date and time for test periods, firing rate, oxygen concentration, coal combustion efficiency, NO_X and CO emissions, and damper settings. The February testing consisted of three periods of continuous operation which were further divided into periods of varying firing rate and oxygen concentration. It is important to note when the boiler was restarted after shutdowns because a trend of increasing coal combustion efficiency and NO_X emissions with length of continuous operation was observed.

For most of the February testing, the damper settings were 100/100/50/0, primary, secondary, tertiary and radial. The settings were changed near the end of the testing to 100/100/30/0 in order to shorten the flame. As the testing progressed, the flame length increased and was impinging on the back wall.

Effect of Load on Coal Combustion Efficiency and Emissions

The testing began on 02/12/96 with a firing rate of 15.2 MM Btu/h and 3.5% O_2 until 0800 hours on 03/13/96. The coal combustion efficiency, based on ash collected at the baghouse outlet, started at approximately 96%, increased to as high as 98% (see Figures D-57 and D-58), and averaged 97.1%. As shown in Figures D-57 and D-58, NO_X emissions, converted to 3% O_2, started at ~300 ppm and increased to ~500 ppm. The firing rate was then decreased to 12.0 MM Btu/h for eight hours while operating with 3.6% O_2. As can be seen in Figure D-58, the coal combustion efficiency remained at ~97% but the NO_X emissions decreased by ~100 ppm to 400 ppm. At 1630 hours on 02/13/96, the firing rate was increased to 15.7 MM Btu/h and the NO_X emissions increased by over 100 ppm to ~540 ppm. This firing rate, with 3.8% O_2, was maintained until 0830 hours on 02/14/96 with an average coal combustion efficiency of 98.1% (see Figure D-59). At 0830 hours, on 02/14/96, the firing rate was decreased to

Table 5-5. Selected Results from the February 1996 Testing

Date/Time	Firing Rate (MMBtu/h)	Oxygen Concentration (%)	Coal Combustion Efficiency (%)	NOx Emissions (ppm at test conditions)	NOx Emissions (lb/MMBtu)	CO Emissions (ppm at test conditions)	CO Emissions (lb/MMBtu)	Damper Settings
2/12 0530h to 2/13 0800h	15.2	3.5	97.1	422	0.63	166	0.15	100/100/50/0
2/13 0830 to 1630h	12.0	3.6	97.1	392	0.59	156	0.14	100/100/50/0
2/13 1700h to 2/14 0830h	15.7	3.8	98.1	541	0.84	140	0.13	100/100/50/0
2/14 0900 to 1630h	12.1	4.2	98.5	445	0.72	168	0.17	100/100/50/0
2/14 1700h to 2/15 0800h	15.7	3.7	97.6	548	0.84	208	0.19	100/100/50/0
2/15 0830 to 1630h	12.1	5.3	98.4	543	1.01	124	0.14	100/100/50/0
2/15 1700 to 2230h	15.6	3.8	97.7	545	0.85	192	0.18	100/100/50/0
Boiler shut down due to problem with Redler conveyor								
2/16 0430 to 0830h	15.6	3.9	97.1	445	0.70	187	0.18	100/100/50/0
2/16 0900 to 1630h	12.0	5.3	98.8	430	0.79	113	0.13	100/100/50/0
2/16 1800h to 2/17 0730h	16.2	3.6	95.0	488	0.74	701	0.64	100/100/50/0
2/17 0900 to 2230h	12.1	5.0	97.8	570	1.02	268	0.29	100/100/28/0
Boiler shut down due to deposition								
2/19 0200 to 0700h	15.2	2.8	94.1	309	0.48	216	0.20	100/100/28/0
2/19 0730 to 1630	12.0	4.6	96.1	298	0.51	244	0.26	100/100/28/0
Boiler shut down because 1,000-hour milestone reached								

12.1 MM Btu/h and maintained until 1630 hours. The NO_x emissions again decreased by ~100 ppm and the coal combustion efficiency increased to 98.5% (see Figure D-59). The O_2 concentration was increased to 4.2% during this period in order to shorten the flame. At 1630 hours the firing rate was increased to 15.7 MM Btu/h and maintained at this level until 0800 hours on 02/15/96. The NO_x emissions increased back to ~550 ppm at 3.7% O_2 with 97.6% coal combustion efficiency (see Figure D-59 and D-60). At 0800 hours on 02/15/96, the firing rate was again decreased to 12.1 MM Btu/h. However, the O_2 concentration was increased to 5.3% in order to maintain a combustion air flow similar to that observed when firing at 15.7 MM Btu/h and 3.6% O_2. This resulted in shortening the flame so that it did not impinge on the back wall. When reducing the firing rate but not the combustion air flow (i.e., operating with a higher O_2 level), the NO_x emissions did not exhibit a decrease but rather maintained the same level that was observed at the higher firing rates (See Figure D-D0). This was also observed when reducing the firing rates on 02/16/96, 02/17/96, and 02/19/96 as shown on Figures D-61, D-62, and D-63, respectively.

In summary, these results indicate that there is a reduction in NO_x emissions when reducing the firing rate to 12.0 MM Btu/h. This reduction in NO_x emissions was observed along with an increase in coal combustion efficiency. After the first two days of operation, the coal combustion efficiency was higher by as much as 1-2% when firing at 12.0 MM Btu/h.

Effect of Excess Air on Coal Combustion Efficiency and Emissions

The effect of excess air on coal combustion efficiency and emissions was investigated in February. Table 5-6 segregates the test periods, from Table 5-5, by firing rate. Four firing rates varying from 12.0 to 16.3 MM Btu/h were used. Since coal combustion efficiency and NO_x emissions have been shown to be a function of time of continuous boiler operation, the period of operation (for which the data have been averaged) after boiler startup is listed in Table 5-5. The boiler was started up three times in February. The first startup was the beginning of the fourth continuous/ash deposition test. The second startup was after fixing the Redler conveyor.

Table 5-6. The Effect of Selected Operating Conditions on Combustion Performance and Emissions During the February 1996 Testing

Firing Rate (MBtu/h)	Test Point Number	Oxygen Conc. (%)	Coal Combustion Eff. (%)	NOx Emissions (ppm at test conditions)	NOx Emissions (lb/MBtu)	Test Period
12.0	1	3.6	97.1	392	0.59	27-35 hours after first startup
	2	4.2	98.5	445	0.72	52-60 hours after first startup
	3	5.3	98.4	543	1.01	75-83 hours after first startup
	4	5.3	98.8	430	0.79	5-13 hours after second startup
	5	5.0	97.8	570	1.02	28-42 hours after second startup (100/100/28/0)*
	6	4.6	96.1	298	0.51	8-16 hours after third startup (100/100/28/0)
15.2	7	3.5	97.1	422	0.63	0-27 hours after initial startup
	8	2.8	94.1	309	0.48	3-8 hours after third startup (100/100/28/0)
15.6	9	3.8	98.1	541	0.84	36-51 hours after first startup
	10	3.7	97.6	548	0.84	60-75 hours after first startup
	11	3.8	97.7	545	0.85	84-90 hours after first startup
	12	3.9	97.1	445	0.70	0-4 hours after second startup
16.3	13	3.6	95.0	488	0.74	14-27 hours after second startup
	14	4.9	93.1	325	0.57	0-2 hours after third startup (100/100/28/0)

* Damper settings were 100/100/50/0 unless otherwise noted.

Ash was observed to have sloughed from the convective pass entrance during the ~1.5 hour period of natural gas/micronized coal cofiring when bringing the boiler back on line after fixing Redler conveyer. This is important to note when interpreting the results in Table 5-6.

When looking at test periods 9 through 11 (15.6 MM Btu/h), the coal combustion efficiency and NO_x emissions were relatively constant when continuously operating from 36 to 90 hours at ~3.8% O_2. This indicates that the coal combustion efficiency and NO_x emissions level off and remain relatively constant after ~36 hours of operation. The results from the fourth test period at 15.6 MM Btu/h, test period 12, were at a similar O_2 level but were from the first four hours after the second startup. The coal combustion efficiency was similar to that observed from test periods 9 through 11; however, the NO_x emissions were lower. This indicates that there are system changes during the first few hours after startup and limited conclusions can be drawn from these time periods. This is further seen from test periods 13 and 14 (at 16.3 MM Btu/h) where test period 14 was at a higher O_2 level, but because it was within the first two hours of startup, the coal combustion efficiency and NO_x emissions were lower.

In summary, these results indicate that the coal combustion efficiency tends to plateau after about 36 hours of continuous operation and that there is an increase in NO_x emissions with increasing O_2 concentration after the 36-hour milestone but no effect on combustion efficiency.

5.4 Summary of Combustion and Emissions Performance Results

Overall performance of the RSFC burner was excellent and showed improvements in several areas when compared with the HEACC. During the short term (8 to 12 hr/day) operation 0.6 lbs/MBtu NOx, 0.1 lbs/MBtu CO and ~97% combustion efficiency can be achieved and maintained with the RSFC burner in the Penn State Boiler with the type of coals tested. However, with increased running time both NOx and combustion efficiencies generally increased. It would appear that the accumulation of ash deposits were responsible for this change in NOx and combustion efficiency with time. It seems reasonable to assume that increases in flame temperatures would occur as deposits increased and provided greater resistance to heat transfer to the waterwall tubes. Higher temperature would work in favor of increased combustion efficiency and towards higher thermal NOx. For example, during December's longest around-the-clock test NOx levels ranged from a low of 365 ppm and a high of 600 ppm with an average NOx value of about 480 ppm, somewhat over the target of 450 ppm. During the same period combustion efficiencies ranged from a low 96.9% to a high of 98.5% with an average value of about 97.8%, nearly marking the target of 98%, while keeping the same burner settings for the entire test duration.

The RSFC burner demonstrated its ability to adjust the flame shape which is an important feature when it is recognized that combustors come in all sizes and shapes. Normally, the longer flames produce lower NOx levels while shorter flames produce higher combustion efficiencies. Longer flames produce lower NOx because they occupy a longer residence time in the fuel rich core where fuel nitrogen has a greater opportunity to then be converted to molecular nitrogen. If the flames are too long and impinge the back wall (as in the case of the Penn State boiler) before combustion is completed, combustion efficiencies will suffer. Short flames tend to produce higher combustion efficiencies because they are more intense and they will not impinge the back wall before combustion is completed. The challenge is to find a happy balance between the two extremes where flame length is long enough to give the low NOx, but not so long that flame impingement causes a reduction in combustion efficiency or tube overheating. This was particularly challenging when burning coal in a small furnace designed for oil and natural gas where bulk residence times are only on the order of 0.7 seconds. As noted earlier, the combustion and emissions performance of the all three coals (Upper Freeport, Middle Kittanning and Kentucky) tested were similar.

6.0 Ash Deposition/Accumulation in the Boiler

6.1 Overview

Ash deposition and accumulation in the boiler were investigated through both cyclic (8-16 h/day) and continuous (24 h/day) boiler operation with the emphasis focused on ash management during continuous boiler operation. There were seven test periods in Task 5.0, with respect to the ash deposition/accumulation study, and they are listed in Table 6-1. Table 6-1 summarizes the type of operation, the quantity of coal fired during each test period, and the amount of ash removed from the boiler. Test periods 1 and 2 were primarily cyclic in nature and were conducted earlier during the series of short term (4 to 12 hrs) tests where the boiler was shut down and restarted keeping one or two shift operation. Test periods 3 (First Continuous Operation/Ash Deposition Test #1), 5 (Continuous Operation/Ash Deposition Test #2), 6 (Continuous Operation/Deposition Test #3), and 7 (Continuous Operation/Ash Deposition Test #3) were conducted specifically to investigate ash management during continuous around-the-clock boiler operation. Test period 4 was to be a long-term continuous boiler operation test but was shortened in length due to operational problems caused by equipment breakdown and weather-induced difficulties.

6.2 Cyclic Operation

Preliminary work on ash deposition and accumulation in the boiler system began with cyclic boiler operation Test periods 1 and 2. They included, primarily, monitoring sootblowing frequency and the quantity of ash retained in the boiler after consuming a known quantity of coal.

Typically the boiler outlet and baghouse inlet temperatures are monitored and the convective pass steam sootblower operated when the boiler outlet temperature reaches 600 °F. When the boiler outlet reaches 600 °F the baghouse inlet temperature approaches 400 °F. For safe baghouse operation 400 °F was set as an upper limit for the Penn State boiler.

Table 6-1. Comparison of Ash Accumulation for the RSFC Burner Tests Conducted from August 1995 to February 1996

Test Period	Dates of Operation	Coal	Type of Operation	Hours of Coal Operation	Total Quantity of Coal Fired (tons)	Total Quantity of Ash Introduced into Boiler (lb)	Quantity of Ash Removed From Furnace (lb)	Quantity of Ash Removed From Breach. (lb)	Total Quantity of Ash Removed From Boiler (lb)	Percent of Ash Retained in Boiler System
1	8/21/95 to 9/8/95	Middle Kittanning (MK)	Cyclic (Short-term)	84.5	48.7	4,008	212.0	123.0	335.0	8.4
2	10/6/95 to 10/25/95	Middle Kittanning	Cyclic (Short-term)	149.4	88.1	6,804	650.8	150.0	800.8	11.8
3	10/30/95 to 11/6/95	Middle Kittanning	Continuous from 10/30 to 11/1 and from 11/1 to 11/6/95	157 total; 112 from 11/1 to 11/6	90.1	6,806	914.5	110.5	1,025.0	15.1
4	11/13/95 to 11/17/95	Middle Kittanning	Continuous from 11/13 to 11/14 and from 11/15 to 11/17/95	70.4	40.4	2,961	275.2	110.5	385.7	13.0
5	11/21/95 to 12/19/95	MK/Upper Freeport/ Kentucky 11/21 to 11/30); Kentucky (12/13 to 12/19)	Cyclic from 11/21 to 11/30 and continuous from 12/13 to 12/19/95	162.0 total; 25.1 from 11/21 to 11/30 and 136.9 from 12/13 to 12/19	93.7	6,215	780.0	215.0	995.0	16.0
6	1/8/96 to 1/16/96	Kentucky	Continuous (4 segments)	176.0 total; (26.5/7.0/ 47.0/95.5)	102.2	5,121	858.0	82.0	940.0	18.4
7	1/22/96 to 2/19/96	Kentucky	Cyclic from 1/22 to 2/8 and continuous from 2/12 to 2/17 (2 seg.)	157.4 total; 23.8 from 1/22 to 1/8 and 133.8 from 2/12 to 2/17 (90.8/42.8)	86.9	4,007	381.5	97.6	479.1	12.0

The sootblowing frequency when firing the Middle Kittanning seam coal on a cyclic basis (Test periods 1 and 2) was similar to that when firing Brookville seam, Kentucky, and Upper Freeport seam coals during previous testing (Miller et al., 1994; Miller et al., 1995). Approximately 3,000 to 10,000 lb of Middle Kittanning seam coal was fired between sootblowing events.

On, August 14, 1995 (Middle Kittanning coal) the boiler and connecting breaching between the boiler and heat-pipe heat exchanger were cleaned after some initial testing with the RSFC burner. Then, after operating through September 7, 1995 the boiler and breaching were cleaned again and 212 and 123 lb of ash were removed from the boiler and breaching, respectively. Approximately 97,500 lb of Middle Kittanning coal was fired, and using an average value of 4.25% ash, approximately 4,150 lb of ash were introduced into the boiler. This translates into 8% of the ash being retained in the boiler system during two-shift per day operation.

Likewise, the boiler was cleaned on October 26, 1995 after firing 176,100 lb of the same coal and 800 lb of ash were removed from the boiler system. During this test period 12% of the ash was retained in the boiler system.

During the cyclic operation, ash accumulation and deposition were not a problem in that they did not cause a forced shutdown. It is obvious that if long term operation is desired, without shut down periods, then equipment must be installed to remove ash deposits and remove ash from the boiler.

6.3 Continuous Operation/Ash Management

Past continuous operation (during testing in November and December 1994) has resulted in 20 to 25% of the ash introduced into the boiler being retained (Miller et al., 1995) and has forced the boiler to be shut down due to plugging of convective pass entrance. Ash deposition and accumulation during continuous boiler operation were investigated during Task 5.0 and the results are presented in this section. For comparison, the summary of the November and December 1994 deposition testing is contained in Appendix G.

During previous boiler operation, it was observed that ash shedding in the furnace occurred when operating in a cyclic nature (12 or 16h/day) due to the thermal shock of shutting the boiler down (During cyclic operation, the boiler is shut down in the evening, and is brought on line firing natural gas). Transition to coal occurs after the boiler firing rate reaches 16 MM Btu/h. As the coal feed rate is increased to the desired firing rate, the natural gas firing rate is decreased while maintaining a total firing rate of 16 MM Btu/h. After the coal firing rate reaches 12 MM Btu/h, the natural gas is turned off.). Continuous testing was conducted to evaluate ash cleanability from the tubes, and ash removability from the furnace and transport to the baghouse.

6.3.1 Continuous Operation/Deposition Test #1 (November 1995)

The first of four tests was conducted from Monday, October 30, 1995 (midnight Sunday night) to mid-day November 6, 1995 (12:30 PM) to investigate the nature of ash deposition during continuous boiler operation (24 h/day) when firing Middle Kittanning seam coal at 15.6 MM Btu/h. A summary of the results of the deposition test is contained in Appendix H (Table H-1). Table H-1 lists the date, time (military clock), total coal fired on each day, cumulative coal usage on each day, cumulative coal usage since the boiler was cleaned, boiler outlet pressure, induced draft (ID) fan amperage, convective pass temperature, boiler outlet temperature, steam production, and soot blowing events. The boiler and breaching (ductwork connecting the boiler to the combustion air preheater) were cleaned prior to the test to ensure that the deposition test would be conducted in a clean boiler.

Coal Consumption and Ash Deposition/Accumulation

Cumulative coal usage is tabulated in Table H-1 because it was found during the 1994 testing that the length of boiler operation before forced shutdown was a function of total coal fired, more specifically a function of the quantity and quality of the inorganic material introduced into the boiler. For example, in November and December 1994, the boiler was shut down after 33 and 59 hours of operation, respectively, because the convective pass entrance was nearly plugged. At firing rates of 16 and 13 MM Btu/h, this was equivalent to approximately 40,000 and 53,000 lb of coal, respectively. The ash content of the coal was 6.50 and 6.29% for the November and December testing, respectively. In November, 1,035 lb of ash, from a total 3,979 lb introduced into the boiler, was removed from the furnace and breaching (26.0% of the ash was retained in the system). Similarly, in December, 915 lb of ash, from a total 4,693 lb introduced into the boiler, was removed from the boiler system (19.5% of the ash was retained in the system). The ash removed from the boiler system after both tests was a combination of ash deposition (from the tubes) and accumulation (from the hearth and breaching).

Prior to beginning the recent series of tests in this project, the steam sootblower in the convective pass of the boiler was replaced with one that ran the entire length of the convective section. The sootblower commonly provided with the package boiler is shorter and does not clean the tubes at the convective pass entrance. The new sootblower extends to the entrance and more effectively removed deposits from the tubes at the entrance compared to earlier experience without it. The total hours accumulated firing coal during the deposition test was 157 of which the last 112 were continuous. The continuous hours were accumulated from November 1 to 6, 1995. During this test boiler was shut down twice for minor mechanical repairs on the baghouse screw feeder. The deposition test was terminated on November 6 because ash was observed in the stack. Subsequently, it was found that six of the 196 bags in the baghouse had failed and had to be replaced.

Upon conclusion of the continuous ash deposition test, the boiler system was cleaned and 914.5 and 110.5 lb of ash were removed from the furnace and breaching, respectively. The ash content of the coal varied from 3.52 to 4.02% over the eight days of testing. Approximately 6,800 lb of ash were introduced into the boiler when firing 180,200 lb of Middle Kittanning coal, resulting in 15.1% of the ash being retained in the boiler.

When the boiler was cleaned after the continuous deposition test, the ash was 1.5 feet deep in the center of the boiler and over two feet deep in some places along the walls. The ash was 'crusty' throughout the boiler and was 'crustier' than that removed on October 26, 1995 (for operation from October 6 to October 25) with the same coal type.

Boiler Outlet Pressure and ID Fan Amperage

The parameters listed in Table H-1 such as boiler outlet pressure and ID fan amperage were good indicators for shutting the boiler down due to excessive deposition at the convective pass entrance. The boiler outlet pressure is typically -0.6 to -0.8 " W.C. (water column). As the convective pass plugs, as observed during the November and December 1994 tests, the boiler outlet pressure slowly becomes more negative until a critical point is reached and the gauge drops from -1.3" W.C. to off-scale (-2.0" W.C.) in approximately 8 hours. Similarly, the ID fan amperage was 30 when firing at 16 MM Btu/h and steadily increased from 30 amps to nearly 33 while still firing at 16 MM Btu/h. The amperage was 28 to 29 when operating at the lower firing rate of 13 MM Btu/h because of the smaller volume of gas being handled. The increase in ID fan amperage, with time, at the lower firing rate was less noticeable.

The boiler outlet pressure and ID fan amperage are plotted as a function of cumulative coal fired for the recent deposition test in Figures 6-1 and 6-2, respectively. The boiler outlet pressure remained very steady over the test, except for the period from 3,800 to 5,000 lb of cumulative coal fired, where the furnace pressure sensor line was plugged with ash. This caused ID fan damper to 'hunt' for a setting which resulted in variations in the boiler outlet pressure and the ID fan amperage. The boiler outlet pressure started at -0.8 "W.C. and was approximately -1.1 "W.C. after 157 hours of operation. The ID fan amperage remained fairly constant at 30 amps.

Boiler Outlet and Convective Section Temperatures

The boiler outlet temperature is typically maintained at 600 °F or less. When the boiler outlet temperature approaches 600 °F, this corresponds to a baghouse inlet temperature of 400 °F, which is the maximum temperature for safe baghouse operation. Figure 6-3 is a plot of the boiler outlet temperature as a function of cumulative coal consumption and shows that the boiler outlet temperature was being maintained. After sootblowing, the boiler outlet temperature was consistently back to 560 to 570 °F.

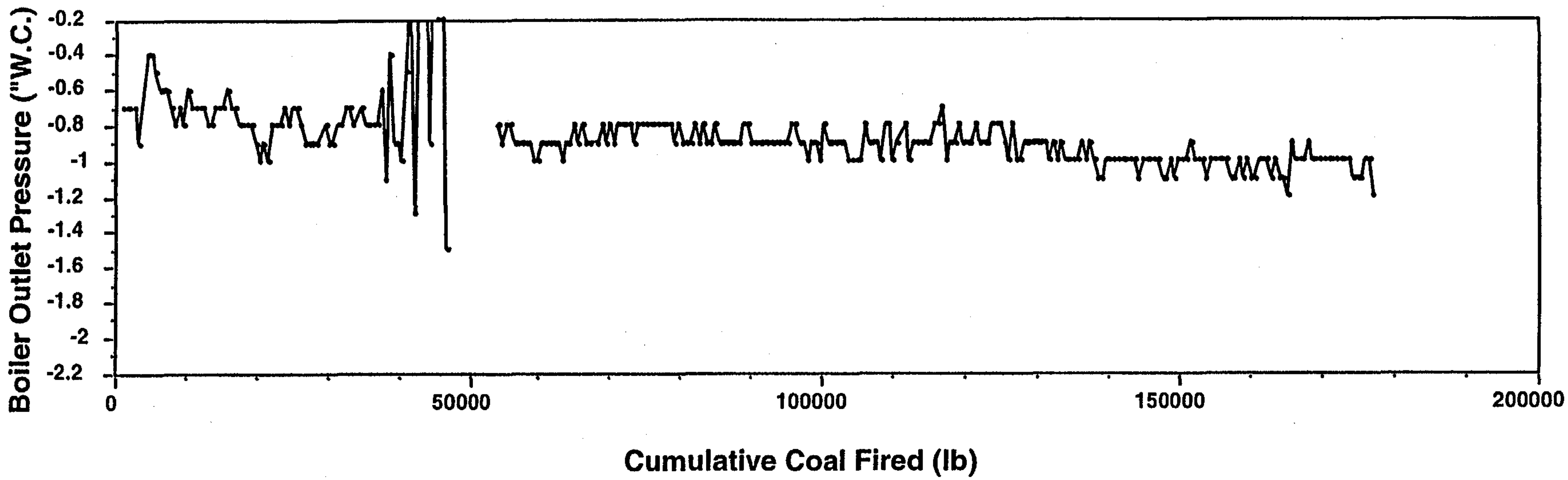


Figure 6-1 BOILER OUTLET PRESSURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING SEAM COAL AT 15.6 MILLION Btu/h

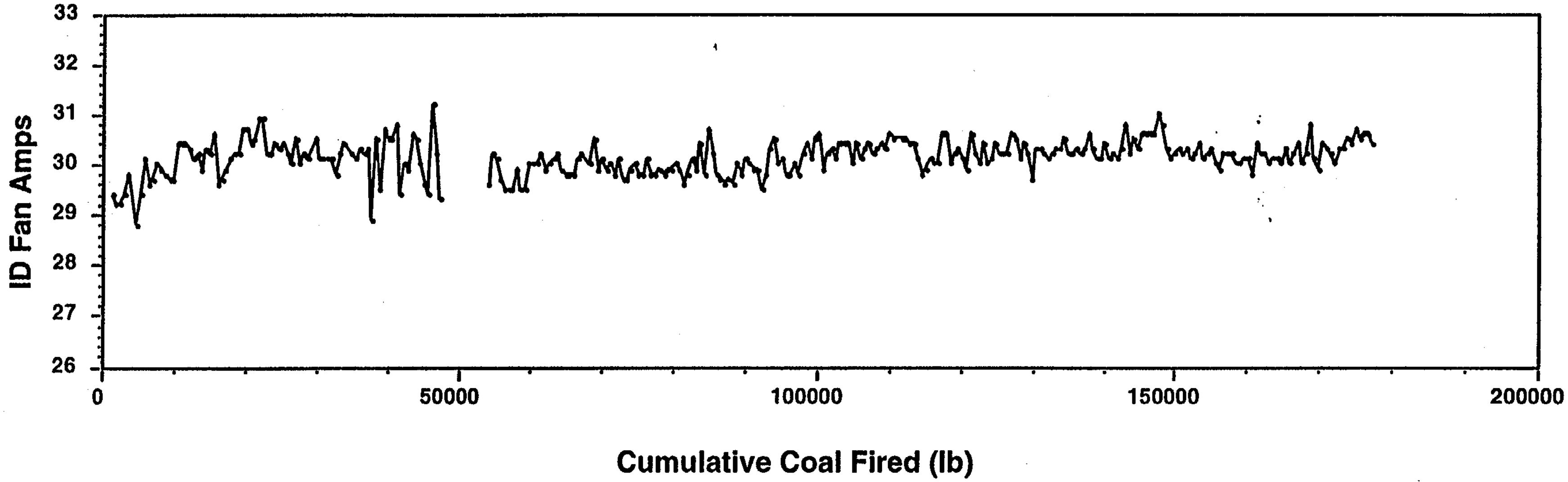


Figure 6-2 ID FAN AMPERAGE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING SEAM COAL AT 15.6 MILLION Btu/h

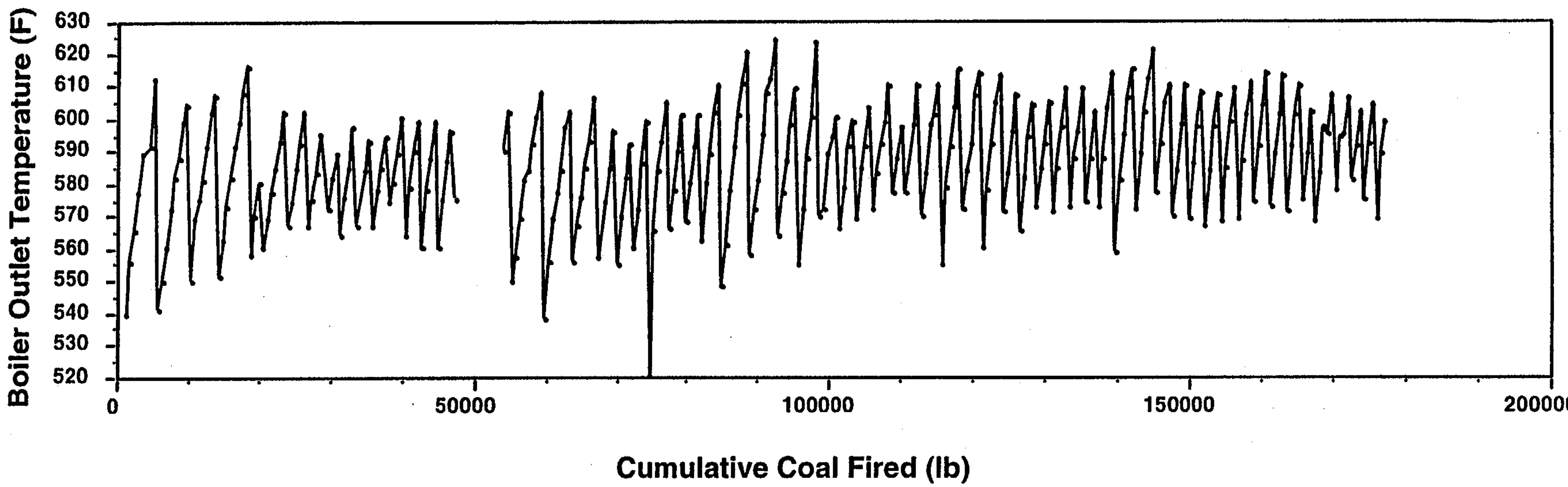


Figure 6-3. BOILER OUTLET TEMPERATURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING SEAM COAL AT 15.6 MILLION Btu/h

The convective pass temperature however, noticeably increased with time for the duration of the test as shown in Figure 6-4. The temperature, which is measured about two feet into the eight foot long convective pass, started at 950 °F and was in the range of 1300 °F when the test was terminated. Total temperature recovery was not achieved after each sootblowing event. The increase in convective pass temperature was due to the ash deposition on the walls in the furnace.

Steam Production Rate

Total steam production rate remained relatively constant at 12,000 lb steam/h as shown in Figure 6-5.

Soot Blowing Frequency

Sootblowing was initiated when the boiler outlet temperature reached 600°F. Sootblowing consists of operating the steam sootblower in the convective pass, the two compressed air-operated sootblowers in the combustion air preheater, and floor air sparge system. Figure 6-6 is a chart showing the elapsed time between sootblows. There were 65 sootblows in a 157 hour test period. The time between events ranged from 4.5 to 1.5 hours. Typically, the time between sootblows was 4 to 4.5 hours after the boiler was started up and decreased to 2 hours as the test progressed.

Observations

Deposition on the boiler walls was observed during the continuous test. Most of the ash sloughed off the walls onto the floor, except from the refractory (rear and front wall, and side wall sight ports) and/or the flame impinged on the walls (midpoint on the side wall and on the back wall).

Regarding the issue of cleanability, the ash that was collected from the furnace appeared to be lightly sintered, but did not appear to have undergone a major degree of melting (slag). The deposits sloughed off the walls during testing and were blown off the wall when an air-cooled camera was inserted into a sight port. The camera seemed to behave like a miniature sootblower.

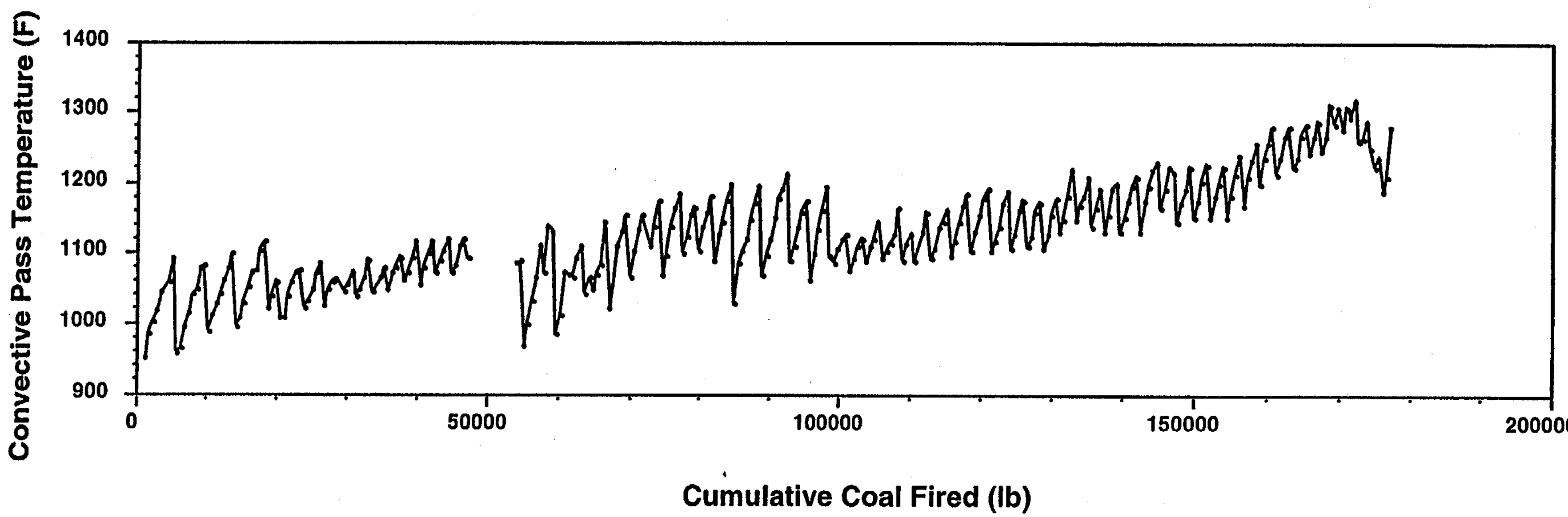


Figure 6-4. CONVECTIVE PASS TEMPERATURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING SEAM COAL AT 15.6 MILLION Btu/h

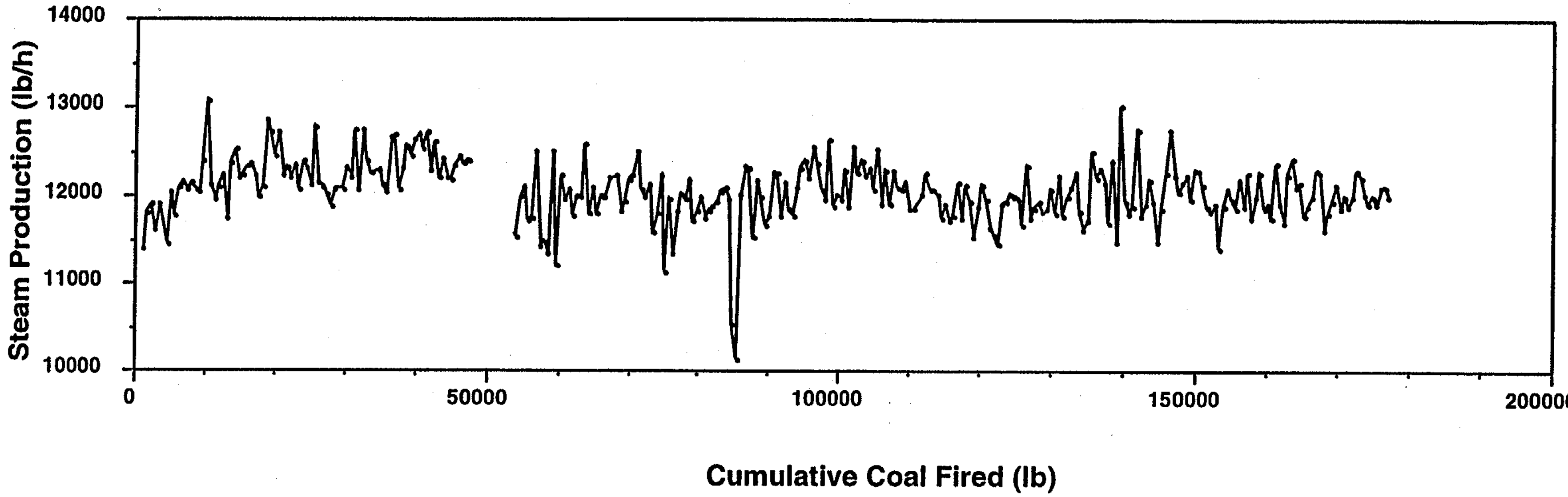


Figure 6-5. STEAM PRODUCTION AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING SEAM COAL AT 15.6 MILLION Btu/h

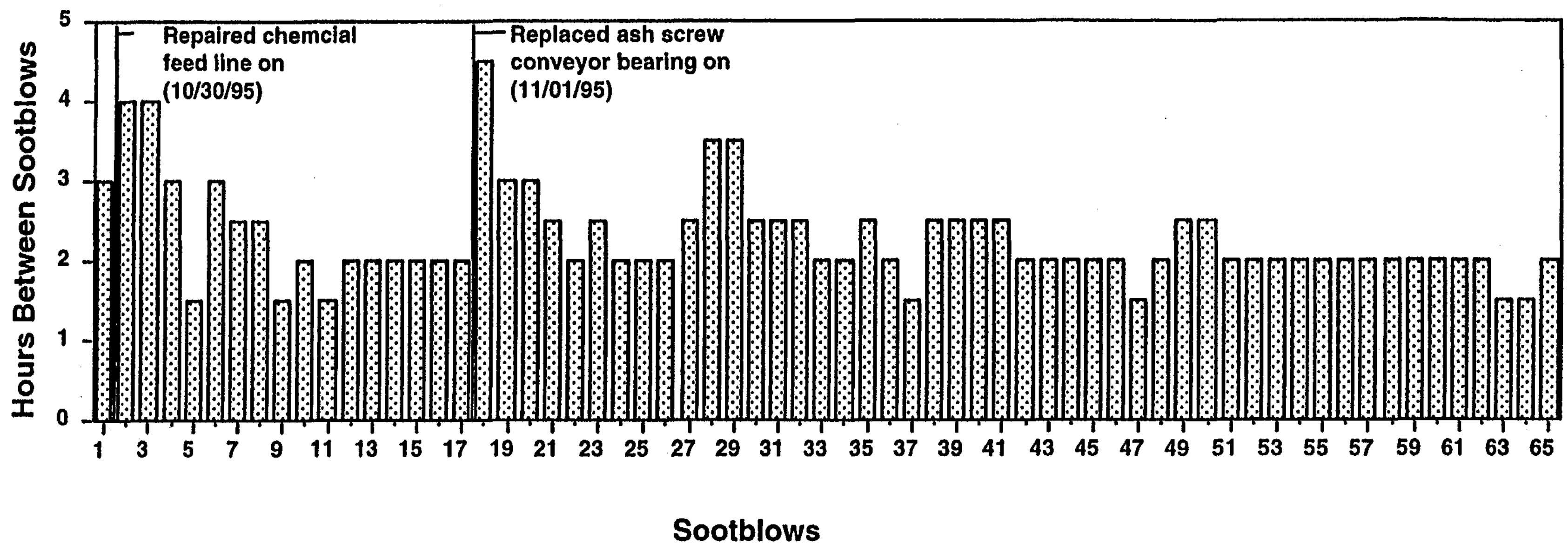


Figure 6-6. HOURS BETWEEN SOOTBLOWS FOR THE DEPOSITION TEST CONDUCTED FROM 10/30/95 TO 11/06/95 WHEN FIRING MIDDLE KITTANNING SEAM COAL AT A FIRING RATE OF 15.6 MILLION Btu/h

The issue of ash removability from the furnace is more complex. The size of the sloughed deposits is such that they cannot be reentrained. It appears that at some point the floor sparge system is covered with settled material or sloughed deposits and becomes ineffective.

6.3.2 Continuous Operation/Deposition Test #2 (December 1995)

The second of four continuous operation/deposition tests was conducted from December 13, 1995 to December 19, 1995 to investigate the ash deposition/accumulation. A summary of the results is contained in Appendix H (Table H-2) which lists coal usage, operational conditions, and soot blowing events. Table H-2 contains results from testing from November 21, 1995, the first day of testing after the boiler was cleaned on November 20, 1995, through December 19, 1995.

The coals tested over this time period included: 1) a mixture of Middle Kittanning (MK) seam and Upper Freeport (UF) seam coal; 2) a mixture of Middle Kittanning seam, Upper Freeport seam, and Kentucky coal; and 3) Kentucky (K) coal. The last truck load of Middle Kittanning seam coal had some Upper Freeport seam coal (which was in storage for Penn State beside the Middle Kittanning seam coal pile) mixed in with it. This coal was used from November 21 through November 29, 1995. The first delivery of Kentucky coal was delivered on November 30, 1995, and testing on this day was a mixture of the three coals. Kentucky coal was used for testing that started on December 13, 1995 and was used for the remainder of Task 5.

Coal Consumption and Ash Deposition/Accumulation

The total hours accumulated firing coal during this test period was 162 of which the last 137 were continuous. The continuous hours were accumulated from December 13 through December 19, 1995. The December deposition test was terminated because the convective pass entrance was nearly plugged.

Upon the conclusion of the continuous deposition test, the boiler was cleaned and 780.5 and 215.0 lb of ash were removed from the furnace and breaching, respectively. The ash content of the coal varied from 2.49 to 4.28% over the eleven days of testing. Approximately 6,215 lb of ash were introduced into the boiler when firing 186,000 lb of coal, resulting in 16.0% of the ash being retained in the boiler.

Boiler Outlet Pressure and ID Fan Amperage

The boiler outlet pressure and ID fan amperage are plotted as a function of cumulative coal fired for this period of testing in Figures 6-7 and 6-8, respectively. During the continuous operation test, the boiler outlet pressure started at -0.8 "W.C. and remained constant for approximately a day. The boiler outlet pressure then decreased from -0.8 to -0.9" W.C. and remained at -0.9" W.C. for several days. As the ash deposits accumulated at the convective pass entrance and started hindering gas flow, the boiler outlet pressure rapidly decreased to <-2.0" W.C. which is the gauge limit.

During the continuous operation/deposition test, the ID fan amperage started at 32 amps and slowly decreased with time to 31 amps at which time the amperage uncharacteristically decreased to 29.5 amps until the boiler shut down.

Boiler Outlet and Convective Section Temperatures

Figure 6-9 is a plot of the boiler outlet temperature as a function of cumulative coal fired and shows that the boiler outlet temperature was being maintained. After sootblowing, the temperature recovery was consistently back to 560 to 570°F.

The convective pass temperature however, increased with time for the duration of the continuous operation test as shown in Figure 6-10. The temperature started at 1,125°F and was in the range of 1,300°F when the test was terminated. Total temperature recovery was not achieved after each sootblowing event. The increase in convective pass temperature was due to ash deposition on the walls of the furnace.

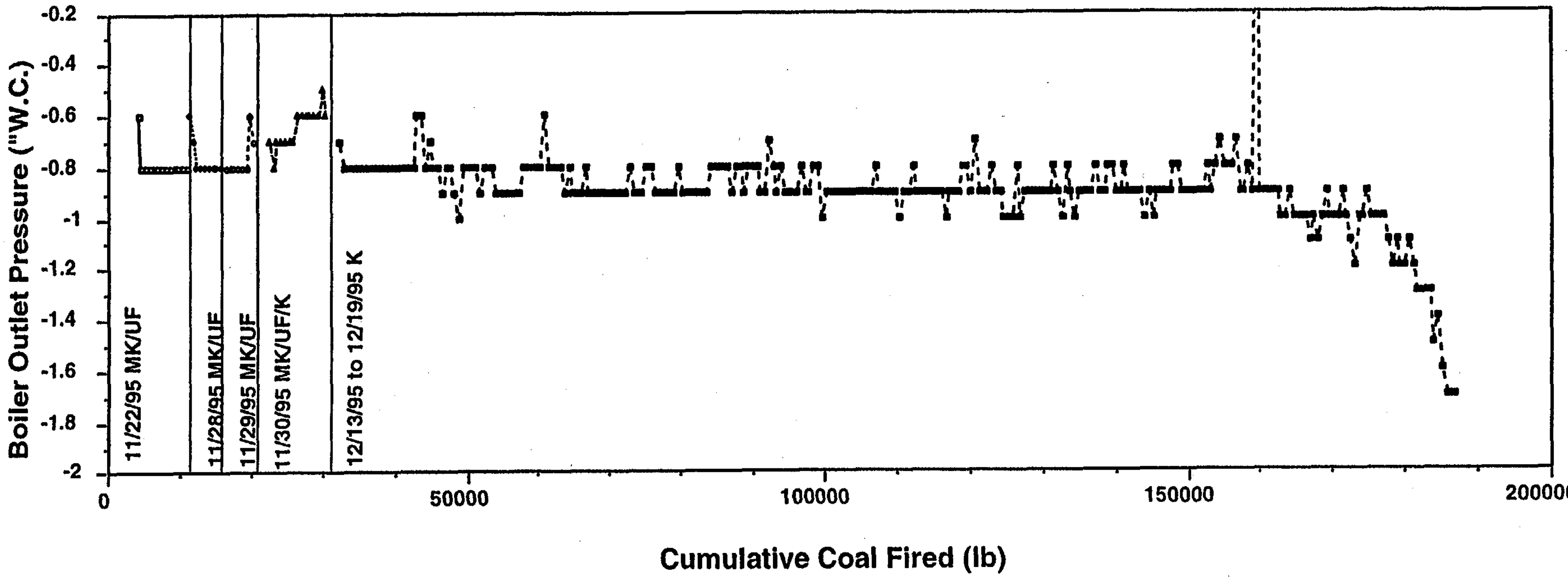


Figure 6-7. BOILER OUTLET PRESSURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING (MK) SEAM, UPPER FREEPORT (UF) SEAM, AND KENTUCKY (K), COAL AT 15.6 MILLION Btu/h FOR TESTING CONDUCTED AFTER CLEANING THE BOILER ON 11/20/95

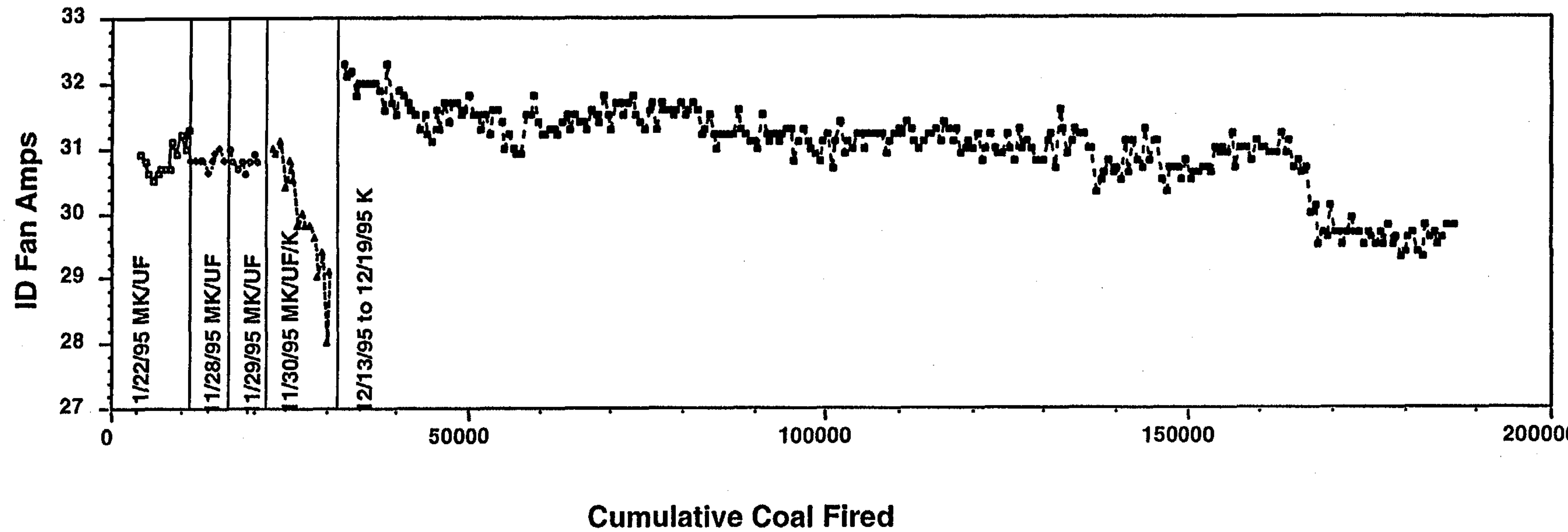


Figure 6-8. ID FAN AMPERAGE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING (MK) SEAM, UPPER FREEPORT (UF) SEAM, AND KENTUCKY (K) COAL AT 15.6 MILLION Btu/h FOR TESTING CONDUCTED AFTER CLEANING THE BOILER ON 11/20/95

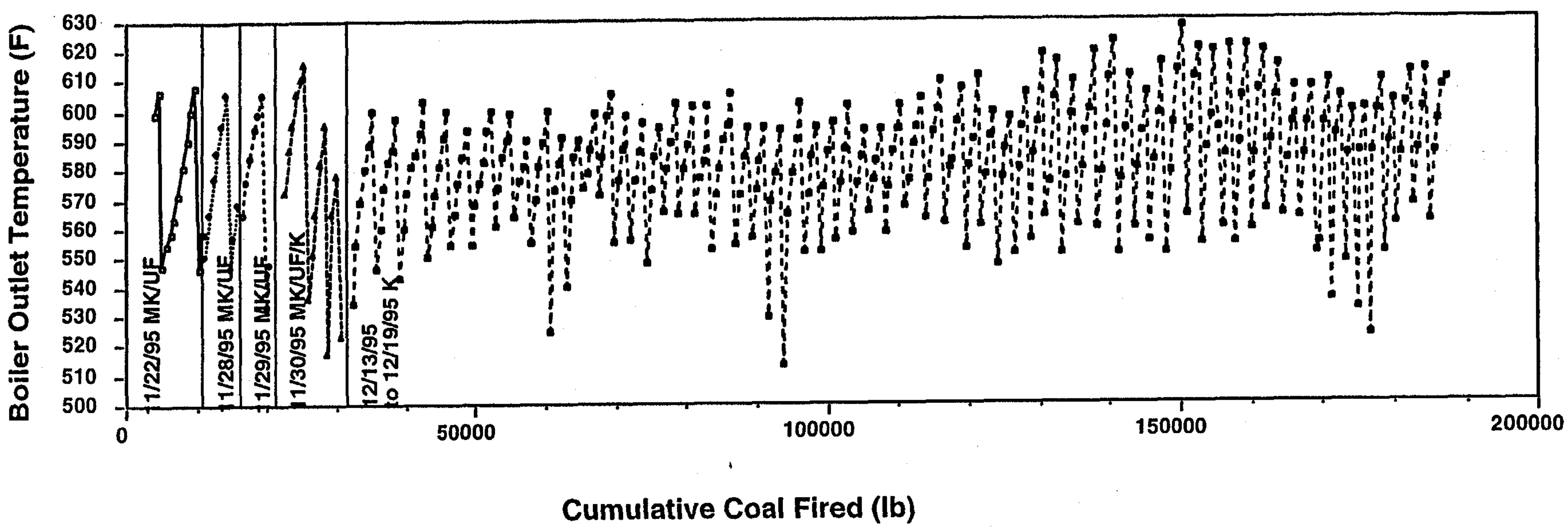


Figure 6-9. BOILER OUTLET TEMPERATURE AS A FUNCTION OF COAL FIRED WHEN FIRING MIDDLE KITTANNING (MK) SEAM, UPPER FREEPORT (UF) SEAM, AND KENTUCKY (K), COAL AT 15.6 MILLION Btu/h FOR TESTING CONDUCTED AFTER CLEANING THE BOILER ON 11/20/95

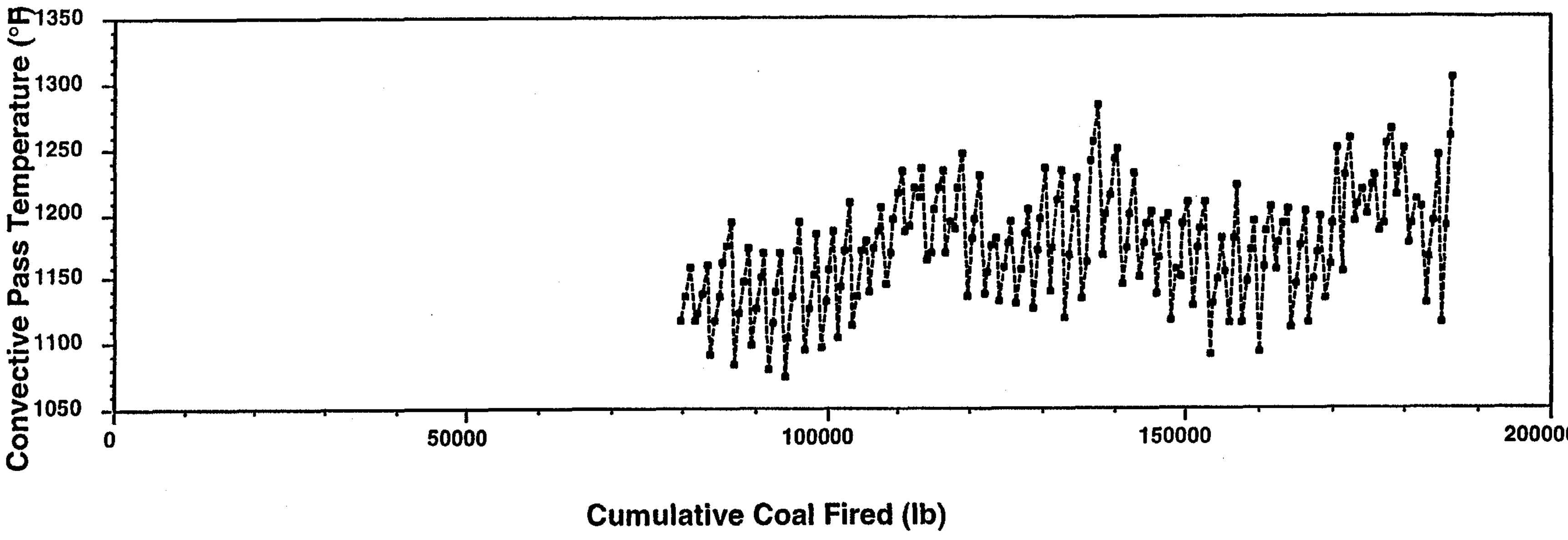


Figure 6-10. CONVECTIVE PASS TEMPERATURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AT 15.6 MILLION Btu/h FROM 12/13/95 TO 12/19/95

Steam Production Rate

During the continuous operation/deposition test, the total steam production rate increased from 12,500 to 13,500 lb/h over the first 32 hours then decreased to 12,500 lb/h and remained relatively constant at this rate until the end of the test as shown in Figure 6-11.

Soot Blowing Frequency

Figure 6-12 is a chart showing the elapsed time between sootblows. There were 68 sootblows in a 162 hour test period. The time between events ranged from 0.5 to 3.5 hours. Typically, the time between sootblows was 3 hours after the boiler was started up and decreased to 1.5 to 2.0 hours as the test progressed (for the continuous operation test).

Observations

Significant deposition on the boiler walls and convective pass entrance was observed during the continuous test. Much of the ash sloughed off the walls onto the floor, except from the convective pass entrance and areas with refractory.

6.3.3 Continuous Operation/Deposition Test #3 (January 1996)

The third of four continuous operation/deposition tests was conducted from January 8, to January 16, 1996 to investigate the ash deposition/accumulation when firing only Kentucky coal. A summary of the results is contained in Appendix H (Table H-3) which lists coal usage, operational conditions, and soot blowing events. Table H-3 contains testing results from January 8, 1996, the first day of testing after the boiler was cleaned on December 20, 1995, through January 16, 1996.

Coal Consumption and Ash Deposition/Accumulation

The total hours accumulated firing coal during this test period was 176; however the test period consisted of four segments of 26.5, 7.0, 47.0, and 95.5 hours.

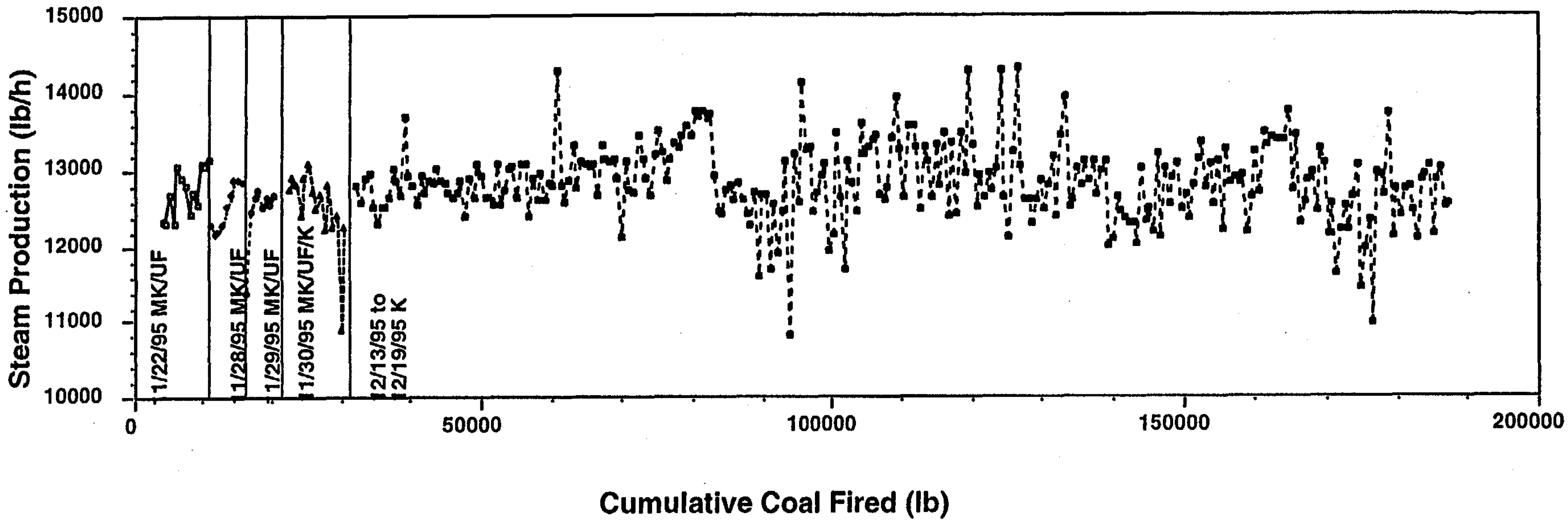


Figure 6-11. STEAM PRODUCTION AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING MIDDLE KITTANNING (MK) SEAM, UPPER FREEPORT (UF) SEAM, AND KENTUCKY (K) COAL AT 15.6 MILLION Btu/h FOR TESTING CONDUCTED AFTER CLEANING THE BOILER ON 11/20/95

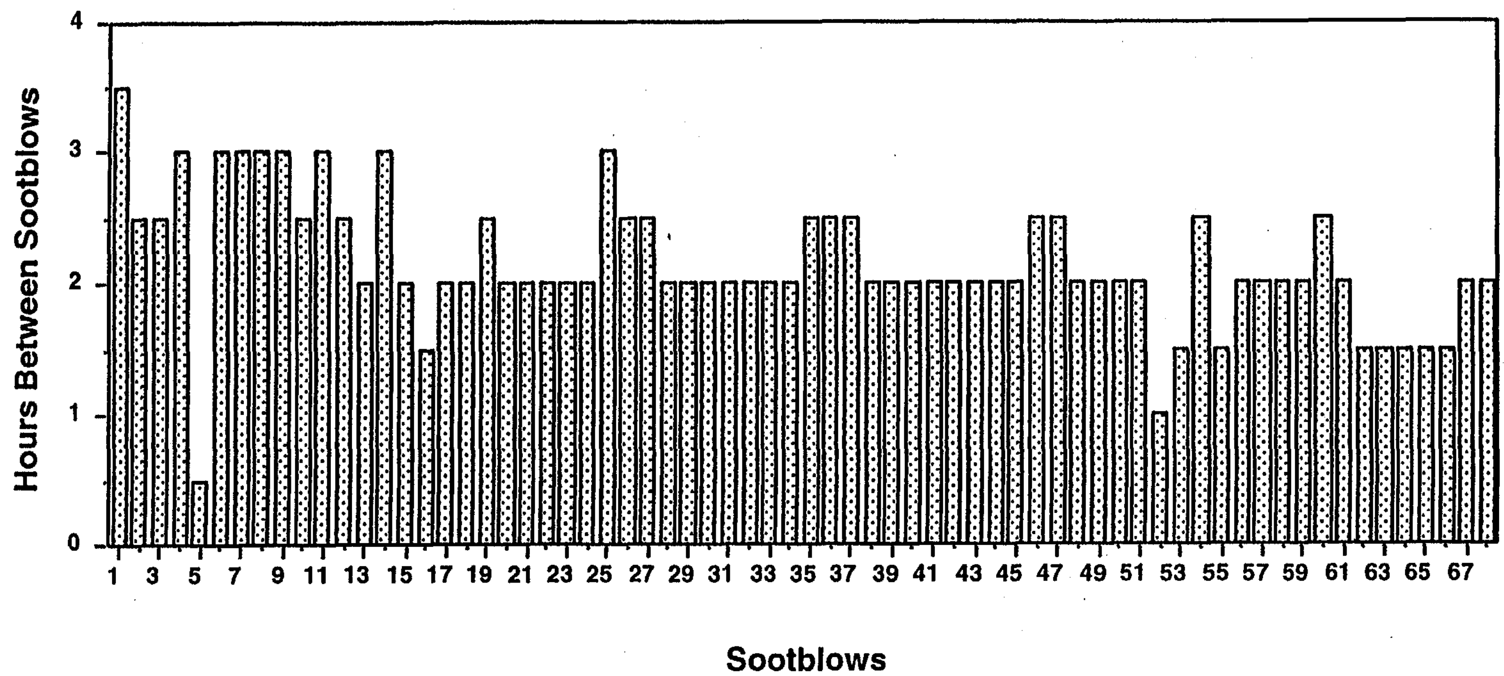


Figure 6-12. HOURS BETWEEN SOOTBLOWS WHEN FIRING MIDDLE KITTANNING SEAM, UPPER FREEPORT SEAM, AND KENTUCKY COAL AT 15.6 MILLION Btu/h

Sootblows 1 through 4 were conducted on 11/22/95, 11/28/95, 11/29/95, and 11/30/95, respectively. The remaining sootblows were conducted during the continuous / deposition test from 12/13/95 to 12/19/95

The boiler was shut down due to low feedwater pressure (after 26.5 hours of operation), running out of coal while awaiting a coal shipment (after 7.0 hours of additional operation), a loss in coal feed due to the cage mill plugging (after 47.0 hours of additional operation), and excessive ash deposition at the convective pass entrance and the formation of a hot spot on the boiler back wall (after 95.5 hours of additional operation).

Upon the conclusion of the testing, the boiler system was cleaned and 858.0 and 82.0 lb of ash were removed from the furnace and breaching, respectively. The ash content of the coal varied from 2.02 to 3.53% over the nine days of testing. Approximately 5,121 lb of ash were introduced into the boiler when firing 102.2 tons of coal, resulting in 18.4% of the ash being retained in the boiler system.

Boiler Outlet Pressure and ID Fan Amperage

The boiler outlet pressure and ID fan amperage are plotted as a function of cumulative coal fired for this period of testing in Figures 6-13 and 6-14, respectively. During the continuous operation test, the boiler outlet pressure started at -0.8 "W.C. and slowly decreased with time to -1.2" W.C. As the ash deposits at the convective pass entrance plugged more of the entrance and started hindering the gas flow, the boiler outlet pressure rapidly decreased until the gauge went off scale (-2.0" W.C.).During the continuous operation/deposition test, the ID fan amperage exhibited much fluctuation. It started at 30 amps, increased to 32.5 amps, slowly decreased to 31 amps, and then started increasing to 32 amps as deposition became more severe.

Boiler Outlet and Convective Section Temperatures

Figure 6-15 is a plot of the boiler outlet temperature as a function of cumulative coal fired and shows that the boiler outlet temperature was being maintained. After sootblowing, the temperature recovery was consistently back to 560 to 570°F.

The convective pass temperature however, increased with time for the duration of the continuous operation test as shown in Figure 6-16. The temperature started at 950°F and was in the range of 1350°F when the test was terminated.

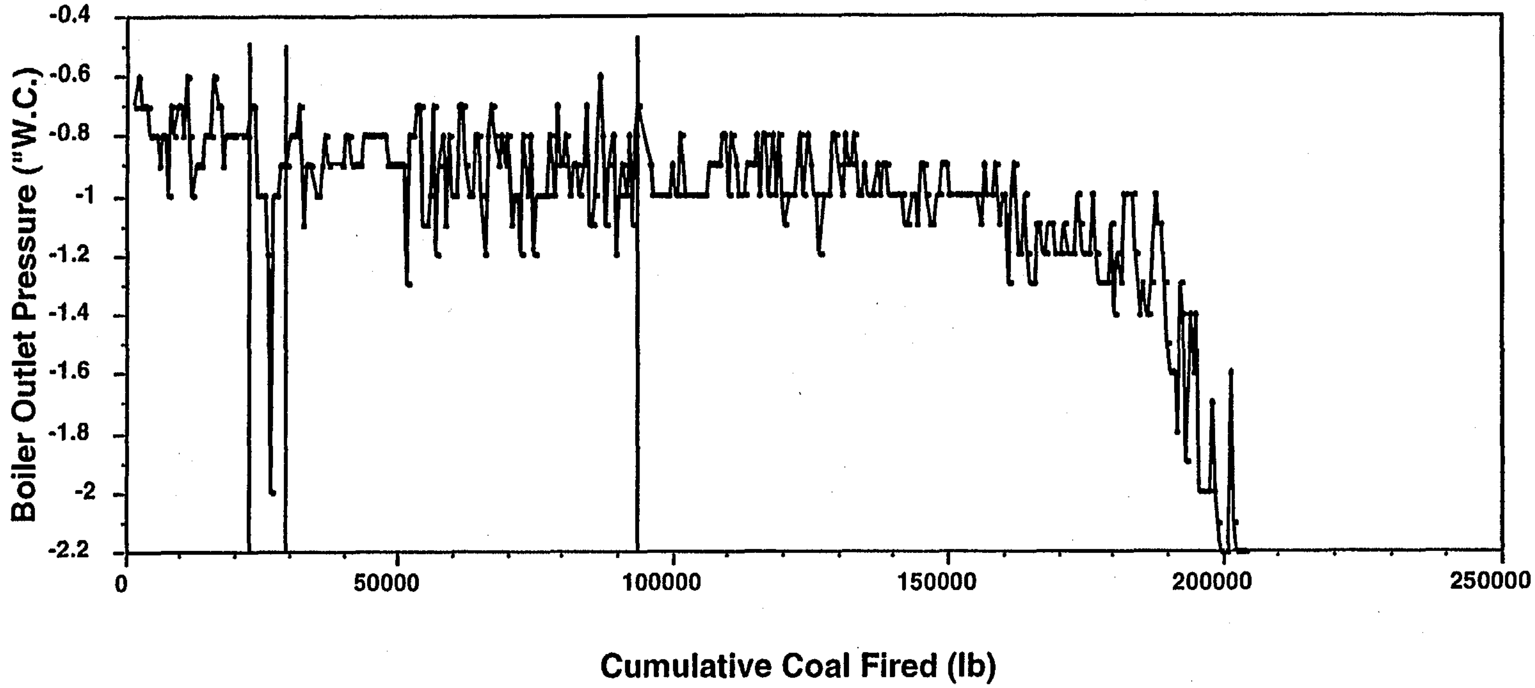


Figure 6-13. BOILER OUTLET PRESSURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AT 14.6 TO 15.6 MILLION Btu/h FOR TESTING CONDUCTED FROM JANUARY 8 TO 16, 1996.

Boiler was shut down at 30,000, 38,000, and 95,000 lb due to low feedwater pressure, no coal available, and main coal hopper plugging, respectively.

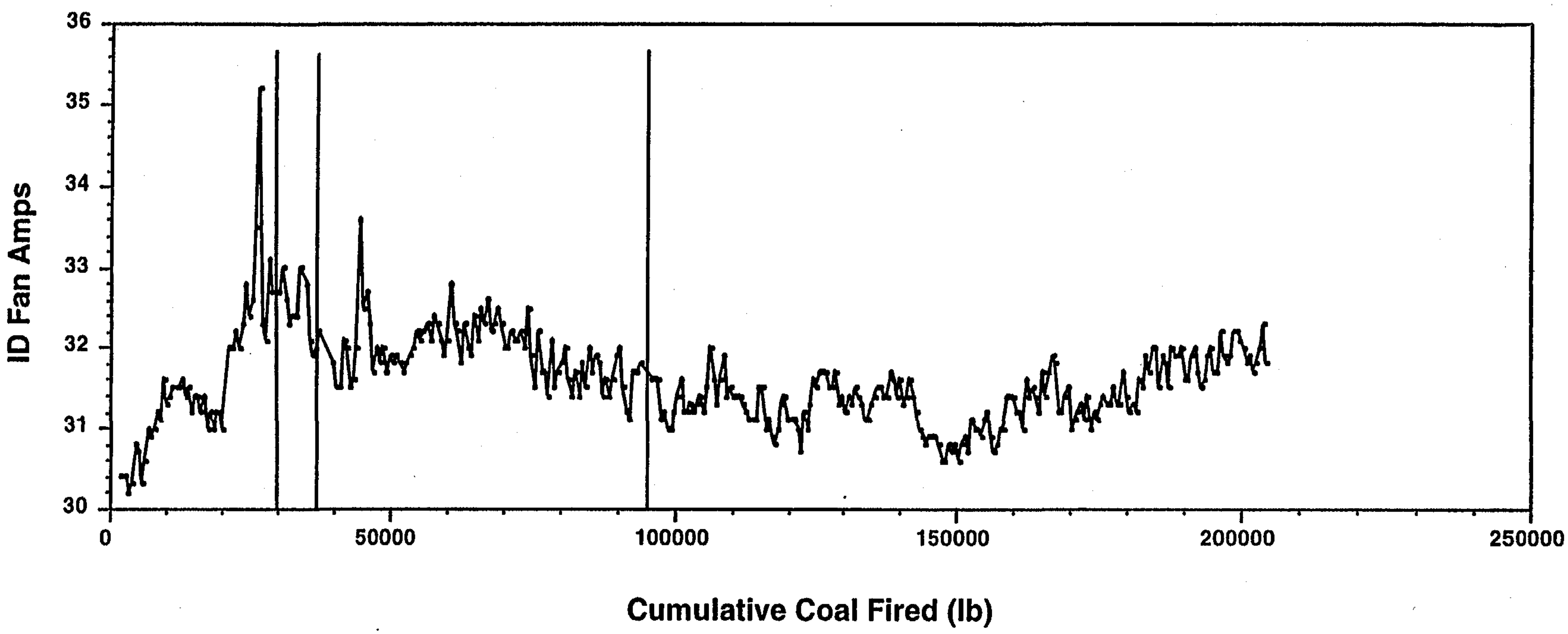


Figure 6-14. ID FAN AMPERAGE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AT 14.6 TO 15.6 MILLION Btu/h FOR TESTING CONDUCTED FROM JANUARY 8 TO 16, 1996.

Boiler was shut down at 30,000, 38,000, and 95,000 lb due to low feedwater pressure, no coal available, and main coal hopper plugging, respectively.

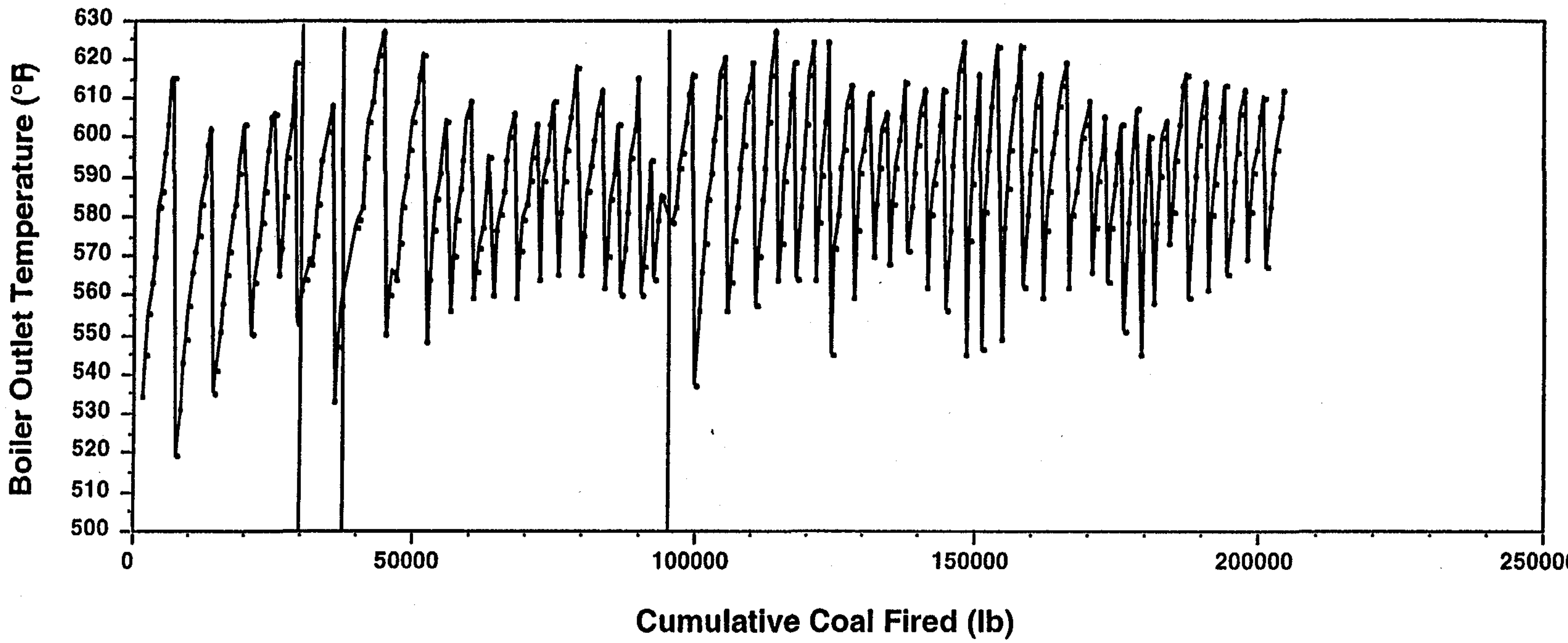


Figure 6-15. **BOILER OUTLET TEMPERATURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AT 14.6 TO 15.6 MILLION Btu/h FOR TESTING CONDUCTED FROM JANUARY 8 TO 16, 1996.**

Boiler was shut down at 30,000, 38,000, and 95,000 lb due to low feedwater pressure, no coal available, and main coal hopper plugging, respectively.

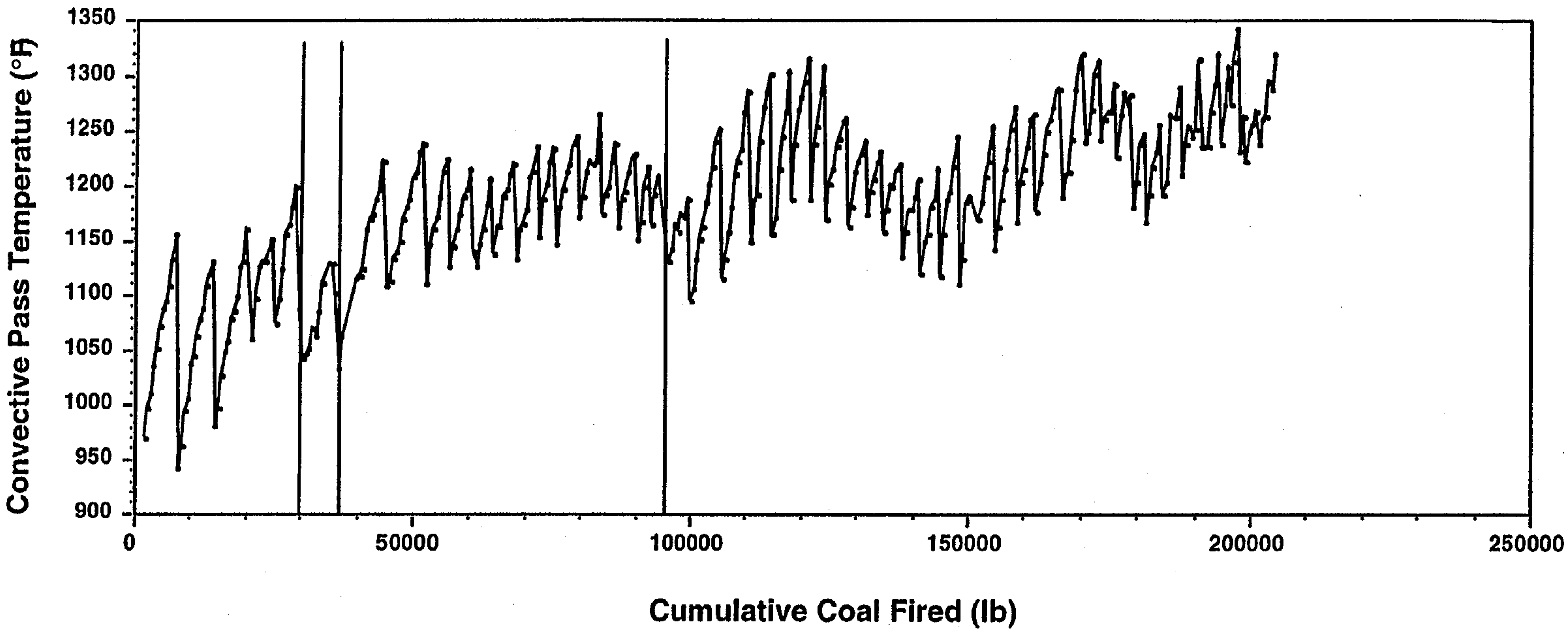


Figure 6-16. CONVECTIVE PASS TEMPERATURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AT 14.6 TO 15.6 MILLION Btu/h FOR TESTING CONDUCTED FROM JANUARY 8 TO 16, 1996.

Boiler was shut down at 30,000, 38,000, and 95,000 lb due to low feedwater pressure, no coal available, and main coal hopper plugging, respectively.

Total temperature recovery was not achieved after each sootblowing event. The increase in convective pass temperature was due to the ash deposition on the walls in the furnace.

Steam Production Rate

The steam production was not reported for this test period because the valve that regulates the back pressure (steam drum pressure) was not operating properly and the drum pressure decreased from 205 to 130 psig resulting in an increase in steam flow in excess of 15,000 lb/h.

Soot Blowing Frequency

Figure 6-17 is a chart showing the elapsed time between sootblows. There were 48 sootblows in a 176 hour test period. The time between events ranged from 2 to 7 hours. Typically, the time between sootblows was 4.5 to 7.0 hours after the boiler was started up and decreased to 2 to 3 hours as the testing progressed (for the continuous operation test).

Observations

Significant deposition on the boiler walls and convective pass entrance was observed. Ash sloughing from the walls was observed whenever the boiler was shutdown. Normally, the boiler operation becomes erratic when the boiler outlet pressure reaches <-2.0 " W.C. (off scale). However, this was not observed and boiler operation continued for about six hours. Since temperatures and ID fan amperage were similar to previous testing and the boiler operation did not appear to be affected by the deposition, a decision was made to continue operating the boiler. However, when a hot spot was observed forming on back wall (discoloration of the paint on the boiler skin), the boiler was shut down.

6.3.4 Continuous Operation/Deposition Test #4 (February 1996)

The final continuous operation/deposition tests was conducted from February 12 to February 17, 1996 to investigate the ash deposition/accumulation when firing Kentucky coal. A summary of the results is contained in Appendix H (Table H-4)

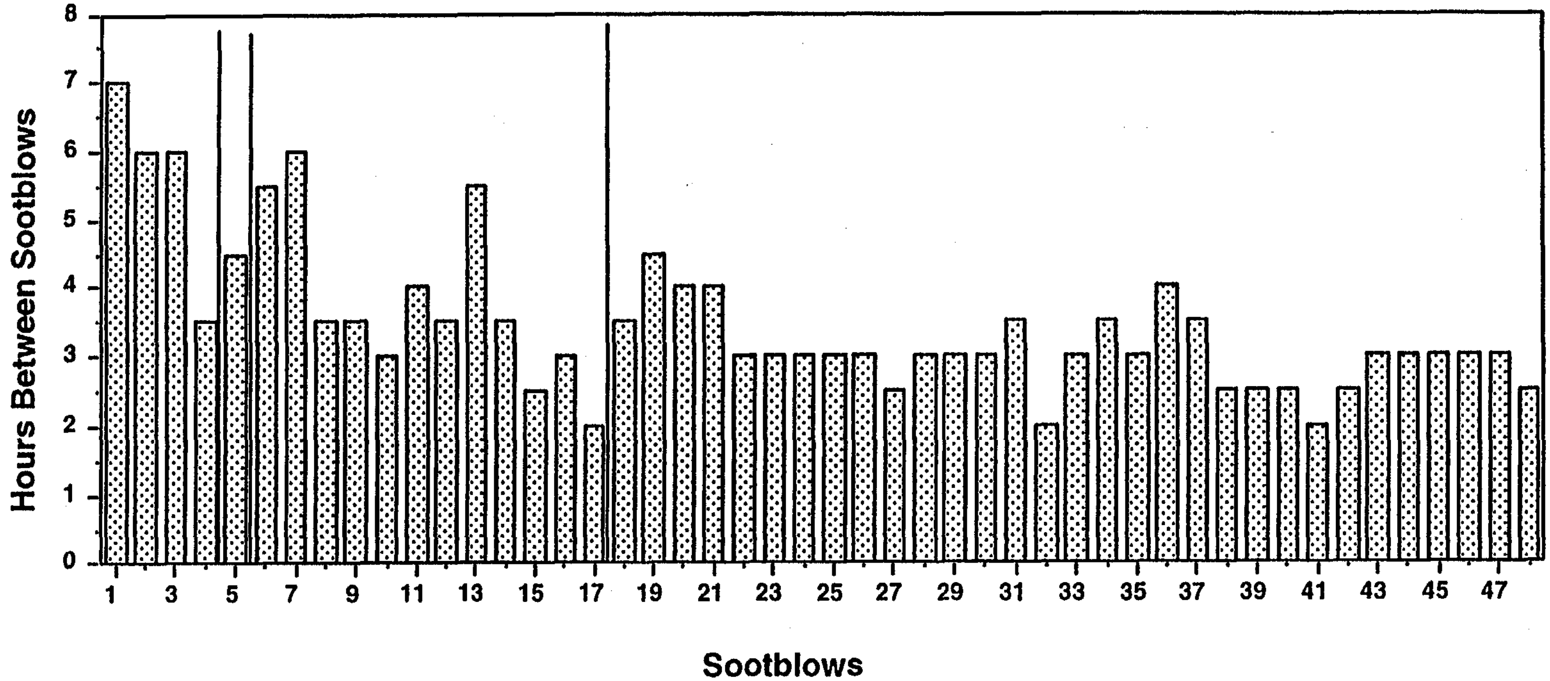


Figure 6-17. **HOURS BETWEEN SOOTBLOWS WHEN FIRING KENTUCKY COAL AT 14.6 TO 15.6 MILLION Btu/h FOR TESTING CONDUCTED FROM JANUARY 8 TO 16, 1996.**

The boiler was shut down between sootblows 4 and 5, 5 and 6, and 17 and 18 due to low feedwater pressure, no coal available, and main coal hopper plugging, respectively.

which lists coal usage, operational conditions, and soot blowing events. Table H-4 contains results from testing from January 22, 1996, the first day of testing after the boiler was cleaned on January 17, 1996, through February 17, 1996.

Coal Consumption and Ash Deposition/Accumulation

The total hours accumulated firing coal during this test period were 157.4. The test period consisted of five days of cyclic operation from January 22 to February 8, 1996, during which 23.8 hours of operation were obtained, and a segment (from February 12 to February 17, 1996) of two continuous periods of operation of 90.8 and 42.8 hours. The boiler was shut down during the continuous period due to a screwdriver being accidentally dropped into the Redler conveyor when trying to unplug coal from the cage mill outlet (after 90.8 hours of operation), and because of excessive ash deposition at the convective pass entrance (after 42.8 hours of additional operation).

Upon the conclusion of the testing, the boiler was cleaned and 381.5 and 97.6 lb of ash were removed from the furnace and breaching, respectively. The ash content of the coal varied from 1.97 to 2.88% over the nine days of testing. Approximately 4,007 lb of ash were introduced into the boiler when firing 173,800 lb of coal, resulting in 12.0% of the ash being retained in the boiler system. This was the lowest amount of ash retained in the boiler system for continuous or a combination of cyclic and continuous operation. Testing that was conducted in a cyclic mode, i.e., test periods 1 and 2, resulted in less ash retained in the boiler. This may be the result of the manner in which the boiler was operated this period. It does not appear to be due to changes in the composition or fusion temperatures of the ash. The ash composition and fusion temperatures for the Kentucky coal were very similar for the testing conducted in January and February, 1996 (see Table 6-2).

The boiler was operated differently from the previous deposition testing in that the firing rate was alternated between a low (12.0 MM Btu/h) and high (15.6 MM Btu/h) rate, and the floor ash sparge system was not reinstalled for this period of testing. Alternating the firing rate may have had a similar affect on ash adhesion to the walls as did cyclic boiler operation. Another explanation is that the ash

Table 6-2. Ash Composition and Fusion Temperatures

Coal	Upper Freeport Seam	Middle Kittanning Seam	Kentucky	Kentucky
Composite	07/31/1995 - 08/03/95	08/23/95 - 08/25/95	01/08/96 - 01/14/96	02/12/96 - 02/18/96
Fusion Temperatures (reducing, °F)				
Initial	+2,800	2,690	+2,800	2,750
Softening	+2,800	2,750	+2,800	+2,800
Hemispherical	+2,800	2,760	+2,800	+2,800
Fluid	+2,800	+2,800	+2,800	+2,800
Composition (wt.%)				
SiO_2	59.7	52.3	46.2	44.8
Al_2O_3	30.9	30.6	36.1	35.6
TiO_2	1.24	1.30	1.11	0.95
Fe_2O_3	4.65	8.28	8.66	9.60
MnO	0.01	0.03	0.02	0.01
CaO	1.26	2.77	4.19	4.10
MgO	0.70	0.98	1.07	1.13
Na_2O	0.30	0.30	0.71	0.68
K_2O	2.40	1.88	1.77	1.89
P_2O_5	0.35	<0.2	<0.2	<0.2
BaO	0.08	0.15	0.10	0.13
SrO	0.13	0.11	0.20	0.23
SO_3	0.5	1.3	<0.5	<0.5
Total	100.5	100.0	100.1	99.1

may not have had a surface on which to initiate deposition with the floor sparge pipes removed.

Boiler Outlet Pressure and ID Fan Amperage

The boiler outlet pressure and ID fan amperage are plotted as a function of cumulative coal fired for this period of testing in Figures 6-18 and 6-19, respectively. As with the previous deposition testing, the boiler outlet pressure was a good indicator of the extent of deposition. As the convective pass entrance became plugged with ash and started hindering the gas flow, the boiler outlet pressure decreased until the gauge went off scale (-2.0" W.C.). The gradual decrease in pressure, that was observed during previous deposition testing, was not as evident during this test period because of the alternating firing rate.

Similar to the boiler outlet pressure, the ID fan amperage varied as a function of firing rate (i.e., flue gas flow rate) and was approximately 31.0 and 28.5 amps for the firing rates of 15.6 and 12.0 MM Btu/h, respectively. There was an increase in amps near the end of the test period as deposition became more severe.

Boiler Outlet and Convective Section Temperatures

Figure 6-20 is a plot of the boiler outlet temperature as a function of cumulative coal fired and shows that the boiler outlet temperature was being maintained. After sootblowing, the temperature recovery was consistently back to 560 to 570°F. The convective pass temperature was the lowest observed during deposition testing and never was higher than 1,200°F as shown in Figure 6-21.

Steam Production Rate

The steam production remained relatively constant for a given firing rate as shown in Figure 6-22. Steam production was approximately 13,000 and 10,000 lb/h for firing rates of 15.6 and 12.0 MM Btu/h, respectively.

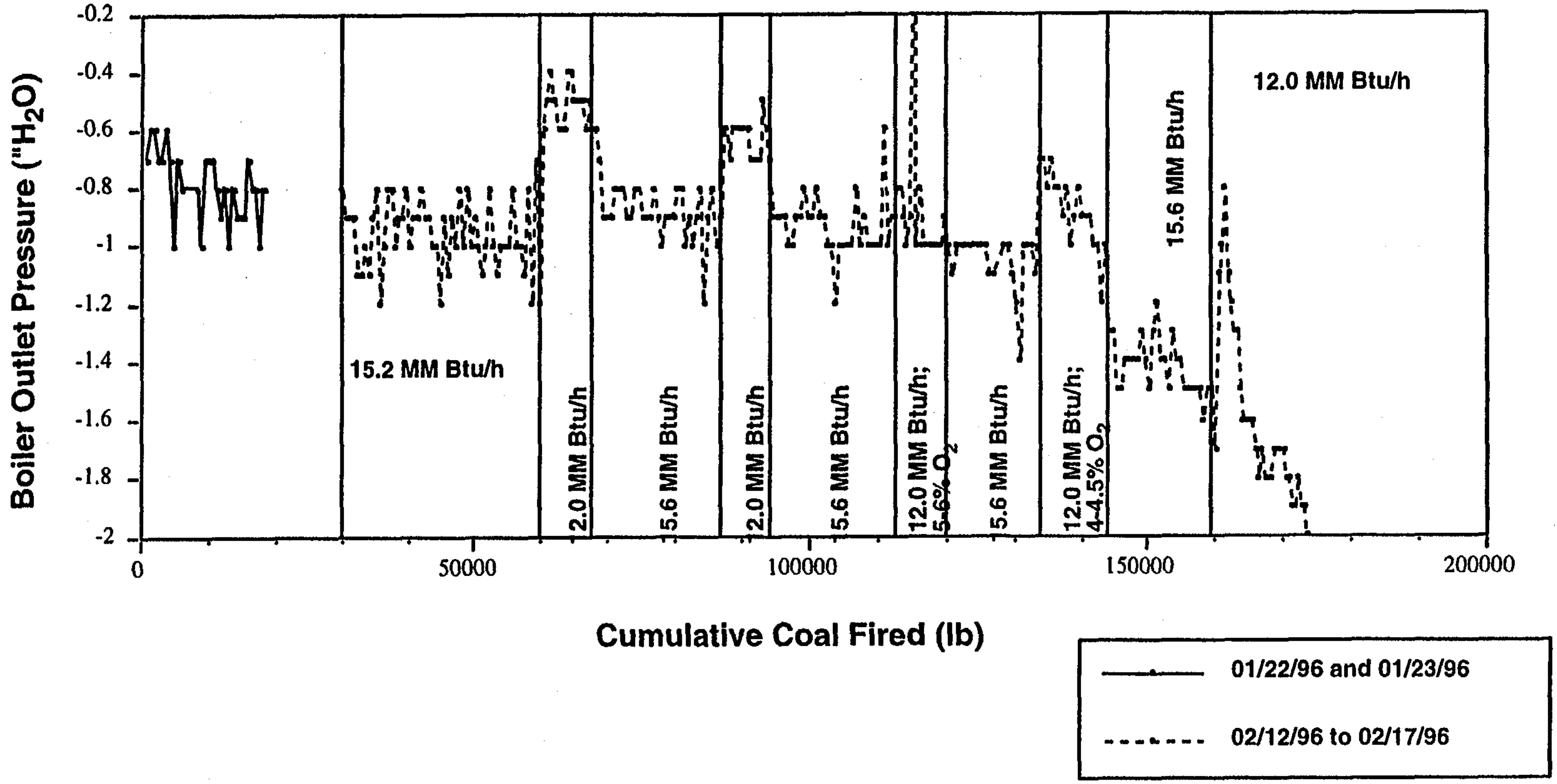


Figure 6-18. BOILER OUTLET PRESSURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AFTER CLEANING THE BOILER ON 01/17/96

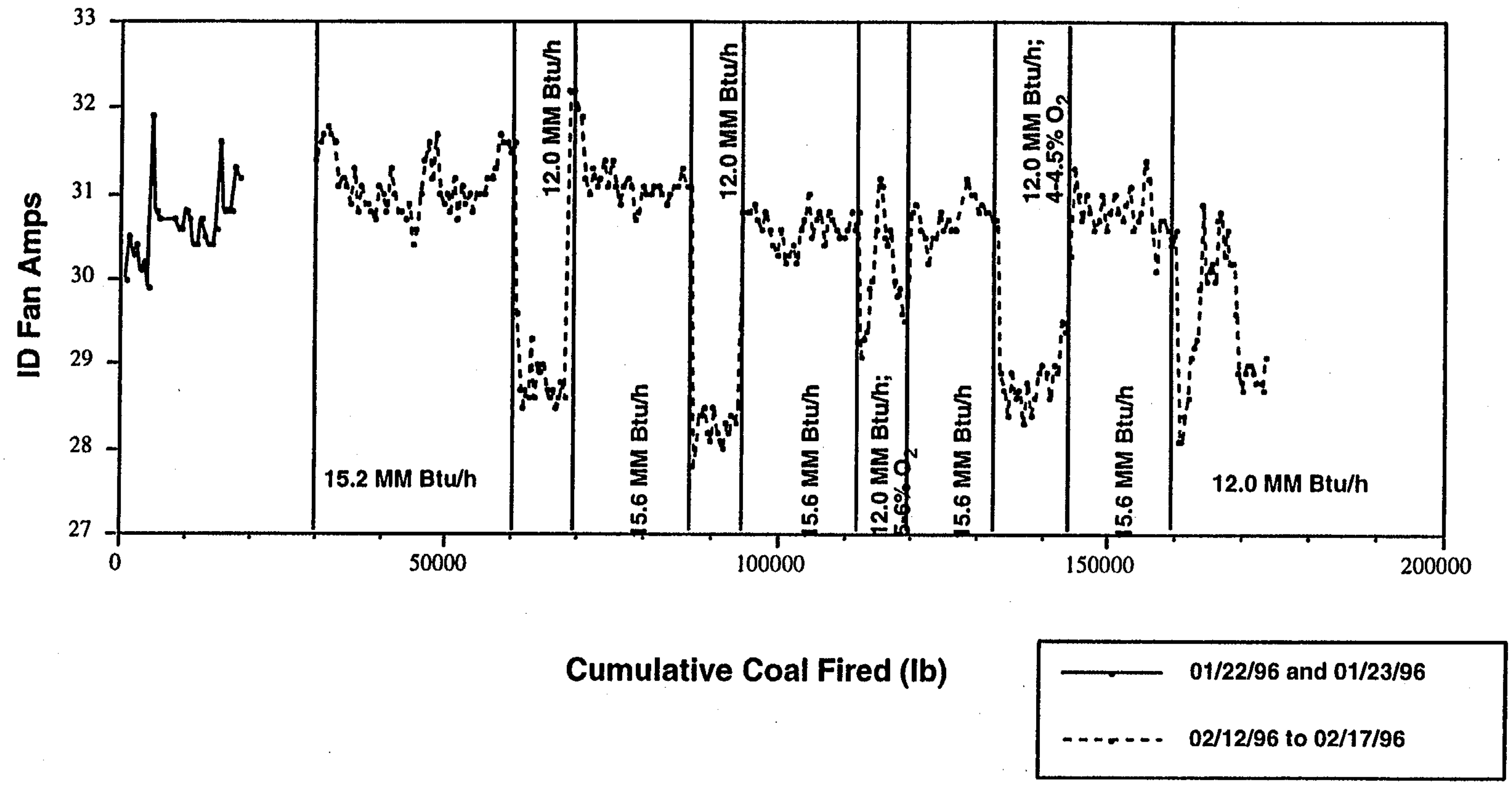


Figure 6-19. ID FAN AMPERAGE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AFTER CLEANING ON 01/17/96

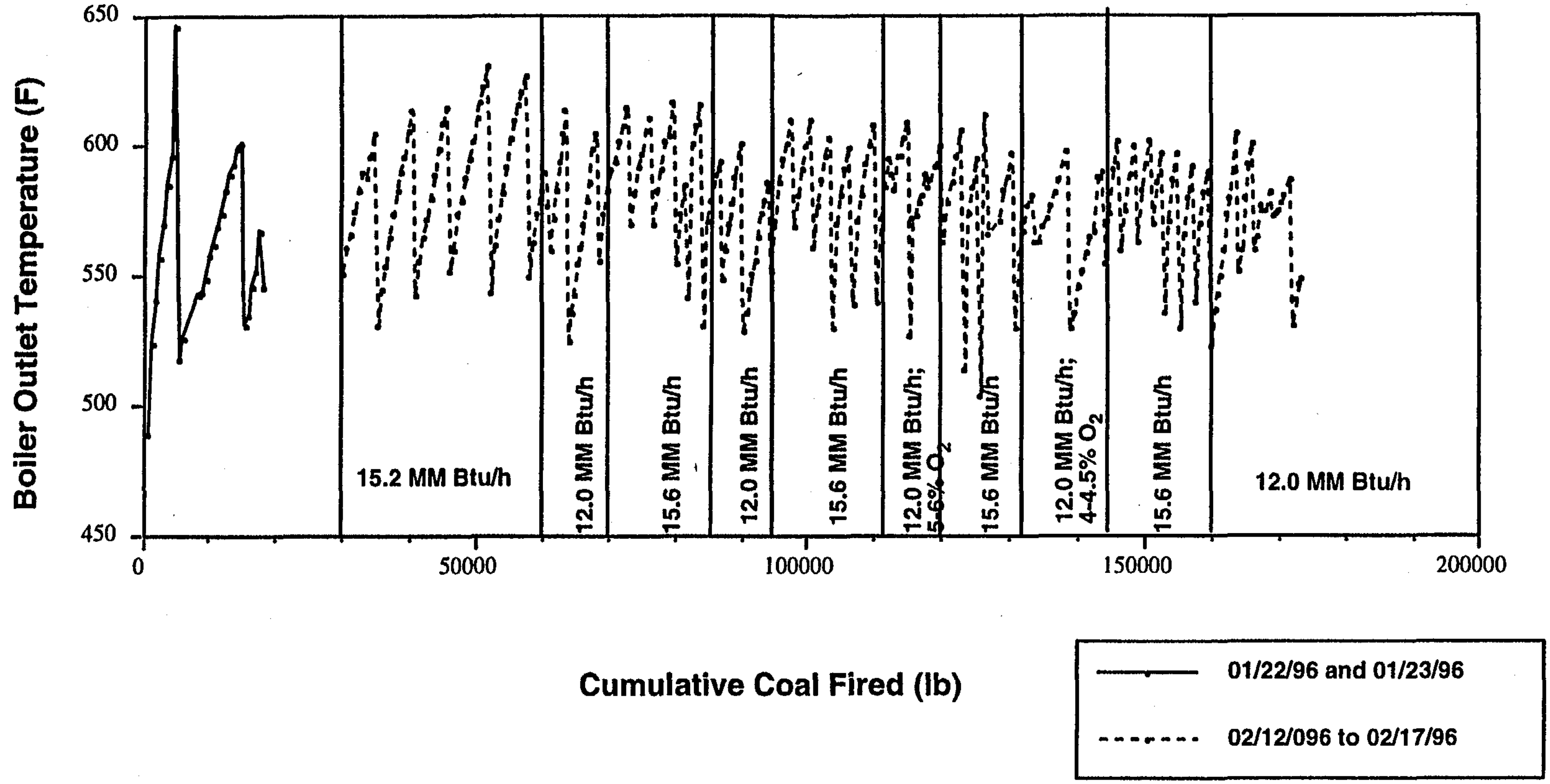


Figure 6-20. BOILER OUTLET TEMPERATURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AFTER CLEANING THE BOILER ON 01/17/96

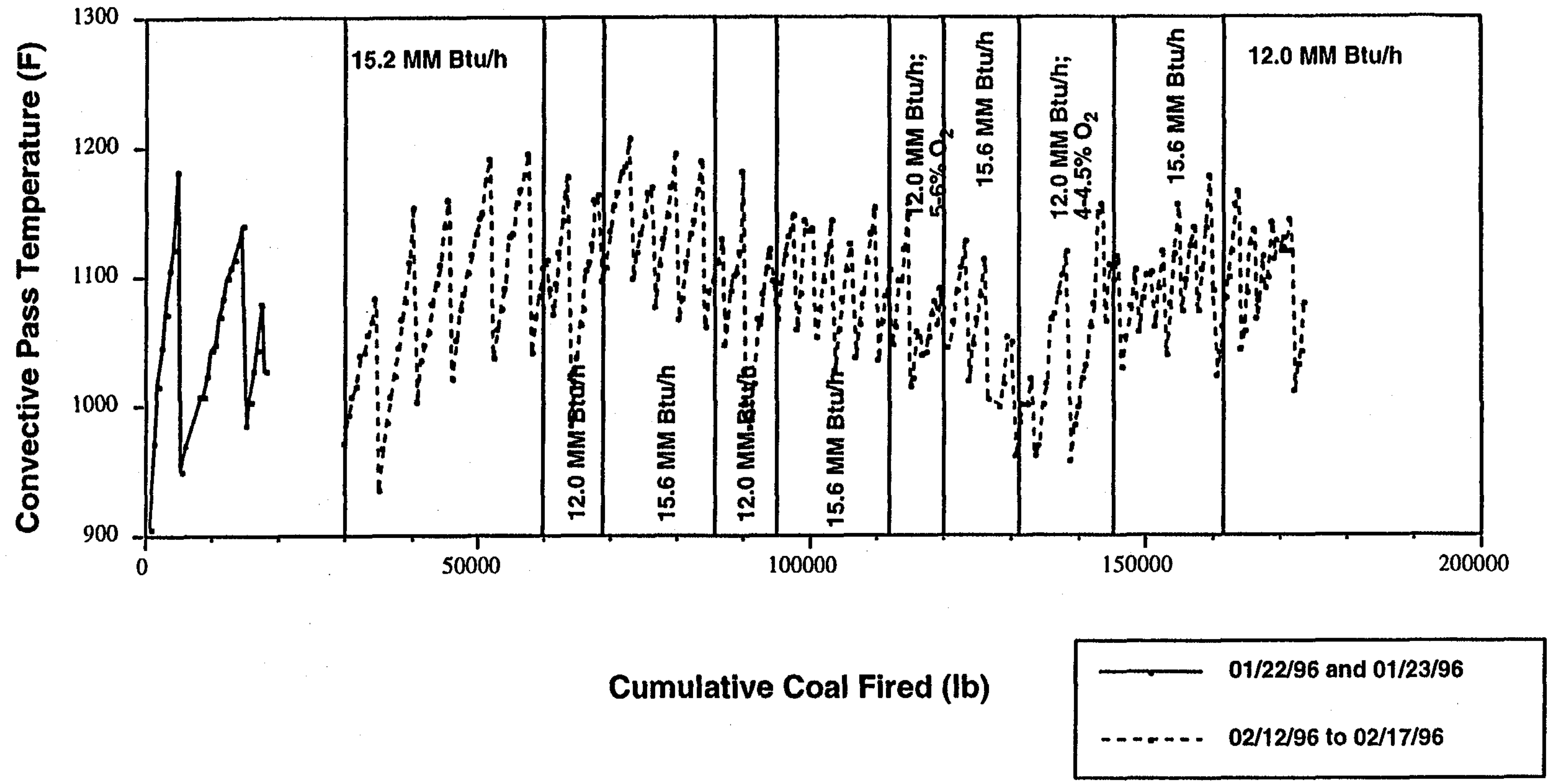


Figure 6-21. CONVECTIVE PASS TEMPERATURE AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AFTER CLEANING THE BOILER ON 01/17/96

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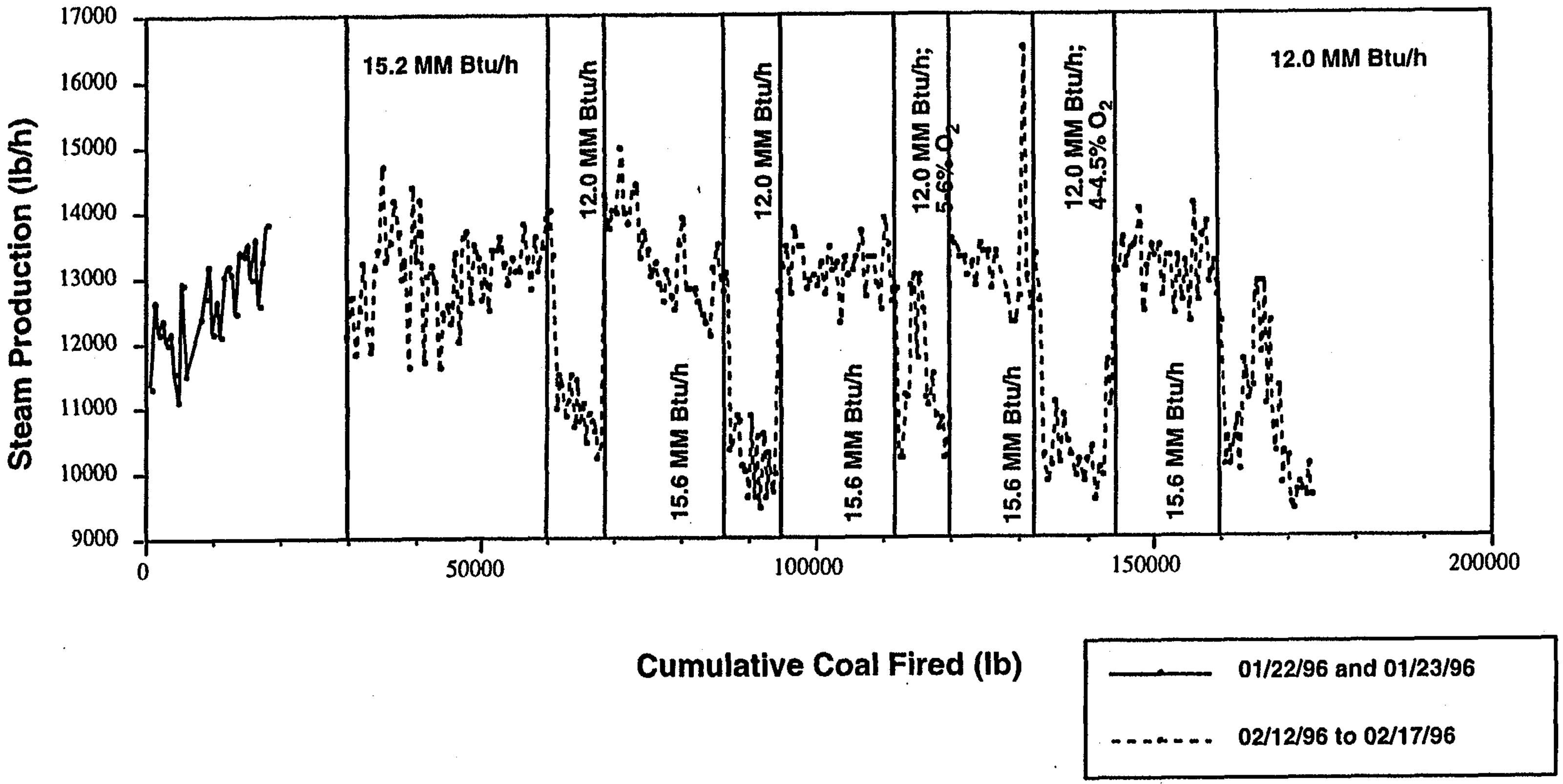

Figure 6-22. STEAM PRODUCTION AS A FUNCTION OF CUMULATIVE COAL FIRED WHEN FIRING KENTUCKY COAL AFTER CLEANING THE BOILER ON 01/17/96

Soot Blowing Frequency

Figure 6-23 is a chart showing the elapsed time between sootblows. There were 35 sootblows in a 157 hour test period. The time between events ranged from 1.5 to 7.0 hours. Typically, increased soot blowing activity was observed during the higher firing rate.

Observations

Significant deposition on the boiler walls and convective pass entrance was observed which caused the boiler to be shut down. Compared to previous deposition testing, the amount of ash retained in the boiler was significantly less.

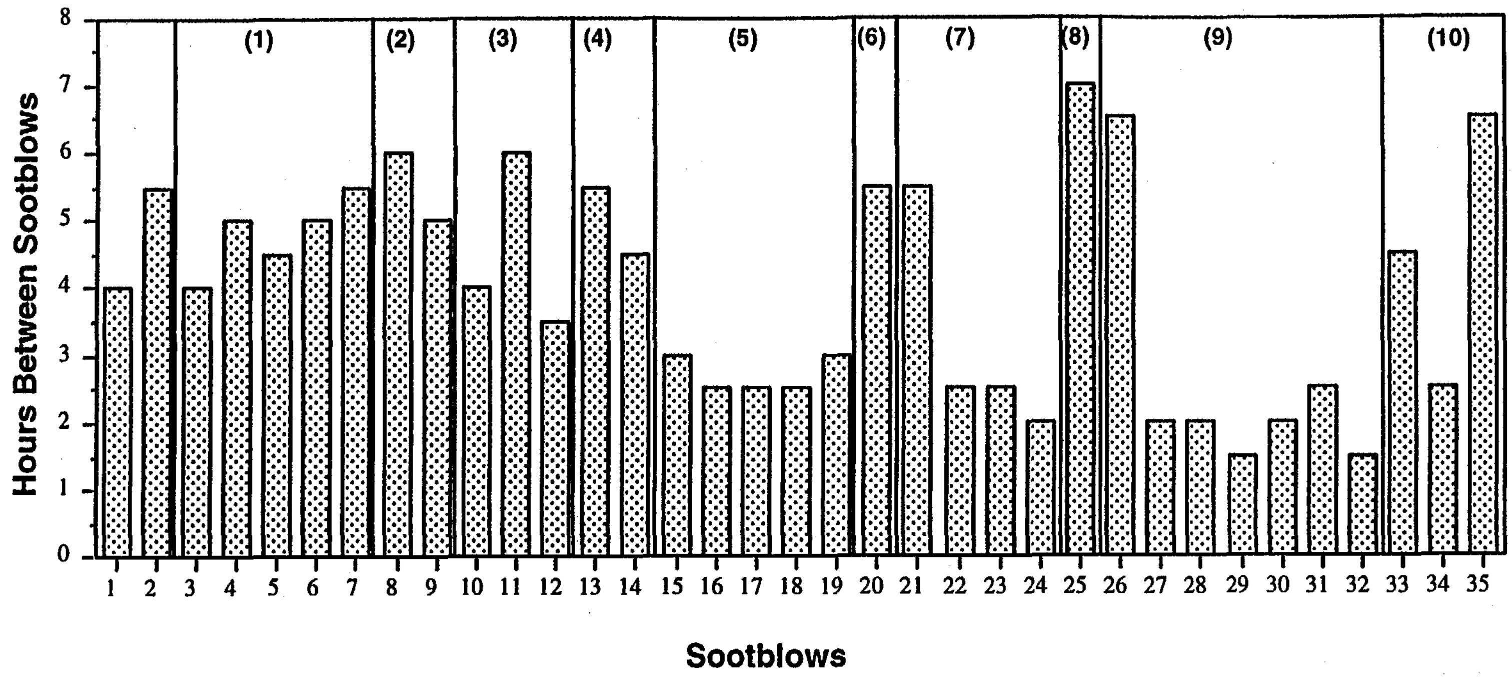

Figure 6-23. HOURS BETWEEN SOOTBLOWS WHEN FIRING KENTUCKY COAL Sootblows 1 and 2 were conducted on 01/22/96 and 01/23/96, respectively. The remaining sootblows were conducted during the continuous/deposition test from 02/12/96 to 02/17/96. Test period conditions are:

1) 15.2 MM Btu/h
2) 12.0 MM Btu/h
3) 15.6 MM Btu/h
4) 12.0 MM Btu/h
5) 15.6 MM Btu/h
6) 12.0 MM Btu/h; 5-6% O_2
7) 15.6 MM Btu/h
8) 12.0 MM Btu/h; 4-4.5% O_2
9) 15.6 MM Btu/h
10) 12.0 MM Btu/h

7.0 Conclusions

Results from Task 5, Long Term Testing, have shown that a boiler, designed to fire oil or natural gas, can be successfully converted to burn micronized coal, from a technical feasibility point of view. A final decision to convert to micronized coal would, necessarily, be dependent on favorable economics also.

The level of technical success is dictated by a number of factors. The mode of boiler operation is a key consideration. If the intent were to operate the boiler at full load, around the clock for periods greater than 7 days, for example, then the installation of equipment for ash removal becomes a necessity. Boiler derating may be required pending the volumetric heat release rate, residence time and specific coal properties. Coals should preferably be low ash (less than 5%) with high fusibility temperatures.

Coal storage, handling, pulverization and transport to the burner was reliable, particularly after the addition of the mass flow bin and gravimetric feeder. Lightoff on natural gas, transition to coal after about 15 minutes and firing on 100% coal after about one hour was also repeatable and reliable with a strong burner flame scanner signal during all stages.

Demonstration testing under Task 5 occurred from July 1995 to mid-February 1996. During this timeframe 174 hours of natural gas firing was logged and 1003 hours of micronized coal firing was logged, under a variety of typical industrial boiler operating conditions. Testing included short term operation (4 to 12 hours of continuous running) as well as around-the-clock testing designed to determine how long the boiler could operate befoe and ash-related constraint would prevent further operation.

Three different low ash, high fusibility ash coals were tested: (1) Upper Freeport, (2) Middle Kittanning, and (3) Kentucky.

Key conclusions drawn from Task 5 testing were as follows:

- The coal storage, handling, milling and transport systems operated reliably with an acceptable level of performance during the long-term coal testing period. The TCS mill typically produced a product having a mass mean particle size between 20 and 25 microns.

- NOx levels at full load when firing natural gas with the RSFC burner ranged from 45 to 55 ppm for a clean furnace and 60 to 70 ppm for a dirty furnace compared to values of 140 to 200 ppm for the HEACC under clean or dirty furnace conditions.

- Short term testing (less than 12 continuous hours) when firing micronized coal showed the RSFC burner to be able to achieve NOx levels in the Penn State boiler ranging from 350 to 450 ppm while achieving combustion efficiencies of 96.5% to 97.5%. The HEACC had comparable NOx values, 350 to 450 ppm, but lower combustion efficiencies of 94% to 95%.

- Long term testing, when firing micronized coal, showed a tendency toward increasing both NOx and combustion efficiency with time. It is believed that the growth of ash deposits on waterwall tubes causes temperatures to increase which adversely affects thermal NOx and works in favor of increasing combustion efficiency.

- The management of ash deposits and ash removal is a concern when burning coal in a boiler designed for oil and gas. About 8% to 20% of the ash in the as-fired coal was retained in the radiant section of the furnace with no means of removal other than manual removal when the boiler was taken off line. The amount of ash retained in the boiler seems to also depend on the mode of boiler operation, i.e. around-the-clock operation for several days vs. short term (8 to 12 hr/day) operation for several days before an ash-related constraint would prevent further operation. With short term tests, ash build up was lower due to some net ash removal during start-up periods when the furnace was operating on natural gas before transitioning to 100% coal firing.

- Based on long term, around-the-clock test results, when firing micronized coal, the Penn State boiler could be operated for about a week before it was required to be taken off line for ash removal. The longest, continuous around-the-clock test was when firing the Kentucky coal at full load (~15.5 Mbtu/hr) for 137 hours. With the coals tested, all being very low ash with high fusibility temperatures, the amount of coal fired and the ash content were the key fuel properties dictating the length of time the boiler could be operated before shutting down for ash-related reasons.

- When firing micronized coal the Penn State boiler must be operated at about 85% of its rated capacity to avoid producing excessively high gas temperatures entering the bag filter.

- Burner startup and shutdown as well as flame stability and flame scanner signal strength during long term testing when firing micronized coal were all excellent, as was the ability to transition from natural gas to coal and the reverse.

- The Penn State boiler with a volumetric heat release rate of 50,000 Btu/ft^3-hr, a bulk residence time of 0.7 seconds and a design steam production rate of 15,000 lb/hr represents the most challenging end of the spectrum for retrofitting coal in an oil/gas designed boiler, from the standpoint of both technical and economic feasibility.

8.0 References

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List of Appendices

Appendix A. Summary of the Chronological History of the Demonstration Conducted at Penn State

Appendix A. Summary of the Chronological History of the Demonstration Conducted at Penn State

This section contains a summary of the experimental testing activities conducted at Penn State from July 1995 through February 1996.

July 1995

During July, activities focused on installing the new burner (referred to as HEACC-2), characterizing the burner on natural gas, conducting baseline natural gas tests, and characterizing the burner on coal. A day-by-day synopsis of the boiler operation for July is:

- July 3 -- The boiler was cleaned prior to starting the HEACC-2 testing. In addition, work started on installing a new convective pass sootblower. The original sootblower ran the length of the convective pass except for the entrance from the furnace into the convective pass. The new sootblower is longer and is capable of cleaning two of the three openings in the membrane wall which comprise the convective pass entrance.
- July 4 -- Holiday
- July 5 -- A code welder from Kibbe Boiler Works welded a guide ring for the extended sootblower onto the boiler tubes. Installation of the sootblower was completed.
- July 6 -- The quarl, per ABB CE's design, was installed. In addition, the HEACC-2 was installed.
- July 7 -- Curing of the refractory quarl was started. Preliminary natural gas data was obtained.
- July 10 -- Curing of the refractory quarl was completed. Burner characterization firing natural gas was conducted. The burner was removed and plates were welded on three of the six tertiary air inlets in order to increase air flow through the primary and secondary air zones. The burner was reinstalled.
- July 11 -- Burner characterization firing natural gas was conducted. Results from all testing are presented in Section 6.3. High burner pressure drop was limiting air through the burner.
- July 12 -- The burner was removed and the plates covering the tertiary air inlets were removed. The burner was reinstalled and burner characterization continued. High burner pressure drop was observed.

- July 13 - Natural gas and coal cofiring was conducted. Coal was fired to test the new coal feed system.
- July 14 - Natural gas and coal cofiring was conducted for ~3.5 hours at firing rates of ~12 million Btu/h coal and ~5 million Btu/h natural gas. The boiler flamed out when attempting to convert to 100% coal firing.
- July 17 - The burner was removed and taken to Windsor, Connecticut for modifications. Modifications consisted of removing the primary and secondary air swirlers and installing tangential primary and secondary air inlets. 'Bubbles' were observed on the surface of the refractory quarl.
- July 18 through 20 -- An ash hopper top was constructed, a coal sampling pipe was installed in the transition piece between the weigh-belt feeder and rotary valve, and the quarl was ground to remove the 'bubbles' and smooth the pockets.
- July 21 -- The modified burner was reinstalled and fired on natural gas with coal transport air. The windbox pressure was substantially less than prior to the modifications.
- July 24 -- The boiler was operated firing natural gas without coal transport air.
- July 25 -- The boiler was fired with natural gas without coal transport air. Longer duration tests were conducted at 13.2 million Btu/h (75% load) with 1, 2, and 3% O_2. Boiler efficiencies were calculated.
- July 26 -- The boiler was fired at 17 million Btu/h (full load) at 1.2% O_2. Boiler efficiency was calculated. After the natural gas test was completed, 100% coal firing was attempted. The boiler shut down when converting from coal and natural gas cofiring to 100% coal firing. The low atomizing air pressure alarm was observed. Upon closer examination it was noted that part of the atomizing air train (which contains a sensor to ensure that there is sufficient atomizing air prior to switching from natural gas/coal-water slurry fuel cofiring to 100% coal-water slurry fuel) was not replaced after installing the burner. Although atomizing air is not used during dry, micronized coal firing, the boiler interlocks contain this parameter. The train was reinstalled with the sensor located between the atomizing air source and a valve which is closed when firing dry, micronized coal.
- July 27 -- The boiler was fired on 100% coal for burner characterization. Ash and coal samples were collected. Burnouts ranged from 81 to 86%.
- July 28 -- The boiler was fired on 100% coal for burner characterization. Burnouts ranged from 86 to 87%.

- July 31 -- The floor ash sparge system was installed. The diffuser located in the end of the coal pipe was removed and the smaller of two coal deflectors was installed. Coal testing started but the inverter and rotary valve motor failed. The rotary valve was dismantled to determine the cause of the shutdown.

August 1995

During August, activities focused on characterizing the burner on natural gas, conducting baseline natural gas tests, and characterizing the burner on coal. A day-by-day synopsis of the boiler operation for August is:

- August 1 -- On July 31, a coal test was started but the inverter and rotary valve motor failed. The rotary valve was dismantled to determine the cause of the shutdown. On August 1, the rotary valve was reassembled and the problem identified. The motor and variable speed drive inverter were damaged. A motor was ordered (with next day delivery) and an inverter was obtained from a coal handling/processing construction company. In addition, a natural gas test was conducted firing at 8.6 million Btu/h (50% load). The boiler efficiency was calculated.
- August 2 -- The inverter and motor for the rotary valve were installed. The burner was removed and approximately 0.5" from the primary air zone was removed to increase the primary air flow area. The burner was then reinstalled.
- August 3 -- The boiler was fired on 100% coal for ~12 hours for burner characterization. Coal and baghouse ash samples were obtained and burnouts ranged from 84 to 93%.
- August 4 -- The boiler was not operated because the Office of Physical Plant (OPP) conducted electrical work in the area and shut off electricity to the coal preparation facility. Site cleanup and equipment maintenance and repair were conducted.
- August 7 -- A shipment of Middle Kittanning seam coal was received and unloaded into the 25-ton coal hopper. All testing conducted during the rest of the reporting period was with Middle Kittanning except for approximately two tons of Upper Freeport seam coal which was in the surge bin. Coal firing was not conducted on this date because the bearing on the transfer fan (located between the TCS mill and burner) failed. ABB CE personnel arrived with three burner extension designs. Two of them were of a divergent design and would not fit into the windbox. It was planned to install the third design which was a cylindrical section.

- August 8 -- A new bearing was installed on the transfer fan. A section of the cylindrical extension was removed and the 8" extension was welded onto the burner between the secondary and tertiary air zones. The burner was reinstalled and characterized firing natural gas and 100% coal (for two hours). Coal and baghouse ash samples were obtained and burnouts ranged from 90 to 92%.
- August 9 -- The boiler was fired on 100% coal for eight hours for burner characterization. Two 2-hour tests were conducted with coal, baghouse ash, and cyclone (which is located in the duct prior to the baghouse) ash samples obtained. The first test was to minimize NO_x emissions and the second test was to maximize coal combustion efficiency. NO_x and coal combustion efficiency (based on the baghouse ash samples) ranged from 330 to 390 ppm and from 92 to 95%, respectively for the first test. NO_x and coal combustion efficiency ranged from 675 to 700 ppm and from 97 to 98%, respectively, for the second test.
- August 10 -- The burner was removed from the boiler and the extension was removed from the burner. Six stainless steel perforated plates with an open area of 50% were installed on the tertiary air scoop inlets to increase the air flow through the primary and secondary air zones. The burner was reinstalled and characterized firing natural gas for three hours and 100% coal for five hours.
- August 11 -- OPP began their annual West Campus Steam Plant maintenance and started up the boilers in the East Campus Steam Plant (ECSP). The demonstration boiler, which is adjacent to the ECSP, was not operated during the maintenance period which lasted through August 18. On August 11, the boiler was drained to reduce the temperature inside the boiler in order to perform burner air flow testing the following week. In addition, modifications to the ash screw mezzanine (located below the baghouse) were started. The modifications were necessary in order to raise the ash screw so the fly ash hopper and cover can be placed directly below the screw outlet and form a dust-free fit. Additional activities included performing site and equipment maintenance.
- August 14 -- The burner was removed from the boiler in order to drill and tap holes. The ash was removed from the boiler. Modifications to the ash screw and mezzanine, and site and equipment maintenance continued.
- August 15 -- Holes were drilled and tapped in the burner for performing pressure readings during the air flow tests. The burner was reinstalled in the boiler. The ash screw and mezzanine modifications were completed. Ash was

removed from the breaching between the boiler and heat pipe combustion air preheater.

- August 16 -- Burner air flow testing was conducted. Installation of the final component (a staircase between the second and third mezzanine levels) to the coal handling modifications was started.
- August 17 -- Burner air flow testing continued. Installation of the staircase continued.
- August 18 -- Burner air flow testing was completed. For the final test, the burner was removed and the perforated plates were removed. The burner was reinstalled. Installation of the furnace ash blowdown system was started. Installation of the staircase was completed.
- August 21 -- Installation of the furnace ash blowdown system was completed. The boiler was filled with water and burner characterization testing restarted. Natural gas and coal testing was conducted for approximately two hours.
- August 22 -- The boiler was fired on natural gas for six hours for burner characterization.
- August 23 -- The boiler was fired on natural gas for six hours and on 100% coal for five hours for burner characterization. Coal, cyclone ash, and baghouse ash samples were obtained and burnouts ranged from 85 to 87% and from 87 to 91% based on the cyclone ash and baghouse ash samples, respectively.
- August 24 -- The boiler was fired on 100% coal for 8.5 hours for burner characterization. Coal, cyclone ash, and baghouse ash samples were obtained and burnouts ranged from 89 to 95% based on the cyclone ash sample.
- August 25 -- The boiler was fired on 100% coal for 4.5 hours for burner characterization. Coal, cyclone ash, and baghouse ash samples were obtained.
- August 28 -- The boiler was fired on 100% coal for eight hours for burner characterization. Coal, cyclone ash, and baghouse ash samples were obtained and burnouts ranged from 87 to 96% and from 93 to 96% based on the cyclone ash and baghouse ash samples, respectively.
- August 29 -- The boiler was fired on 100% coal for 6.5 hours for burner characterization. Coal, cyclone ash, and baghouse ash samples were obtained and burnouts ranged from 94 to 96% and from 95 to 97% based on the cyclone ash and baghouse ash samples, respectively.
- August 30 -- The boiler was fired on 100% coal for 6.5 hours for burner characterization and suction pyrometery. Coal, cyclone ash, and baghouse ash

samples were obtained and burnouts ranged from 93 to 96% and from 94 to 97% based on the cyclone ash and baghouse ash samples, respectively.

- August 31 -- The boiler was fired on 100% coal for six hours for burner characterization. Coal, cyclone ash, and baghouse ash samples were obtained and burnouts ranged from 94 to 96% and from 95 to 96% based on the cyclone ash and baghouse ash samples, respectively.

September 1995

During September, activities focused on characterizing the burner on coal, preparing for and attending a U.S. Department of Energy (DOE)/ABB CE/Penn State project review meeting, repairing the boiler feedwater pump, and performing equipment maintenance and repair. A day-by-day synopsis of the boiler operation for September is:

- September 1 -- Work started on replacing the sheave on the TCS, Inc. mill to increase the mill speed from 1,940 to 2,080 rpm in order to reduce the coal particle size.
- September 4 -- Holiday
- September 5 -- Work on replacing the sheaves on the mill was completed. A decrease in the particle size was observed.

  A shipment of Middle Kittanning seam coal was received. All testing in September was with Middle Kittanning seam coal.

  The boiler was operated on a two-shift per day basis for burner characterization. Two hours of steady-state boiler operation was conducted after replacing the sheave. The coal combustion efficiency, based on baghouse particulate samples, was 97.5%. The boiler efficiency was calculated. The boiler was then operated for an additional hour after changing the swirler settings.
- September 6 -- The boiler was fired on 100% coal for ~10.5 hours for burner characterization. Coal, baghouse ash, and cyclone ash samples were collected. NO_x and coal combustion efficiency (based on the baghouse samples) ranged from 403 to 600 ppm and 96.2 to 96.9, respectively.
- September 7 -- The boiler was fired on 100% coal for ~10.5 hours for burner characterization. Coal, baghouse ash, and cyclone ash samples were collected. NO_x and coal combustion efficiency (based on the baghouse samples) ranged from 414 to 526 ppm and 95.6 to 96.8, respectively. During boiler shutdown, the feedwater pump failed.

- September 8 -- The feedwater pump was removed and driven to a pump vendor for inspection and repair. It was determined that the pump was not repairable and must be replaced.
- September 11 through 20 -- The boiler was not operated due to feedwater pump, motor, and electrical component procurement. Activities that were conducted during this period include:
  - Identified and ordered the feedwater pump/motor combination and necessary electrical components;
  - Performed data reduction for August and September testing;
  - Completed the analysis of all coal and ash samples collected in August and September;
  - Removed the burner and delivered to ABB CE for cold flow testing;
  - Prepared information for a DOE/ABB CE/Penn State project review meeting;
  - Conducted equipment and instrumentation maintenance and repair which included replacing the bearing on the Redler conveyor, removing, cleaning, and reinstalling the cage mill bearing, inspecting the cage mill internals (with a mill serviceman) to identify replacement materials for worn parts, and ordering parts to repair the steam orifice; and
  - Installed a railing and ladder on the ash screw mezzanine.
- September 21 -- Attended a DOE/ABB CE/Penn State project review meeting. Information that was prepared for the meeting is attached. This includes plots of coal combustion efficiency as a function of time and plots of CO and NO_X emissions as a function of time for testing conducted in August and September, burner characterization results, coal particle size distributions for samples collected at the burner inlet, coal-fired testing summary, and boiler efficiencies for testing conducted in August and September.
- September 22 -- The boiler and ducting connecting the boiler to the heat pipe heat exchanger were cleaned and the ash collected and weighed. Dismantling of the cage mill began in order to install new striking plates on the cage mill bars.
- September 25 -- The cage mill was disassembled and the striking plates were removed.
- September 26 -- New striking plates were installed in the cage mill. Started assembling the floor ash sparge system in the boiler.
- September 27 -- The cage mill was reassembled. Work continued on installing the floor ash sparge system in the boiler.
- September 28 -- The burner was returned to Penn State. The floor ash sparge system was installed in the boiler. Beitzel Inc., a coal handling/processing construction company, was on site to replace the switchgear in the motor

control center and installed conduit and wires for the new feedwater pump (to be delivered October 2, 1995). Electrical components had to be replaced because the new motor is larger (50 hp compared to 20 hp).

- September 29 -- Beitzel Inc. completed the electrical work. The burner was reinstalled.

October 1995

During this reporting period, activities focused on completing the feedwater pump installation, performing a matrix of tests when firing the burner on coal, and operating the boiler on a continuous basis to investigate deposition. A day-by-day synopsis of the boiler operation for October is:

- October 2 through 5 -- The feedwater pump arrived on October 2 and was set into place. Since the location of the new feedwater pump inlet was not identical to that of the old pump, repiping was necessary. In addition, the electrical hookups were completed and the boiler operated to check out the pump.
- October 6 -- The boiler was operated to complete checking out the pump.
- October 9 -- ABB CE personnel were on site and the modified burner (radial scoops were installed on three of the six tertiary air scoops by ABB CE) was fired on natural gas and on micronized coal. The burner was operated with the primary air damper 100% open, the secondary air damper 100% open, the tertiary air damper 50% open, and the axial inlet 0% open (100/100/50/0; Subsequent discussions of damper settings will use this type of identification) when firing coal and collecting particulate samples from the cyclone (located in the ducting prior to the baghouse) and baghouse outlet. Coal combustion efficiency, based on the baghouse sample (subsequent combustion efficiencies are based on the baghouse sample), averaged 93.3±0.7%. NO_x and CO emissions averaged 297 and 219 ppm, respectively, at an O_2 concentration of 3.6%.

  Operational parameters are listed in the burner characterization summary sheet which is attached. This summary sheet contains the burner characterization results for testing conducted from 07/24/95 through 10/31/95. In addition, a summary sheet of all coal-fired testing is attached. Note that the summary sheet is not complete as data reduction (boiler efficiency, emissions reported in lb/MM Btu, etc.) for October is currently underway. An updated summary sheet will be provided next month.

  In addition to the summary sheet and listing of operational parameters, the coal combustion efficiency results from EFRC Analytical Services are attached for the October testing. The analytical spreadsheets contain the combustion efficiency for each baghouse and cyclone sample collected.

- October 10 -- The boiler was operated for approximately two hours on coal to evaluate the effect of the radial scoops. The radial scoops caused turbulence within the tertiary air zone which reduced the swirl number. The boiler was shutdown and the burner removed. Modifications to the radial air inlets were started, which involved removing the scoops and installing a damper over the inlet, which was flush with the tertiary air barrel.
- October 11 -- The axial air inlet modifications were completed and the burner reinstalled. Two tests were conducted firing micronized coal. The damper settings during these tests were 100/100/50/0 and 100/100/50/25. Coal combustion efficiencies for the tests were 95.1±0.8 and 96.1±0.5%, respectively. NO_x and CO emissions and O_2 concentrations were 380 and 369 ppm, 130 and 125 ppm, and 3.6 and 3.8%, respectively, for the two tests.
- October 12 -- Matrix testing began on October 12. A copy of the matrix is attached. Test periods of ~4 hours were used. Two shifts per day operation was conducted for October 12 and 13. Tests No. 1 and 2 were conducted and the results are contained in the coal-fired summary sheet.
- October 13 -- Tests No. 3 and 4 were conducted and the results are contained in the coal-fired summary sheet.
- October 16 -- Three shifts per day operation was conducted for the week of October 16. The operation was to investigate deposition and perform matrix testing. Tests No. 6, 7 and 8 were completed and the results are contained in the coal-fired summary sheet.
- October 17 -- Tests No. 9, 10, 11A, 11B, 13, and 14 were completed and the results are contained in the coal-fired summary sheet. Test No. 12 was replaced with Tests No. 11A and 11B, 0/100/50/75 and 0/100/50/25, respectively.

  The cage mill was packed with coal during Test No. 14 and coal could not be transferred from the 25-ton main hopper to the 3-ton surge hopper; consequently, the boiler was down for approximately two hours.
- October 18 -- Tests No. 15, 16, 17, 18, and 19 were completed and the results are contained in the coal-fired summary sheet. Upon the conclusion of Test No. 16, a mill isolation valve (knife valve between the mill and burner) inexplicably closed. The boiler was brought back on line without any further incident. Penn State's Office of Physical Plant informed EFRC that there was an electrical spike at the East Campus Steam Plant (next door to the

demonstration boiler) around the time of the valve closure. The normally closed valve is pneumatically operated. Possibly the electrical spike caused a fluctuation in Penn State's air compressors, which in turn caused the valve to close due to insufficient air pressure to keep it open.

The dampers were set to conduct Test No. 20 and the flame was observed to be on the back wall. The test was not conducted and testing continued with Test No. 21.

- October 19 -- Tests No. 21, 22, 25, and 29 were completed and the results are contained in the coal-fired summary sheet. Tests No. 23, 24, 26, 27, and 28 were not conducted because the flame was on the back wall.
- October 20 -- Tests No. 30, 31, 33, and 35 were completed and the results are contained in the coal-fired summary sheet. Test No. 32 was not conducted because the flame was on the back wall during Test No. 31; damper settings for Test No. 32 would have resulted in a long flame also.
- October 23 -- The boiler was not operated because the site was prepared for an open house on October 24.
- October 24 -- Testing resumed with two shift per day operation. Two tests were conducted with damper settings of 100/100/50/0 and coal transport air levels of 385 and 340 acfm.

  A Micronized Coal transfer session was held at Penn State and was attended by delegates from New State Electric & Gas Corporation, CONSOL, Eastman Kodak, and the U.S. Department of Energy. Presentations were given by Penn State, ABB CE, and TCS Inc. (mill manufacturer), and the boiler was toured during micronized coal firing.
- October 25 -- Two tests were conducted with damper settings of 100/100/50/0 and coal transport air levels of 300 and 400 acfm.
- October 26 -- The boiler was cleaned to remove ash from the furnace and the breaching which connects the boiler outlet to the heat-pipe heat exchanger. This was done in preparation of a 12-day test (24 hour/day operation over a two week period including the weekend). Work on assembling a new floor air sparge system was started.
- October 27 -- The air sparge system was completed and installed. The boiler was prepared for the testing to begin on midnight Sunday (October 29).
- October 30 -- The continuous test began at midnight Sunday (October 29). The boiler was brought down at 0800 hours to repair the chemical feed line into the

steam drum. Steam was leaking around the pipe. Coal firing resumed at ~1600 hours.

- October 31 -- Continuous micronized coal testing was conducted. ABB CE performed in-furnace testing. The furnace was mapped for gaseous concentration, temperature, and heat flux. In addition, an in-furnace camera was used to observe and record the inside of the furnace, and Penn State used an in-situ particle counter-sizer-velocimeter to map the furnace.

November 1995

During November, activities focused on completing the long-term test to investigate deposition (which started in October), replacing worn bagfilters in the baghouse, conducting combustion performance testing, and performing data reduction. A day-by-day synopsis of the boiler operation for November is:

- November 1 -- A test to investigate deposition was started on Sunday, October 29, 1995 at midnight. The plans were to operate 24h/day for twelve days (two weeks of operation including the weekend). The boiler was brought down at 0800 hours (all time is referenced as military time) on October 30, 1995 to repair the chemical feed line into the steam drum. Steam was leaking around the pipe. Coal firing resumed at ~1600 hours and was fired for 24 hours on October 31, 1995.

  Operation on November 1 was a continuation of that on October 31, 1995. The burner was operated with the primary air damper 100% open, the secondary air damper closed (0% open), the tertiary air damper 25% open, and the radial damper closed (100/0/25/0; Subsequent discussions of damper settings will use this type of identification).

  The boiler was operated until 1230 hours and was shutdown to replace the bearing in the ash screw which transfers ash from the baghouse to the ash storage bin. While the bearing was being replaced, two thermocouples were installed on the end of the burner to monitor metal temperature (burner metal temperature is contained in the attached coal-fired summary sheet). Operation resumed at 2200 hours.

  Particulate samples were collected from the cyclone (located in the ducting prior to the baghouse) and baghouse outlet. Coal combustion efficiency, based on the baghouse sample (subsequent combustion efficiencies are based on the baghouse sample), averaged 98.5±0.1% for samples collected from 0000 to 0800 hours. NO_x and CO emissions averaged 573 and 107 ppm, respectively, at an O_2 concentration of 3.5%. Combustion results after replacing the ash screw bearing (2200 to 2400 hours) were 96.6% combustion efficiency, and 410 and 129 ppm NO_x and CO, respectively, at an O_2 concentration of 3.7%, damper settings of 100/100/50/50, and mill air flow of 320-340 acfm.

ABB CE performed in-furnace testing which started ~2200 hours and continued into the morning of November 2 (0400 hours). The furnace was mapped for gaseous concentration, temperature, and heat flux.

- November 2 -- Continuous micronized coal testing was conducted from 0000 to 0930 hours with the damper settings at 100/100/50/50 and 320-340 acfm mill air flow. Coal combustion efficiency averaged 96.7±0.6% and NO_x and CO emissions averaged 430 and 150 ppm, respectively, at an O_2 concentration of 3.5%.

  Mill air flow was then increased to 380-400 acfm at 1030 hours and testing continued through 1200 hours on 11/03/95. The average combustion efficiency and emissions for this period were 96.3±0.6%, 172 ppm CO, and 408 ppm NO_x.

  ABB CE performed in-furnace testing on November 2 at the higher mill air flow rate. The furnace was mapped for gaseous concentration, temperature, and heat flux. In addition, Penn State used an in-situ particle counter-sizer-velocimeter to map the furnace.

- November 3 through 6 -- On November 3 at 1200 hours, the burner damper settings were changed to 100/100/50/0 to shorten the flame because it was striking the back wall. The boiler was operated at this set of conditions, with ~400 acfm mill air flow, until 1800 hours. At 1800 hours, the mill air flow was reduced and the boiler was operated at 350 to 385 acfm until it was shut down on November 6. Averaged results for this time period are contained in the coal-fired summary sheet.

  The boiler was shut down on November 6 at 1230 hours because ash was observed coming from the stack. A manhole in the baghouse hopper was opened and the bottom of the baghouse was inspected to determine if bagfilters had come loose and fallen into the hopper. Since none were found, it was suspected that there were bagfilters with holes. The top of the baghouse was opened to see if failed bags could be identified by ash on the plenum (bagfilter outlet to the ID fan). None could be identified during a brief inspection. It was too warm to work on the top of the baghouse; therefore, the top was closed and the baghouse was allowed to cool down prior to further action.

The boiler was opened up to cool down in order to clean the furnace and breaching. In addition, equipment maintenance was conducted and data reduction performed.

- November 7 -- The top of the baghouse was opened again to identify failed bagfilters. However, it started to rain and work was stopped. The cleaning of the boiler was completed and data reduction continued.
- November 8 -- Pulverized limestone was fed into the boiler (with the ID fan on) and drawn into the baghouse. Six bags were found to be defective after opening the top of the baghouse and checking the plenum. The bags/cages were removed and lowered to the ground. In addition, data reduction continued.
- November 9 -- Six new bags were installed on the cages and they were reinstalled in the baghouse. Limestone was fed into the boiler to condition the bags. The plenum was checked and no leaks were detected. The boiler was then cleaned to remove excess limestone from the system. The floor air sparge system was assembled.
- November 10 -- Water and steam were introduced into the boiler and a cold startup was conducted to prepare for testing on Monday.
- November 13 and 14 -- The boiler was brought on line at midnight on Sunday, November 12, 1994 to conduct a week of continuous testing. After firing for two hours, the boiler was brought off line because the rotary valve located between the baghouse ash hopper and ash screw was not operating. The valve was made operational and testing resumed at 1200 hours and continued through 2230 hours on November 14. The boiler was operated with damper settings of 100/100/50/0 and mill air flows of 370 to 400 acfm. Testing was stopped on November 14 because water/oil were detected in the sample line.
- November 15 -- The analyzers were repaired and the boiler was brought back on line at the start of the midnight (November 16) to 8 a.m. shift.
- November 16 and 17 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flows of 370 to 410 acfm.
- November 20 -- The boiler was drained of water and the ends of the steam and mud drum were removed in preparation of the yearly boiler inspection (conducted for insurance purposes). The furnace and breaching were cleaned of ash and 275 and 94 lb were removed, respectively. A new floor ash sparge system was constructed. In addition, data reduction was conducted.

- November 21 -- The boiler was inspected, the drums sealed, water and steam reintroduced into the boiler, and the boiler was brought on line. However, computer (data acquisition system) problems were experienced and the boiler was shut down until the next day.
- November 22 -- The computer for the data acquisition system was replaced and the system made operational. The boiler was operated from 1630 to 2230 hours with damper settings of 100/100/50/0 and mill air flows of 375 to 400 acfm.
- November 23 -- Thanksgiving Holiday
- November 24 -- Data reduction was conducted.
- November 27 -- Testing was not conducted because the boiler control panel did not have power. The system was made operational for testing the following day.
- November 28 -- The boiler was operated for one shift with damper settings of 100/100/50/0 and mill air flows of 380 to 400 acfm.
- November 29 -- The boiler was operated for one shift with damper settings of 100/100/50/0, mill air flows of 300 to 330 acfm, and a coal gun setting of 36.5" . All previous testing in November was with a coal gun setting of 39.5".
- November 30 -- The boiler was operated for two shifts with the first shift conducting testing with damper settings of 100/100/50/0, mill air flows of 300 to 330 acfm, and a coal gun setting of 39.5" . The second shift started testing with damper settings of 100/100/50/0, mill air flows of ~400 acfm, and a coal gun setting of 39.5". Testing was terminated after two hours because ash was again observed being emitted from the stack indicating that more bags were failing.

December 1995

During December, activities focused on conducting a second long-term test to investigate deposition (the first was conducted in November 1995), replacing worn bagfilters in the baghouse, and performing data reduction. A day-by-day synopsis of the boiler operation for December is:

- December 1 -- Testing was terminated on November 30, 1995 because ash was observed being emitted from the stack indicating that bags were failing. This was the second time this occurred in less than a month. During the first incident, six bags were found with holes and were replaced. This time a decision was made to replace all the bags (There is a total of 196 in the baghouse.) at one time rather than a few every three weeks.

Activities included data reduction and equipment maintenance (i.e., replacing the transfer fan shaft and impellers).

- December 4 -- New bags were ordered with a partial delivery expected Friday, December 8, and the balance on Monday, December 11. Approximately 150 of the bags/cages were removed from the baghouse and put on top of the boilerhouse. The venturis and bags were removed from the cages, the bags were put into drums for disposal, and the cages and venturis were stacked on the roof of the boilerhouse.
- December 5 -- The remaining bags were removed, except for the six that were replaced in November, and twenty bags (which were on hand as spares) were installed.
- December 6 -- Site cleanup (from the bags removal) and data reduction were conducted.
- December 7 -- Site cleanup and data reduction were conducted.
- December 8 -- Data reduction was performed. The cages and venturis were brought down from the roof of the boilerhouse and stacked in the Fuel Preparation Facility in preparation for installing the first shipment of bags.
- December 9 (Saturday) -- The first shipment of bags were installed on 113 of the cages. The venturis were attached and the bags/cages were installed in the baghouse.
- December 11 -- The remaining 57 bags were installed on the cages.
- December 12 -- The venturis were attached on the remaining cages, and the bags/cages were installed in the baghouse. Limestone was put into the duct upstream of the baghouse to condition the bags.
- December 13 -- The deposition test was started. The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of ~375 acfm.
- December 14 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of ~375 acfm.
- December 15 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of ~375 acfm.
- December 16 (Saturday) -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of ~375 acfm.
- December 17 (Sunday) -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of ~375 acfm.

- January 9 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of ~370 to 400 acfm. The coal feed rate was changed to 19.8 lb/m (to maintain a firing rate of 15.6 MM Btu/h) at 1630 hours after a new coal calorific value was received.
- January 10 -- The boiler came off line at 0130 hours due to low feedwater level in the steam drum. Penn State's steam plant personnel were making adjustments on the East Campus Steam Plant boilers and insufficient feedwater to the demonstration boiler resulted. The demonstration boiler was brought back on line and was firing 100% coal at ~0430 hours at a rate of 19 lb/m.

  The steam back pressure regulator valve (which regulates the steam flow from the boiler into the University's steam distribution line and hence the steam drum pressure) was not maintaining the desired ~200 psig pressure. The pressure was 120 to 185 psig resulting in steam flows exceeding 15,000 lb/h. Since the test was a deposition test, it was decided to continue operating but note the conditions the steam was produced at so that the boiler derating results would not be biased.

  The boiler was shut down at 1130 hours due to no coal available. A coal delivery was received from Bradford coal at ~1500 hours and the boiler was firing 100% coal at 1800 hours at a rate of 19.8 lb/m.
- January 11 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of 365 to 395 acfm. The steam pressure was increased to ~210 psig and maintained at ~200 psig for the duration of the test after tapping on the back pressure valve.
- January 12 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of 370 to 400 acfm except for one hour from 1700 to 1800 hours. The main coal storage hopper plugged resulting in a loss of coal feed. The boiler was back at 100% coal firing at 1800 hours. It was observed that some deposits burned off when bringing the boiler back on line.

  A hand-held lance, operated with compressed air, was constructed to remove ash deposits from the tubes at the convective pass entrance in order to keep the entrance clear and prolong boiler operation. The lance was inserted into a sight port located on the boiler sidewall directly across from the convective pass entrance with minimal success.
- January 13 (Saturday) -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of 370 to 395 acfm.

- January 14 (Sunday) -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of 375 to 400 acfm.
- January 15 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of 375 to 400 acfm. Deposition became noticeable in convective pass and the boiler outlet pressure increased from ~-1.0 to -1.3" H_2O.
- January 16 -- The boiler was operated continuously with damper settings of 100/100/50/0 and mill air flow of 380 to 405 acfm until 1730 hours. The boiler outlet pressure increased to -1.8 to -1.9" H_2O at ~0500 hours and the gauge went off scale

  (-2.0" H_2O) at 1300 hours. The convective pass entrance was nearly plugged but the ID fan amperage (which is an indication of deposition in the convective pass) remained relatively unchanged. The boiler was shut down at 1730 hours due to a hot spot appearing on the back wall. A total of 176 hours of coal firing were obtained during this test with the last 95.5 hours continuous.
- January 17 -- Photographs of the ash deposition/accumulation in the boiler were taken and are attached. The boiler was cleaned and 858.3 and 82.5 lb of ash were removed from the furnace and breaching, respectively.

  Data reduction was performed.
- January 18 -- Activities included performing data reduction, hauling a load of fly ash to the Bradford ash disposal site, and removing and cleaning components of the back pressure regulator valve.
- January 19 -- Preparations for conducting a fourth continuous deposition test starting on January 22 were made which included repairing water lines (for conditioning the fly ash) on the ash screw and cleaning gas sample lines in the emissions monitoring system. In addition, data reduction was conducted.
- January 22 -- The third deposition test was started. The test was to begin at midnight (Sunday, January 21) but was delayed until 1530 hours due to water softener repair (on Penn State's power plant equipment). The boiler was operated with damper settings of 100/100/50/0. Coal feed was lost at 2100 hours due to the main coal hopper plugging. The boiler was brought back on line and data were recorded starting at 2230 hours.
- January 23 -- Fly ash was observed being emitted from the stack during sootblowing at 0400 hours. The boiler was shut down at 0700 hours.

  Limestone was fed into a port upstream of the baghouse in order to identify problem bagfilters. A ring of limestone was observed around two venturis.

The two bagfilters were removed and inspected. No problems with them were noted. All the bagfilters were on the cages. All of the venturis were tightened and the baghouse top was closed.

The boiler was brought on line at 2300 hours on natural gas. Natural gas was fired for several hours before switching to coal in order to heat the baghouse.

- January 24 -- Coal was introduced to the boiler at ~0330 hours and 100% coal firing was started at 0400 hours. Fly ash was again observed being emitted from the stack and the boiler was shut down at 0530 hours.

  Discussion were held with Air Engineering Services (AES), the local representative through which the baghouse was purchased, to order gaskets for the venturis and material to conduct a blacklight test (to determine if there were cracked welds on the tubesheet).

  Date reduction was performed.
- January 25 -- A order was placed for venturi gaskets and the materials for a blacklight test (fluorescent powder and blacklight). Activities included equipment maintenance and repair (i.e., plugging leaks in the transfer fan, steam valve leak). Data reduction was also performed.
- January 26 -- Data reduction and equipment maintenance and repair were conducted (i.e., steam valve leak).
- January 29 -- Data reduction and equipment maintenance and repair were conducted (i.e., plugging a leak in the boiler access door).
- January 30 -- Data reduction and routine equipment maintenance were conducted.
- January 31 -- Personnel from ABB CE arrived with a modified burner. Minor changes were made to the modified burner (tabs were welded over air inlets and the burner was shortened by ~1.5") and it was installed.

  The baghouse was inspected by ABB CE personnel who concluded that the gasket between the tubesheet and two baghouse walls (inlet and outlet sides) was missing. High-temperature silicone was applied and allowed to dry overnight.

February 1996

During February, activities focused on testing the movable-block RSFC when firing natural gas, conducting a fourth long-term test to investigate deposition, analyzing samples, and performing data reduction. A day-by-day synopsis of the boiler operation for February is:

- February 1 -- The movable-block RSFC burner was tested firing natural gas under the direction of ABB/CE personnel. The burner was removed at the end of the day and ~65% of the primary and secondary air areas were closed off by welding plates over the air inlets.
- February 2 -- EFRC and ABB/CE personnel were informed by Office of Physical Plant (OPP) personnel that the gas company (Columbia Gas) was implementing a natural gas curtailment effective Saturday, February 3, 1996 at 8:00 am due to very cold weather. It was the intention to operate the boiler for ABB/CE on Saturday, and possibly Sunday, to obtain performance data. However, after receiving word about the gas curtailment, it was decided to operate the boiler through the night and shut down prior to the 8:00 am deadline.

  The burner was reinstalled and testing continued firing natural gas. The burner was removed at noon and additional open combustion air areas were covered. Rather than incrementally closing off air inlet area, it was decided to close off the maximum possible area that could be tolerated before the welder went off work. As open area was needed, the burner would be removed and plates ground off the air inlets.

  The burner was tested until midnight. Upon ABB/CE personnel instruction, the burner was removed and loaded into ABB/CE's van for transportation back to ABB/CE's facilities.
- February 5 -- The natural gas curtailment was still in effect. Activities focused on analyzer repair and equipment maintenance.
- February 6 -- The natural gas curtailment was still in effect. Activities focused on analyzer repair and equipment maintenance.
- February 7 -- The natural gas curtailment was lifted. The RSFC was reinstalled in order to conduct a final continuous/deposition test planned to begin on February 12, 1996. The boiler system was fired using natural gas for several hours in order to heat the system. Micronized coal was fired for ~1.5 hours to check for fly ash emissions from the system. No ash was observed.
- February 8 -- The boiler was fired on coal for a second day to check for fly ash emissions. Ash was observed emitting from around the cyclone sampling port prior to the baghouse. The leak was fixed and the system readied for the continuous/deposition test.
- February 9 -- Final preparations were completed for the continuous/deposition test to start on February 12.

- February 12 -- Continuous/deposition test #4 was started at 0000 hr (military time; Sunday night midnight). The boiler was firing 100% coal at 0500 hr with damper settings of 100/100/50/0 (primary air/secondary air/tertiary air/radial damper) and 19 lb coal/m (~15.2 MM Btu/h).

  The hand-held air lance that was constructed last month to remove ash deposits from the tubes at the convective pass entrance was modified. The end was modified by reducing the number of openings for the compressed air from four (1 axial and 3 radial) to one (radial).
- February 13 -- The boiler was operated continuously with damper settings of 100/100/50/0. The firing was reduced to 12.0 MM Btu/h (15 lb coal/m) at 0830 and operated at the lower load for eight hours to simulate reduced steam demand. At 1630 hours the firing rate was increased to 15.6 MM Btu/h (19.5 lb coal/m).
- February 14 -- The boiler was operated continuously with damper settings of 100/100/50/0. The firing was reduced to 12.0 MM Btu/h at 0830 and operated at the lower load for eight hours. At the lower firing rate the flame was longer and impinged on the back wall. The mill air flow was reduced from ~380 acfm to ~350 acfm and the O_2 concentration was increased from ~3.7% to 4.2% to reduce the flame length. At 1645 hours the firing rate was increased to 15.6 MM Btu/h.

  The hand-held air lance was not able to remove ash deposits building on the tubes at the convective pass entrance.
- February 15 -- The boiler was operated continuously with damper settings of 100/100/50/0. The firing was reduced to 12.0 MM Btu/h at 0830 and operated at the lower load for eight hours. To shorten the flame, the O_2 concentration was increased from 3.7% to 5.3% . At 1630 hours the firing rate was increased to 15.6 MM Btu/h.

  The boiler was shut down at 2300 hr because a screwdriver was dropped into the Redler conveyor (conveyor located between the cage mill and surge bin) while trying to unplug the cage mill of packed coal. Portions of the conveyor were disassembled in order to find and remove the screwdriver to ensure that it would not pass through the coal feed system in the TCS mill.
- February 16 -- The screwdriver was retrieved, the Redler reassembled, and the boiler was fired with 100% coal at a firing rate of 15.6 MM Btu/h at 0400 hours with damper settings of 100/100/50/0. The firing rate was reduced to 12.0 MM Btu/h at 0830 hr and operated at the lower load for eight hours. To shorten the

flame, the O_2 concentration was increased from 3.7% to 5.3% . The coal feed rate was increased from 15 lb/m to 17 lb/m at 1630 hr and to 19.5 lb/m (15.6 MM Btu/h) at 1830 hr.

- February 17 (Saturday) -- The firing rate was reduced to 12.0 MM Btu/h at 0830 hr and the dampers changed to 100/100/28/0 in order to reduce the length of the flame. Because of a significant buildup of ash on the convective pass entrance, it was decided to maintain the lower firing rate for the duration of the testing. The O_2 concentration was increased from 3.6% to 5.0%.

  The boiler was shutdown at 2230 hr due to ash plugging the convective pass entrance. The continuous/deposition test length was a total of 133.6 hours with 90.8 hours accrued from 02/12/96 through 02/16//96 and 42.8 hours from 02/16/96 and 02/17/96. Approximately 984 total hours of 100% micronized coal-fired operation was obtained in Task 5.0 from July 1995 to February 12, 1996.

- February 18 (Sunday) -- Photographs of the ash deposits were taken and copies are attached. The ash was removed from the firebox and breaching, the ducting connecting the boiler outlet with the heat pipe heat exchanger. A total of 479.1 lb was removed, 381.5 lb from the firebox and 97.6 from the breaching.

  The boiler was brought back on line in order to obtain the 1,000-hour milestone firing 100% micronized coal. The boiler was fired at 20 lb coal/m with damper settings of 100/100/28/0.

- February 19 -- The boiler was continuously operated until 1630 hours which produced 1,002.5 cumulative hours firing 100% micronized coal during Task 5.0 testing. During the last day of operation, the coal feed was reduced to 19 lb/m at 0130 hr and to 15 lb/m (12.0 MM Btu/h) at 0730 hr.
- February 20 -- Activities included sample analysis and data reduction.
- February 21 -- Activities included sample analysis and data reduction.
- February 22 -- Activities included sample analysis and data reduction.
- February 23 -- Activities included sample analysis and data reduction.
- February 26 -- Activities included sample analysis and data reduction.
- February 27 -- Activities included sample analysis and data reduction.
- February 28 -- Activities included sample analysis and data reduction.
- February 29 -- Activities included sample analysis and data reduction.

Appendix B. Task 5 Data Summary

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
7/24/95	1200	2.05	39	10.47	38		13.1	12,588	8 to 8	210	7.6				3,890	381	NA	526	341		open	open	closed		out	-4
(Gas firing)	1220	2.90	37	10.03	38		13.1	12,013	10.0	210	7.3				3,910	380		530	344		open	open	open 1/4		out	-4
	1250	1.00	305	11.00	37		13.1	12,250	6 to 8	207	8.0				3,540	381		524	340		open	open	closed		out	-4
	1415	1.00	78	11.01	43		17.0	15,488	8.5 to 9.5	215	5.6				4,660	394		570	369		open	open	open		out	-3
	1450	1.40	52	10.84	42		17.0	15,500	9 to 10.5	217	5.3				4,690	395		572	373		open	open	open		out	4
	1535	1.10	66	10.97	44		17.0	15,751	9.5 to 11	215	5.4				4,680	393		571	372		open	open	open		out	1
	1552	1.00	66	11.00	44		17.0	15,500	9.5 to 10.5	220	5.5				4,850	392		572	372		open	open	open 85%		out	4
	1615	0.90	65	11.00	44		17.0	15,813	9 to 10	218	5.7				4,570	387		573	372		open	closed	open		out	4
	1700	0.90	63	11.10	35		8.9	8,950	5 to 8	200	1.6				2,400	368		481	318		open	closed	open		out	4
	1720	2.80	43	10.10	36		9.2	8,725	7 to 8.5	200	3.2				2,810	382		483	318		open	open	open 25%		out	
7/25/95	0930	2.80	108	9.50			13.1	12,813	8.0	210	7.0				4,080	372		531	338		open	closed	open 50%		out	-1
(Gas firing)																										
	0955	2.80	30	9.48	40		13.3	12,575	9.0	210	7.1				4,050	374		533	342		open	open	open 50%		out	-4
	1045	1.48	27	10.48	40		17.0	15,713	10 to 11	215	3.4				4,720	388		569	370		open	open	open		out	-4
	1210	2.05	130	10.17	47		17.1	15,750	11.0	217	5.5				4,680	390	183	576	378		open	open	open		out	4
(75% load)																										
3% O2	1450	3.06	45	9.67	44		13.2	12,256	8.5 to 10	210	6.7				3,920	367		531	346		open	open	open 25%		out	-4
2% O2	1530	2.13	49	10.14	44		13.2	12,484	8 to 9.5	207	6.1				3,740	371		528	344		open	open	open 25%		out	-4
1% O2	1600	1.25	65	10.55	43		13.2	12,084	7.5 to 9.5	210	5.5				3,560	372		525	343		open	open	open 25%		out	-4
7/26/95	1010	1.55	33	11.06	21		16.9	15,639	10 to 12	215	5.5				4,760	388		567	364		open	open	open		out	4
(Gas firing;	1240	1.16	47	11.14	29		17.1	15,676	9 to 10.5	217	5.5				4,690	392		570	371		open	open	open		out	0
100% load)																										
7/27/95	1445	2.53	389	16.20	393	439	14.8			200	4.0						371			931	open	open	closed		-5	-9.5
(Coal firing)	1453	3.20	450	16.34	396	421	14.8	11,193	10 to 11	200	3.5				2,880	393	359	517	348		open	open	open 25%		-5	-9
	1515	2.91	422	15.45	350	415	14.8	10,797	9.5 to 11	200	3.1				2,820	393	359	518	350		open	open	open 25%		-5	-9
	1519	2.88	776	15.60		419	14.8	11,060	8 to 9	205	2.5				2,800	393	354	518	360		open	open	open 75%		-5	-9
	1537	3.19	348	15.47		404	14.8	10,680	8.5 to 10	200	3.2				2,920	395	365	530	352		open	open	open 50%		-5	-9
	1557	3.08	350	16.05		410	14.8	10,919	9 to 10.5	200	4.0				3,020	398	366	538	356		open	open	open 25%		-5	-9
7/28/95	1300	3.04	183	15.14	322	388	15.4	12,470	10.0	200	7.6				3,330	409	364	564	369		open 50%	open	closed		-5	-9
(Coal firing)	1321	3.50	202	15.07		373	15.4	12,134	7.5 to 9	203	7.2				3,410	412	362	569	372		open	open	closed		-5	-9
	1333	3.03	241	15.57		383	15.4	12,632	7.5 to 10	200	5.1				3,430	414	356	571	372		open	open	open 25%		-5	-9
	1343	2.72	270	15.79		394	15.4	12,613	8.5 to 10	205	4.1				3,410	415	358	569	373	1,045	open	open	open 50%		-5	-9
	1359	3.09	205	15.37		383	15.4	11,895	8.5 to 10	200	5.1				3,490	416	369	575	375	1,044	open	open	open 25%		-5	-9
	1412	3.03	253	15.66		383	15.4	11,774	8.5 to 9.5	205	5.3				3,400	413	358	573	374	1,042	open	open 50%	open 25%		-5	-9
	1433	3.06	226	14.98		376	15.4	13,550	7.5 to 9	200	6.0				3,540	414	362	582	378	1,058	open 50%	open	open 25%		-5	-9
	1510	2.71	219	15.94		386	15.4	13,925	7.5 to 9	200	6.1				3,510	419	358	588	379	1,067	open 50%	open 50%	open 25%		-5	-9
	1522	2.94	227	15.87		389	15.4	12,616	7.5 to 9	200	6.4				3,570	417	353	590	380	1,079	open 50%	open 50%	open 25%		-7	-9
	1536	3.03	201	15.03		375	15.4	13,394	10 to 11	210	6.7				3,710	419	367	602	383	1,095	open 50%	open 50%	open 25%		-3	-9
7/31/95	1635	2.72	153	16.18	560		15.4	11,750	10.0		6.3				3,630	420	372	593	381		open 50%	open 50%	open 50%		-5	-8
(Coal firing)																										
8/1/95	1607	1.35	61	11.41	48		8.5	8,490	9.5	205	1.3				2,130	375		471	321	813	open	open	open 75%		out	4
(Gas firing)	1700	1.48	52	11.40	45		8.5	9,320	8.0	200	1.8				2,130	367		469	315	812	open	open	open 75%		out	4
8/3/95	1107	2.68	198	15.62	433	413	15.4	13,000	11.0	207	7.2				3,210	404	350	529	354		closed	closed	closed		-7	-7
(Coal firing)	1134	2.77	158	15.57	498	401	15.4	13,115	11.5	207	8.0				3,340	401	357	542	361	1,013	closed	closed	closed		-7	-7
	1205	2.36	190	15.53	477	408	15.4	12,500	10.0	205	7.9				3,410	401	322	539	362	1,017	closed	closed	closed		-7	-7
	1223	3.22	183	15.35	457	392	15.4	12,850	9.0	205	7.8				3,350	401	315	543	362	1,015	closed	closed	closed		-7	-7
	1253	2.85	166	15.32	479	394	15.4	13,033	11.0	203	7.9				3,310	402	307	548	363	1,033	closed	closed	closed		-7	-7
	1317	2.60	158	15.75	508	401	15.4	13,050	11.5	205	8.0				3,360	402	299	550	365	1,036	closed	closed	closed		-7	-7
	1347	2.12	515	16.36	458	428	15.4	12,870	10.0	205	7.2				3,200	408	300	547	364	1,035	closed	closed	closed		-7	-7
	1441	2.67	202	15.52	466	409	15.4	12,980	11.0	203	4.4				3,310	414	282	561	370	1,059	open 75%	closed	closed		-7	-7
	1501	3.20	187	15.37	476	401	15.4	12,500	12.0	203	3.5				3,410	415	302	571	373	1,086	open	closed	closed		-7	-7
	1548	2.64	169	15.50	438	389	15.4	12,880	12.0	202	3.5				3,360	392	272	521	356	989	open	closed	closed		-7	-7
	1615	1.84	366	16.24	480	420	15.4	13,630	12.0	203	3.6				3,370	395	276	528	358	1,028	open	closed	closed		-7	-7
	1640	2.40	216	16.33	566	421	15.4	14,100	12.0	204	7.2				3,600	395	288	543	362	1,031	open 25%	closed	closed		-7	-7
	1700	2.74	168	15.71	547	417	15.4	14,300	13.0	207	4.4				3,680	402	294	556	367	1,066	open	closed	open 50%		-7	-7
	1730	2.79	171	15.41	517	425	15.4	14,900	13.0	205	4.4				3,940	408	382	574	377	1,098	open	closed	open 50%		-7	-7
	1744	4.15	171	14.35	556	386	15.4	14,000	12.0	202	4.4				3,950	414	378	581	382	1,097	open	closed	open 50%		-7	-7
	1830	4.60	185	13.80	472	357	15.4	12,708	13.0	206	4.8				3,940	418	377	587	387	1,402	closed	closed	open		flush	-7
	1845	4.58	335	14.19	394	348	15.4	13,205	12.5	205	4.7				3,600	415	360	573	380	1,107	closed	closed	open		2	-7
	1900	4.39	210	14.68	402	344	15.4	13,138	12.5	202	4.3				3,680	412	333	575	378	1,106	closed	closed	open		2	2
	1915	3.64	224	14.80	429	362	15.4	12,563	11.5	202	6.8				3,500	412	340	573	375	1,102	closed	closed	closed		2	2
	1930	4.38	187	13.92	450	340	15.4	13,295	9.5	202	6.8				3,700	412	342	583	379	1,113	closed	closed	open 25%		2	2
	1945	3.76	306	15.16	412	363	15.4	13,092	11.0	200	7.8				3,380	409	341	572	378	1,097	open	closed	closed		2	0
	2000	3.28	163	15.00	470	363	15.4	12,996	11.0	200	8.0				3,440	405	331	581	376	1,101	open	closed	closed		0	0
	2015	3.04	154	15.86	633	389	15.4	13,645	11.0	210	8.2					405	344	586	379	1,099	open	closed	closed		2	2
8/8/95	1210	1.52	171	11.79	119		16.6	15,081	13.0	215	5.5				4,450	400	0	560	369	1,136	open 75%	closed	open		flush	-9
(Coal firing	1743	2.91	388	16.23	398	423	15.4	11,239	13.0	195	3.0				3,210	409	345	545	359	1,034	closed	closed	open		42.25	-8.5
except for	1805	3.19	305	16.31	344	464	15.4	12,717	12.5	200	3.3				3,220	412	314	551	361	1,028	closed	closed	open		42.25	-8.5
1210 which	1830	2.44	721	16.94	357	523	15.4	12,949	12.5	200	3.2				3,220	415	291	564	364	1,089	closed	closed	open		42.25	-8.5
was gas firing)																										

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	SH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
8/9/95	0900	3.65	145	15.79	333	513	15.6	12,500	13.0	203	3.4				3,460	408	326	565	362	1,078	closed	closed	open		42.25	-8.5
(Coal firing)	0930	3.85	234	16.09	348	526	15.6	13,500	12.5	198	3.7				3,650	422	343	587	375	1,127	closed	closed	open		42.25	-8.5
	1000	3.99	289	15.66	362	516	15.6	13,179	13.0	195	4.0				3,670	428	352	597	382	1,149	closed	closed	open		42.25	-8.5
	1030	3.41	174	15.46	363	5123	15.6	13,384	13.0	195	4.0				3,720	433	351	608	385	1,156	closed	closed	open		42.25	-8.5
	1100	3.42	206	15.83	371	525	15.6	13,436	13.0	200	4.0				3,670	436	352	612	389	1,176	closed	closed	open		42.25	-8.5
	1130	3.31	187	15.88	393	523	15.6	13,777	13.0	197	4.0				3,670	439	353	620	394	1,182	closed	closed	open		42.25	-8.5
	1206	3.33	204	15.66	384	500	15.6	14,061	13.0	200	3.6				3,580	400	337	532	363	1,021	closed	closed	open		42.25	-8.5
	1230	3.09	179	15.76	415	517	15.6	13,217	13.0	200	3.8				3,550	401	313	545	362	1,048	closed	closed	open		42.25	-8.5
	1400	2.27	108	16.49	684	582	15.6	14,374	11.5	200	8.2				3,600	407	326	584	379	1,102	open	closed	closed		42.25	-8.5
	1430	2.37	117	16.09	675	553	15.6	13,962	12.0	200	8.2				3,580	409	315	591	384	1,112	open	closed	closed		42.25	-8.5
	1500	2.52	114	16.36	701	557	15.6	14,704	11.5	200	8.2				3,560	413	330	599	388	1,130	open	closed	closed		42.25	-8.5
	1530	3.08	118	15.92	688	540	15.6	14,338	11.5	195	8.2				3,550	416	319	605	391	1,125	open	closed	closed		42.25	-8.5
	1600	2.80	126	16.88	674	553	15.6	14,031	11.5	197	8.3				3,580	422	331	612	398	1,136	open	closed	closed		42.25	-8.5
8/10/95	1100	1.63	160	11.51	420	5	17.1	16,530	8.0	191	6.0				4,660	390	nm	566	376	1,091	100%	100%	100%		0	4
(Coal firing	1345	3.33	139	15.51	420	520	15.4	14,217	10 to 11	190	4.5				3,590	401	375	557	366	1,038	open	closed	open		33.25	-7
except for	1415	3.45	130	15.76	440	524	15.4	14,606	10 to 11	195	4.6				3,670	407	370	564	373	1,028	open	closed	open 75%		33.25	-7
1100 which	1445	3.61	119	15.84	453	530	15.4	14,466	10 to 11	196	4.4				3,630	412	372	571	377	1,035	open	closed	open 50%		33.25	-7
was natural	1505	3.19	125	15.62	441	543	15.4	14,035	10 to 11	195	6.5				3,660	413	371	573	378	1,031	open	closed	open 25%		33.25	-7
gas firing)	1530	3.99	125	15.77	475	534	15.4	14,453	10 to 11	190	7.2				3,660	412	378	580	380	1,045	open	open	open 12%		33.25	-7
	1555	3.83	127	15.68	468	537	15.4	14,470	10 to 11	195	6.8				3,650	415	382	589	384	1,066	open	closed	open 50%		33.25	-7
	1620	4.19	133	14.81	411	520	15.4	14,423	10 to 11	190	5.0				3,690	420	369	591	387	1,068	closed	closed	open		33.25	-7
	1635	3.93	137	15.02	397	530	15.4	14,539	12	195	5.2				3,660	421	372	592	387	1,070	closed	closed	open		32.5	-6
	1650	3.04	146	15.73	378	559	15.4	14,034	12.5	195	5.2				3,700	421	381	592	387	1,071	closed	closed	open		31	-5
	1700	3.73	145	15.10	393	534	15.4	14,283	12.5	189	5.5				3,780	422	379	596	389	1,076	closed	closed	open		31	-5
	1735	3.70	190	15.09	353	533	15.4	13,369	10.5	195	4.6				3,740	424	369	601	391	1,049	closed	closed	open		27	2
8/21/95	1630	2.04	78	10.87	49	3	17.0	17,270	11.0						4,609	407	400	587	394	1,098	100%	100%	100%			
(Gas firing)																										
8/22/95	0935	2.43	55	11.06	58		16.0	15,000			6.7	3.0	-1.3	3.2	4,360	388		577			100%	100%	50%		33.375	4
(Gas firing)	0950	2.13	51	11.11	65		16.0	15,528			5.2	2.7	-1.4	3.1	4,333	400		579		1,139	100%	0%	100%		33.375	4
	1030	2.03	53	11.25	65		16.0	15,053			2.8	2.7	-1.4	3.2	4,352	403		579		1,138	100%	0%	90%		33.375	3
	1036	1.21	198	11.76	59		16.1	15,776			4.1	3.6	-1.6	3.2	4,150	398				1,119	100%	10%	40%		33.375	3
	1055	0.58	844	12.02	57		16.0	15,682			4.4	3.6	-1.6	3.2	4,000			572		1,126	100%	10%	75%		33.375	3
	1115	1.48	72	11.65	56		16.1	15,564			6.9	3.1	-1.2	3.3	4,226			571		1,129	100%	100%	33%		33.375	3
	1150	1.14	144	11.83	53		16.0	15,036			7.2	3.2	1.7	3.4	4,160			571		1,126	100%	50%	33%		33.375	3
	1200	1.68	152	11.52	58		16.0	15,732			6.8	3.2	-1.4	3.3	4,220			574		1,121	100%	65%	60%		33.375	3
	1205	1.91	152	11.31	60		16.0	15,899			6.8	3.1	-1.0	3.3	4,290			574		1,131	100%	100%	60%		33.375	3
	1230	1.02	78	11.75	61		16.0	16,030			5.7	3.6	-1.5	3.3	4,096			575		1,117	100%	0%	60%		33.375	3
	1245	1.93	48	11.30	67		16.0	15,497			5.3	2.7	-1.2	2.8	4,280			570		1,023	100%	0%	100%		33.375	3
	1315	1.89	60	11.36	64		16.0	15,381			4.7	2.4	-1.2	2.7	4,285			576		1,076	100%	50%	100%		33.375	3
	1320	1.98	176	11.31	63		16.0	15,731			4.5	2.2	-0.8	2.9	4,280			577		1,079	100%	100%	90%		33.375	3
	1415	1.06	89	11.78	61		16.0	15,390			7.0	4.3	-0.6	3.6	4,006			570		1,070	100%	100%	30%		39.375	-3
	1430	0.94	88	11.78	56		16.0	15,752			7.0	4.2	-0.5	3.5	4,006			570		1,071	100%	100%	30%		39.375	-3
	1525	2.00	59	11.28	56		16.0	14,934			6.6	3.3	-3.6	-0.8	4,445			575		1,085	100%	100%	30%		32.375	4
8/23/95	0817	1.61	35	11.50	60		16.0	14,843			5.4	2.2	-0.9	2.9	4,260	405		577		1,087	100%	100%	60%		29.5	3
(Gas firing	0832	0.99	151	11.82	57		16.1	14,770			5.4	2.6	-0.9	2.8	4,140	408		574		1,085	100%	100%	60%		29.5	3
0817 to 1125	0856	1.56	31	11.56	55		16.1	16,118			0.9	3.3	-1.0	3.4	4,320	395		576		1,076	100%	100%	30%		29.5	3
and coal firing	0912	0.96	112	11.82	57		16.1	15,915			6.6	3.3	-1.0	3.1	4,120	402		575		1,076	100%	100%	30%		29.5	3
1420 to 1715)	0940	1.61	31	11.50	56		16.1	16,063			7.0	1.6	-0.6	3.6	4,180	398		578		1,087	60%	100%	40%		29.5	3
	1021	2.04	21	11.30	72		16.2	15,741			6.0	2.2	-1.0	3.4	4,380	405		584		1,093	100%	0%	75%		29.5	3
	1041	1.12	43	11.78	56		16.2	16,616			7.0	3.5	-1.2	3.5	4,200	401		581		1,086	100%	0%	50%		29.5	3
	1051	0.40	1888	12.08	48		16.2	15,258			7.5	3.5	-1.5	3.4	4,030	399		574		1,079	100%	0%	25%		29.5	3
	1059	0.99	80	11.84	49		16.2	15,818			7.1	3.4	-0.8	3.4	4,170	398		576		1,080	100%	100%	25%		29.5	3
	1125	1.20	1896	11.50	53		16.2	15,537	12.5		5.0	1.3	0.0	3.1	4,090	408		576		1,120	35%	100%	100%		29.5	3
	1420	3.72	231	15.46	131		15.7	12,136	12.0		4.2	1.7	-0.5	2.9	3,352	396	357	540		972	35%	100%	100%		32	
	1440																						25%			
8/24/95	0912	3.17	231	15.29	363	555	15.7	13,053	12.5	190	4.5	1.5	0.0	3.2	3,450	419	360	580	373	1,083	100%	100%	50%		-3	out
(Coal firing)	941	3.31	201	15.34	455	561	15.7	14,020	10	188	7.8	3.4	0.0	2.9	3,550	420	367	594	381	1,068	100%	100%	0%		-3	out
	1042	3.67	125	15.58	455	551	15.7	14,135	12.0	191	7.8	3.0	0.0	2.7	3,620	398	364	547	365	978	100%	100%	0%		-7	out
	1130	2.84	139	16.02	521	531	15.7	13,625	10.0	185	8.5	3.4	1.0	2.7	3,493	392	372	550	364	981	100%	0%	0%		-5	out
	1151	2.66	141	15.88	498	531	15.7	14,145	9.5	184	8.4	3.4	1.2	2.9	3,530	392	353	553	367	891	100%	0%	0%		-4.5	-9
	1231	2.55	133	15.75	467	551	15.7	14,757	12.5	187	4.8	1.4	-0.6	2.5	3,480	405	325	559	371	1,008	100%	0%	50%		-9	-9
	1258	3.27	154	15.79	379	542	15.7	14,595	12.0	185	3.3	1.1	-0.7	2.1	3,550	406	318	566	374	1,011	100%	0%	100%		-9	-9
	1327	2.93	367	16.16	379	635	15.7	13,834	12	183	3	1.0	-0.6	1.9	3,370	407	326	562	374	997	100%	0%	100%		-13.5	-9
	1503	Uniform testing																								
8/25/95	uniform testing																									
(Coal firing)																										
8/28/95	uniform testing																									
(Coal firing)																										

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press. (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
8/29/95	1030	3.28	133	15.21	436	525	15.8	13,547	13.0	191	4.1		0.3	2.2	3,466	415	399	579	379	1,052	100%	100%	50%		-10.5	-9
(Coal firing)	1100	3.49	138	15.31	430	529	15.8	13,874	12.0	189	4.3	1.1	0.4	2.2	3,480	418	399	586	384	1,060	100%	100%	50%		-10.5	-9
	1130-1700	uniform testing																								
8/30/95 (Coal firing)	uniform testing																									
8/31/95 (Coal firing)	uniform testing																									
9/5/95	1130	Uniform testing																								
(Coal firing)	1400	3.85	87	15.64	479	512	15.0	13,822	12.5	190	5.1	0.6	0.2	2.8	3,630	414	378	548	384	991	100%	100%	50%		-10.5	-9
	1430	4.05	74	15.54	500	519	15.0	14,118	13.5	185	4.7	0.6	0.2	2.7	3,600	408	386	557	381	1,002	100%	100%	50%		-10.5	-9
9/6/95	0845	4.05	132	15.73	459	531	15.0	12,999	13.5	192	4.9	0.3	0.0	2.5	3,440	408	379	570	374	1,005	100%	0%	70%		-10.5	-9
(Coal firing)	0945	3.89	123	15.32	406	519	15.0	13,513	13.5	186	4.7	0.2	0.1	2.7	3,500	420	387	588	387	1,046	100%	100%	70%		-10.5	-9
	1015	3.72	144	15.48	413	532	15.0	13,599	13.5	186	4.7	0.3	0.0	2.7	3,440	423	380	592	389	1,070	100%	0%	70%		-10.5	-9
	1045	3.61	128	15.52	442	522	15.0	13,671	13.2	187	5.3	0.6	-0.2	2.7	3,330	428	381	603	394	1,091	100%	0%	50%		-10.5	-9
	1115	3.52	186	16.02	443	515	15.0	14,490	13.2	184	5.3	0.6	-0.2	2.6	3,380	410	388	545	377	1,001	100%	0%	45%		-10.5	-9
	1230	3.78	123	15.57	403	525	15.0	14,276	12.5	183	3.8	0.6	-0.2	2.3	3,430	412	370	574	386	1,031	100%	0%	100%		-10.5	-9
	1445	4.01	151	15.80	452	483	15.0	14,534	12.5	179	4.2	0.2	-0.3	2.4	3,510	415	382	557	388	1,005	100%	0%	75%		-10.5	-9
	1700	4.19	128	15.28	532	520	15.0	14,252	13.0	178	6.5	0.6	-0.6	3.3	3,500	426	394	603	402	1,091	100%	0%	25%		-10.5	-9
	1915	3.13	121	15.90	600	548	15.0	14,030	13.0	181	8.7	1.2	-0.9	3.6	3,350	408	389	595	393	1,087	100%	0%	0%		-10.5	-9
9/7/95	0930	3.57	119	15.59	414	539	15.0	13,246	13.0	183	8.3	0.8	-0.8	2.7	3,330	422	393	609	385	1,103	100%	50%	0%		-9	39.5
(Coal firing)	1130	3.72	104	15.44	528	515	15.0	13,332	13.0	183	7.8	0.8	0.2	2.6	3,280	407	392	568	379	1,037	100%	100%	0%		-9	39.5
	1300	4.25	193	15.42	398	508	15.0	13,138	13.0	185	3.2	0.3	0.2	1.7	3,400	419	389	595	394	1,092	100%	100%	100%		-9	39.5
	1500	3.89	111	15.20	415	528	15.0	13,848	13.0	181	3.4	0.5	-0.5	2.2	3,390	409	376	570	385	1,063	100%	50%	100%		-9	39.5
	1630						15.0		13.0	180	3.7	0.4	-0.5	2.2	3,457	420	378	597	351	1,110	100%	0%	100%		-9	39.5
	1900						15.0		13.0	183	3.3	0.3	-0.3	1.7	3,275	419	372	596	396	1,098	0%	100%	100%		-9	39.5
10/9/95	1100	3.79	230	14.56	313	700	15.8	13,309	14.0	200	4.5	0.3	-0.2	2.3	3,400	400	373	558	374	1,006	100%	100%	50%	0%	-9.5	-9
	1130	3.66	239	14.59	307	693	15.8	13,025	14.0	200	4.5	0.3	-0.2	2.3	3,420	404	372	565	377	1,034	100%	100%	50%	0%	-9.5	-9
	1200	3.60	193	15.40	305	556	15.8	12,613	14.0	200	4.5	0.3	-0.2	2.3	3,400	409	375	575	381	1,048	100%	100%	50%	0%	-9.5	-9
	1230	3.66	208	14.65	272	545	15.8	13,575	14.0	200	4.6	0.4	-0.3	2.4	3,430	416	385	585	387	1,088	100%	100%	50%	0%	-9.5	-9
	1300	3.45	206	14.14	299	538	15.8	13,350	14.0	200	4.6	0.4	-0.3	2.4	3,460	420	386	593	392	1,096	100%	100%	50%	0%	-9.5	-9
	1430	3.52	235	14.71	287	517	15.8	13,135	13.0	190.5	3.1	0.5	0.0	1.6	3,330	410	382	581	386	1,121	100%	100%	100%	0%	-9.5	-9.5
10/10/95	0745	1.21	632	11.12	67	14	17.0	17,700	14.0	200	7.0	1.3	0.5	3.5	4,380	381	0	579	381	1,120	100%	100%	50%	?	-15	-9
	0815	1.59	44	10.00	69	11	17.0	19,100	8.0	200	6.8	1.3	-0.5	6.7	4,450	382	0	575	382	1,097	100%	100%	50%	?	-15	4
	0915	3.77	31	9.86	78	6	12.5	12,600	13.0	195	6.8	1.3	-0.5	6.7	2,790	382	0	540	356	1,036	100%	100%	50%	?	-15	4
10/11/95	1130	3.60	132	15.90	357	536	15.8	12,000	14.0	200	4.3	1.3	0.0	2.0	3,550	404	403	562	379	1,024	100%	100%	50%	0%	-9	-9
	1200	3.51	129	16.70	389	540	15.8	12,000	14.0	200	4.3	1.0	-0.2	2.2	3,530	411	404	573	387	1,052	100%	100%	50%	0%	-9	-9
	1230	3.96	134	15.90	368	538	15.8	11,700	14.0	205	4.3	1.0	-0.2	2.1	3,530	410	412	581	391	1,063	100%	100%	50%	0%	-9	-9
	1300	3.43	143	16.24	379	565	15.8	12,000	14.0	210	4.4	1.0	-0.2	2.1	3,520	422	398	592	398	1,091	100%	100%	50%	0%	-9	-9
	1330	3.41	124	16.24	408	552	15.8	12,600	14.0	210	4.4	1.0	-0.2	2.1	3,570	408	390	555	388	1,018	100%	100%	50%	0%	-9	-9
	1400	3.43	120	16.26	408		15.6	12,697	13.0	197	4.3	0.9	-0.2	2.0	3,540	409	382	568	389	1,048	100%	100%	50%	0%	-9	-9
	1430	4.06	139	15.88		541	15.8		132.0	195	4.3	0.9	0.0	2.1	3,810	413	382	583	395	1,091	100%	100%	50%	25%	-9	-9
	1500	4.40	104	15.63	370	483	15.8	12,164	13.0	194	4.3	0.9	0.0	2.1	3,810	406	381	547	386	989	100%	100%	50%	25%	-9	-9
	1530	3.47	120	15.68	359	540	15.8	11,790	13.0	194	3.8	0.8	0.0	1.8	3,550	403	393	558	380	1,010	100%	100%	50%	25%	-9	-9
	1600	3.52	130	15.65	382	557	15.8	11,846	13.0	194	3.8	0.9	-0.1	1.7	3,570	407	396	570	384	1,039	100%	100%	50%	25%	-9	-9
	1630	3.66	134	15.89	383	552	15.8	11,612	13.0	194	3.1	0.7	0.0	1.8	3,580	412	388	580	389	1,055	100%	100%	50%	25%	-9	-9
10/12/95	1030	3.80	115	16.05	349	552	15.8	11,100	14.0	200	4.6	1.0	-0.2	2.2	3,660	413	358	585	384	1,048	100%	100%	40%	0%	-9	-9
	1100	3.44	123	16.30	333	573	15.8	12,100	14.0	200	4.6	1.0	-0.2	2.2	3,590	419	346	590	389	1,063	100%	100%	40%	0%	-9	-9
	1130	3.45	125	16.50	312	562	15.8	11,600	14.0	200	4.6	1.0	0.0	2.2	3,550	422	356	597	393	1,088	100%	100%	40%	0%	-9	-9
	1200	3.90	94	16.20	337	530	15.8	12,200	14.0	200	4.6	1.0	-0.2	2.2	3,630	406	381	552	380	981	100%	100%	40%	0%	-9	-9
	1230	3.68	97	15.58	332	534	15.8	12,000	14.0	200	4.6	1.0	-0.2	2.2	3,610	405	366	560	380	993	100%	100%	40%	0%	-9	-9
	1300	3.76	94	16.01	184	544	15.8	11,700	14.0	200	4.7	1.2	-0.2	2.2	3,640	408	381	569	385	1,005	100%	100%	40%	0%	-9	-9
	1330	3.56	113	16.38	300	557	15.8	12,000	14.0	200	4.6	1.2	-0.2	2.2	3,650	412	352	576	388	1,018	100%	100%	40%	0%	-9	-9
	1400	3.27	384	15.65	296	549	15.8	11,600	13.0	192	2.1	0.4	0.0	1.0	3,190	411	352	564	388	1,077	100%	100%	50%	100%	-9	-9
	1430	3.44	249	15.79	318	548	15.8	11,500	12.5	192	2.1	0.4	0.4	1.1	3,390	415	347	594	392	1,135	100%	100%	50%	100%	-9	-9
	1500	3.30	220	15.56	333	486	15.8	11,500	12.5	191	2.0	0.0	0.2	0.1	3,410	404	351	537	376	1,029	100%	100%	50%	100%	-9	-9
	1530	3.89	470	15.63	301	531	15.8	11,300	12.5	192	2.0	0.2	0.2	0.9	3,420	403	344	562	377	1,070	100%	100%	50%	100%	-9	-9
	1600	3.32	191	15.88	333	546	15.8	11,500	12.5	192	2.0	0.1	0.3	0.9	3,430	411	356	581	385	1,117	100%	100%	50%	100%	-9	-9
	1630	3.30	310	15.83	305	557	15.8	11,500	12.5	191	2.1	0.2	0.2	0.9	3,360	421	350	599	395	1,132	100%	100%	50%	100%	-9	-9
	1700	3.55	184	15.76	292	487	15.8	11,700	12.5	192	2.1	0.2	0.2	0.8	3,410	411	346	542	383	1,018	100%	100%	50%	100%	-9	-9
10/13/95	0815	3.75	106	15.80	244	538	15.8	12,000	14.0	200	3.7	1.0	-0.2	1.8	3,590	399	370	570	375	1,007	100%	100%	50%	25%	-9.5	-9.5
	0845	3.92	111	15.75	471	547	15.8	11,700	14.0	200	3.5	0.8	-0.2	2.0	3,490	406	362	578	380	1,020	100%	100%	50%	25%	-9.5	-9.5
	0915	3.90	114	16.09	546	550	15.8	12,000	14.0	200	3.6	0.8	-0.2	2.0	3,470	414		590	386	1,035	100%	100%	50%	25%	-9.5	-9.5
	0945	3.26	119	16.29	539	554	15.8	11,900	14.0	200	3.4	1.0	-0.2	2.0	3,650	416		596	391	1,054	100%	100%	50%	25%	-9.5	-9.5
	1015	3.22	128	16.40	308	560	15.8	11,800	14.0	200	3.4	1.0	-0.2	2.0	3,480	423		603	395	1,073	100%	100%	50%	25%	-9.5	-9.5
	1045	3.77	109	15.70	480	513	15.8	11,900	14.0	200	3.4	1.0	-0.2	2.0	3,620	409	363	560	384	1,018	100%	100%	50%	25%	-9.5	-9.5
	1115	3.48	129	16.20	495	532	15.8	12,000	14.0	200	3.6	1.0	-0.2	2.2	3,620	407	350	567	383	1,027	100%	100%	50%	25%	-9.5	-9.5
	1145	3.32	126	16.10	487	535	15.8	12,000	14.0	200	3.4	1.0	-0.2	2.2	3,640	410	340	573	386	1,054	100%	100%	50%	25%	-9.5	-9.5
	1215	3.99	117	16.30	508	534	15.8	12,100	14.0	200	3.4	1.0	-0.2	2.2	3,610	414	363	588	392	1,075	100%	100%	50%	25%	-9.5	-9.5

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb.Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	1245	3.39	170	15.85	375	540	15.6	11,800	14.0	200	3.0	0.8	-0.2	2.0	3,490	418	382	566	392	1,112	100%	100%	50%	50%	-9.5	-9.5
	1315	3.77	144	15.70	406	550	15.6	11,800	14.0	200	3.0	0.8	-0.2	2.0	3,670	424	375	513	403	1,143	100%	100%	50%	50%	-9.5	-9.5
	1345	3.82	113	15.40	409	507	15.6	12,100	14.0	200	3.0	0.8	0.0	2.1	3,700	409	382	564	387	1,046	100%	100%	50%	50%	-9.5	-9.5
	1415	3.50	126	15.75	400	531	15.6	11,995	13.0	193	2.9	0.6	-0.1	1.6	3,640	412	381	574	390	1,077	100%	100%	50%	50%	-9.5	-9.5
	1445	3.75	137	15.75	388	533	15.6	11,896	13.0	193	2.8	0.6	-0.2	1.6	3,630	415	370	585	392	1,098	100%	100%	50%	50%	-9.5	-9.5
	1515	3.59	138	15.63	403	532	15.6	12,037	13.0	193	2.9	0.7	-0.2	1.8	3,680	422	375	596	397	1,125	100%	100%	50%	50%	-9.5	-9.5
	1545	3.67	116	15.56	398	503	15.6	11,921	14.0	193	3.0	0.7	-0.1	2.0	3,600	408	386	558	382	1,038	100%	100%	50%	50%	-9.5	-9.5
	1615	4.00	115	15.88	380	521	15.6	11,829	13.0	192	3.0	0.7	-0.2	1.8	3,610	411	395	571	386	1,068	100%	100%	50%	50%	-9.5	-9.5
	1645	3.22	133	15.88	391	543	15.6	11,802	13.0	192	3.0	0.6	-0.1	1.6	3,570	415	386	579	389	1,097	100%	100%	50%	50%	-9.5	-9.5
10/16/95	0200	3.91	131	15.21	378	520	15.0	10,986	13.5	196	3.7	0.4	0.2	1.4	3,420	404	374	578	374	1,052	50%	100%	50%	0%	39.5	-9
	0230	3.70	122	15.42	407	535	15.0	11,661	13.5	197	3.9	0.6	0.2	2.0	3,340	411	366	587	381	1,061	50%	100%	50%	0%	39.5	-9
	0300	3.54	142	15.97	489	525	15.0	11,274	13.5	195	3.8	0.7	0.2	2.1	3,440	417	369	595	388	1,078	50%	100%	50%	0%	39.5	-9
	0330	3.47	138	15.47	446	522	15.0	11,781	13.5	195	3.9	0.7	0.2	2.1	3,390	422	380	603	391	1,110	50%	100%	50%	0%	39.5	-9
	0400	3.69	111	15.14	475	495	15.0	11,294	13.5	195	3.8	0.7	0.2	2.0	3,440	403	388	542	373	969	50%	100%	50%	0%	39.5	-9
	0430	3.84	110	15.96	457	512	15.0	10972	13.5	195	4	0.8	0.1	2.1	3170	397	383	548	368	972	50%	100%	50%	0%	39.5	-9
	0500	3.67	138	15.84	450	521	15.0	12,025	13.5	194	3.8	0.8	0.2	2.1	3,300	398	391	558	371	992	50%	100%	50%	0%	39.5	-9
	0530	3.19	128	16.95	406	532	15.0	11,099	13.5	195	3.8	0.7	0.1	2.0	3,350	403	375	567	376	1,023	50%	100%	50%	0%	39.5	-9
	0600	3.37	111	15.53	444	530	15.0	11,856	13.5	194	3.9	0.4	0.2	2.1	3,430	408	374	582	381	1,056	50%	100%	50%	0%	39.5	-9
	0630	3.16	229	15.72	361	534	15.0	11,117	13.5	194	2.1	0.0	-0.2	1.1	3,410	410	386	586	381	1,124	50%	100%	50%	100%	39.5	-9
	0700	3.96	156	15.32	441	535	15.6	12,487	13.5	193	2.8	0.0	-0.2	1.4	3,740	420	392	627	398	1,186	50%	100%	50%	100%	-9.5	-9
	0730	3.66	168	15.40	412	490	15.6	11,344	13.5	193	2.4	0.0	-0.2	1.4	3,660	399	376	656	374	1,055	50%	100%	50%	100%	-9.5	-9
	0800	2.97	174	15.70	416	413	15.6	11,921	13.6	194	2.4		-0.3	1.4	3,450	398	380	573	375	1,093	50%	100%	50%	100%	-9.5	-9
	0830	3.54	171	15.21	384	501	15.6	11,115	13.6	194	2.4	0.1	-0.3	1.4	3,540	403	376	587	380	1,113	50%	100%	50%	100%	-9.5	-9
	0900	3.65	182	15.88	425	525	15.6	12,216	13.5	193	2.4	0.1	0.3	1.4	3,540	411	373	602	387	1,160	50%	100%	50%	100%	-9.5	-9
	0930	3.21	904	15.00	394	575	15.6	11,887	13.5	192	2.3	0.2	0.2	1.3	3,590	417	373	614	391	1,182	50%	100%	50%	100%	-9.5	-9
	1000	3.28	202	14.74	488	555	15.6	12,198	13.5	193	2.3	0.2	0.2	1.4	3,530	422	379	625	397	1,203	50%	100%	50%	100%	-9.5	-9
	1030	3.61	144	14.58	466	508	15.6	12,449	13.5	192	2.4	0.1	0.2	1.4	3,570	403	372	568	380	1,099	50%	100%	50%	100%	-9.5	-9
	1100	3.55	162	14.55	470	520	15.6	12,900	13.5	193	2.4	0.1	0.2	1.4	3,650	405	374	582	382	1,126	50%	100%	50%	100%	-9.5	-9
	1130	3.44	120	14.43	460	526	15.6	12,334	13.5	192	3.5	0.2	0.2	1.8	3,580	412	391	598	388	1,134	50%	100%	50%	25%	-9.5	-9
	1200	2.69	143	15.09	482	555	15.6	12,599	13.6	192	3.4	0.2	0.2	1.8	3,490	418	376	606	392	1,158	50%	100%	50%	25%	-9.5	-9
	1230	3.12	141	15.29	602	561	15.6	12,259	13.5	192	3.4	0.1	0.2	1.9	3,580	422	381	618	392	1,183	50%	100%	50%	25%	-9.5	-9
	1300	3.87	117	15.29	552	516	15.6	12,243	13.5	193	3.4	0.1	0.2	1.9	3,530	408	393	567	381	1,074	50%	100%	50%	25%	-9.5	-9
	1330	3.57	108	15.28	584	519	15.6	12,368	13.5	192	3.3	0.2	0.2	1.8	3,520	407	383	577	381	1,106	50%	100%	50%	25%	-9.5	-9
	1400	3.20	131	15.15	603	534	15.6	12,342	13.5	193	3.4	0.3	0.2	1.8	3,550	413	391	589	386	1,126	50%	100%	50%	25%	-9.5	-9
	1430	3.20	125	14.77	547	535	15.6	11,927	13.0	193	3.4	0.3	0.2	1.8	3,580	417	388	598	389	1,145	50%	100%	50%	25%	-9.5	-9
	1500	3.36	139	15.46	440	544	15.6	11,954	13.0	192	3.4	0.3	0.2	1.9	3,520	420	378	607	394	1,164	50%	100%	50%	25%	-9.5	-9
	1530	2.84	143	15.93	607	555	15.6	11,887	13.0	192	3.4	0.3	0.2	1.9	3,580	426	376	616	398	1,181	50%	100%	50%	25%	-9.5	-9
	1600	3.92	112	14.30	455	488	15.6	11,767	13.5	193	3.1	0.1	-0.2	1.5	3,650	411	383	577	384	1,107	50%	100%	50%	50%	-9.5	-9
	1630	3.70	118	14.30	443	496	15.6	11,880	13.0	193	3.1	0.2	-0.2	1.6	3,620	412	375	584	386	1,123	50%	100%	50%	50%	-9.5	-9
	1700	4.00	125	14.50	476	511	15.6	12,374	13.0	194	3.3	0.3	-0.2	1.7	3,640	416	383	598	391	1,154	50%	100%	50%	50%	-9.5	-9
	1730	3.97	129	14.50	442	513	15.6	11,636	14.0	194	3.2	0.2	-0.1	1.7	3,640	420	388	603	394	1,162	50%	100%	50%	50%	-9.5	-9
	1800	3.53	142	14.90	475	535	15.6	11,771	14.0	193	3.4	0.3	-0.2	1.8	3,710	409	379	612	396	1,179	50%	100%	50%	50%	-9.5	-9
	1830	4.15	98	14.26	451	475	15.6	12,510	14.0	194	3.3	0.3	-0.2	1.7		409	387	562	382	1,079	50%	100%	50%	50%	-9.5	-9
	1900	3.91	119	14.70	460	500	15.6	12,455	14.0	193	3.5	0.3	-0.2	1.8	3,640	410	380	586	384	1,116	50%	100%	50%	50%	-9.5	-9
	1930	3.89	130	14.70	472	514	15.6	12,429	14.0	194	3.4	0.3	-0.2	1.8	3,570	413	386	595	388	1,131	50%	100%	50%	50%	-9.5	-9
	2000	3.84	138	15.10	423	522	15.6	11,988	14.0	193	3.4	0.3	-0.2	1.8		418	385	603	391	1,160	50%	100%	50%	50%	-9.5	-9
	2100	3.63	90	14.77	451	460	15.6	11,796	14.0	194	4.8	0.2	-0.2	2.6	3,680	407	375	565	380	1,059	0%	100%	50%	0%	-9.5	-9
	2130	3.81	109	14.80	530	489	15.6	12,647	14.0	194	4.9	0.3	-0.1	2.6	3,600	405	373	567	381	1,071	0%	100%	50%	0%	-9.5	-9
	2200	3.98	126	14.83	531	499	15.6	12,290	14.0	192	4.9	0.3	-0.1	2.8	3,620	409	376	583	385	1,102	0%	100%	50%	0%	-9.5	-9
	2230	3.55	111	15.09	587	525	15.6	12,390	14.0	193	4.9	0.3	-0.2	2.6	3,650	414	385	592	390	1,108	0%	100%	50%	0%	-9.5	-9
	2300	3.57	107	14.99	573	519	15.6	12,630	14.0	192	5.0	0.3	-0.2	2.8	3,690	419	381	604	395	1,117	0%	100%	50%	0%	-9.5	-9
	2330	3.53	89	14.62	586	463	15.6	12,000	14.0	193	5.0	0.2	-0.2	2.8	3,670	406	378	566	380	1,064	0%	100%	50%	0%	-9.5	-9
10/17/95	0000	3.62	97	15.21	536	510	15.6	12,348	13.5	192	5.0	-0.2	-0.2	2.5	3,610	407	386	580	383	1,105	0%	100%	50%	0%	-9.5	-9
	0030	3.69	108	14.57	549	508	15.6	12,512	13.5	192	4.8	-0.2	-0.3	2.5	3,660	410	391	588	387	1,111	0%	100%	50%	0%	-9.6	-9
	0100	3.96	122	14.84	553	524	15.6	11,935	13.5	192	4.7	-0.2	-0.3	2.5	3,650	414	392	598	392	1,125	0%	100%	50%	0%	-9.5	-9
	0200	3.89	156	15.72	416	511	15.6	11,988	13.0	191	2.5	-0.5	-0.1	1.4	3,620	404	391	584	383	1,142	0%	100%	50%	100%	-9.5	-9.5
	0230	3.81	139	15.63	406	519	15.6	11,816	13.0	192	2.5	-0.6	-0.2	1.4	3,590	410	380	600	390	1,170	0%	100%	50%	100%	-9.5	-9.5
	0300	4.12	556	15.10	387	522	15.6	11,431	13.0	191	2.5	-0.5	-0.2	1.5	3,610	414	381	611	394	1,177	0%	100%	50%	100%	-9.5	-9.5
	0330	3.73	628	15.37	369	470	15.6	11,831	13.5	192	2.5	-0.4	-0.2	1.5	3,490	401	383	565	378	1,101	0%	100%	50%	100%	-9.5	-9.5
	0400	3.13	360	15.69	405	513	15.6	11,562	13.5	192	2.4	-0.2	0.0	1.5	3,340	406	382	592	381	1,164	0%	100%	50%	100%	-9.5	-9.5
	0430	3.67	662	15.66	365	538	15.6	12,091	13.5	190	2.5	-0.1	0.0	1.4	3,570	415	378	612	393	1,187	0%	100%	50%	100%	-9.5	-9.5
	0500	3.85	124	15.08	421	434	15.6	11,675	13.0	194	2.5	-0.3	0.0	1.4	3,580	405	374	563	383	1,104	0%	100%	50%	100%	-9.5	-9.5
	0530	3.56	133	15.35	383	469	15.6	12,351	13.5	191	2.4	-0.2	0.0	1.4	3,910	403	382	579	380	1,138	0%	100%	50%	100%	-9.5	-9.5
	0600	3.45	317	15.42	322	530	15.6	13,039	13.5	190	2.4	-0.1	0.0	1.5	3,510	408	398	595	387	1,173	0%	100%	50%	100%	-9.5	-9.5
	0630	3.98	110	15.31	463	451	15.6	12,534	13.5	190	2.8	-0.3	0.0	1.5	3,550	401	386	559	380	1,108	0%	100%	50%	75%	-9.5	-9.5
	0700	3.76	279	15.74	432	504	15.6	11,605	13.5	191	2.6	-0.4	0.0	1.4	3,500	398	375	577	380	1,134	0%	100%	50%	75%	-9.5	-9.5
	0730	3.62	341	15.45	430	522	15.6	13,353	13.5	190	2.5	-0.3	-0.1	1.5	3,460	402	384	590	383	1,152	0%	100%	50%	75%	-9.5	-9.5
	0800	4.24	206	15.20	426	527	15.6	13,245	13.5	189	2.7	-0.3	-0.1	1.4	3,600	411	378	624	394	1,191	0%	100%	50%	75%	-9.5	-9.5
	0830	3.80	184	15.27	448	552	15.6	11,620	13.5	192	2.7	-0.3	-0.2	1.4	3,590	417	379	638	400	1,220	0%	100%	50%	75%	-9.5	-9.5
	0900	3.75	182	15.48	436	472	15.6	11,993	13.5	191	2.7	-0.3	-0.2	1.4	3,580	410	382	579	382	1,129	0%	100%	50%	75%	-9.5	-9.5
	0930	3.48	166	15.89	468	515	15.6	12,800	13.5	193	2.7	-0.3	-0.2	1.4	3,590	416	375	600	387	1,175	0%	100%	50%	75%	-9.5	-9.5
	1000	3.55	182	15.73	463	530	15.6	11,571	13.5	191	2.6	-0.3	-0.1	1.4	3,600	423	387	614	392	1,202	0%	100%	50%	75%	-9.5	-9.5
	1030	3.37	294	15.49	436	535	15.6	11,989	13.5	192	2.6	-0.3	-0.1	1.4	3,600	429	353	626	398	1,222	0%	100%	50%	75%	-9.5	-9.5
	1100	3.43	147	14.75	458	451	15.6	12,449	13.5	194	4.0	-0.3	-0.2	2.3	3,860	415	389	579	383	1,142	0%	100%	50%	25%	-9.5	-9.5
	1130	3.63	182	14.97	482	501	15.6	11,916	13.5	192	4.1	-0.2	-0.2	2.1	3,680	417	388	598	391	1,163	0%	100%	50%	25%	-9.5	-9.5
	1200	3.60	158	14.58	446	520	15.6	11,836	13.5	191	4.1	-0.2	-0.2	2.1	3,840	422	384	606	396	1,183	0%	100%	50%	25%	-9.5	-9.5
	1230	3.66	141	14.70	654	481	15.6	11,850	13.5	190	4.0	-0.2	-0.2	2.1	3,590	413	377	581	388	1,132	0%	100%	50%	25%	-9.5	-9.5
	1300	3.60	148	14.85	551	489	15.6	11,975	13.5	191	4.0	-0.2	-0.2	2.2	3,660	417	380	589	393	1,142	0%	100%	50%	25%	-9.5	-9.5
	1330	3.43	179	15.10	441	543	15.6	11,886	13.5	190	4.1	-0.2	-0.2	2.1	3,620	422	390	601	398	1,185	0%	100%	50%	25%	-9.5	-9.5
	1400	3.23	172	16.10	446	546	15.6	12,143	13.5	190	4.2	-0.2	-0.1	2.3	3,670	427	400	610	400	1,206	0%	100%	50%	25%	-9.5	-9.5
	1430	3.31	137	15.10	460	494	15.6	12,197	13.5	191	4.2	-0.2	-0.1	2.1	3,510	415	400	581	389	1,142	0%	100%	50%	25%	-9.5	-9.5
	1500	3.47	155	14.98	470	517	15.6	12,086	13.5	190	4.3	-0.2	-0.1	2.0	3,670	418	394	591	393	1,165	0%	100%	50%	25%	-9.5	-9.5
	1530	3.31	135	14.72	473	498	15.6	12,692	13.5	192	4.7	1.4	-0.2	2.4	3,700	423	392	573	392	1,134	100%	100%	50%	0%	-9.5	-9.5
	1600	3.40	125	14.60	463	502	15.6	12,338	13.5	189	4.7	1.6	-0.2	2.5	3,710	417	387	577	390	1,147	100%	100%	50%	0%	-9.5	-9.5
	1630	3.48	134	14.70	553	525	15.6	12,112	13.5	191	4.7	1.4	-0.1	2.5	3,620	420	386	595	394	1,162	100%	100%	50%	0%	-9.5	-9.5
	1700	3.87	113	14.60	552	448	15.6	12,482	14.5	190						412	386	569	386	1,129	100%	100%	50%	0%	-9.5	-9.5
	1730	4.64	130	13.90		485	15.6	12,013	14.5	191	4.9	1.4	0.0	2.5	3,060	414	398	585	388	1,131	100%	100%	50%	0%	-9.5	-9.5
	1800	3.47	138	14.20		513	15.6	12,353	14.5	191	4.8	1.5	-0.2	2.5	3,890	420	401	593	393	1,146	100%	100%	50%	0%	-9.5	-9.5

Table B-1. Burner Characterization Summary

Date	Time	O2	CO	CO2	NOx	SO2	Firing Rate	Steam Flow	UV signal	Steam Press	Windbox P.	Static Pressure			Comb. Air	Comb.Air	Mill Air Flow	Boiler Outlet	BH. Inlet	Conv. Pass	Swirler Settings				Coal Gun	Gas Gun
		(%)	(ppm)	(%)	(ppm)	(ppm)	(MM Btu/h)	(lb/h)		(psig)	(in W.C.)	Primary	Secondary	Tertiary	(acfm)	(F)	(acfm)	(F)	(F)	(F)	Primary	Secondary	Tertiary	Radial Damp	Position	Position
	1830	4.13	146	14.30		524	15.6	12,027	14.5	191	4.8	1.4	-0.2	2.4	3,710	423	385	602	396	1,157	100%	100%	50%	0%	-9.5	-9.5
	1900	3.72	133	14.70		442	15.6	11,646	13.5	191	4.7	1.3	-0.1	2.3	3,650	415	394	585	386	1,103	100%	100%	50%	0%	-9.5	-9.5
	1930	3.45	115	14.70		498	15.6	11,938	14.0	190	4.7	1.3	-0.1	2.3	3,650	414	389	582	385	1,141	100%	100%	50%	0%	-9.5	-9.5
	2000	3.39	249	14.90	452	530	15.6	11,930	13.5	190	2.4	0.3	-0.1	1.5	3,590	416	392	586	388	1,181	100%	100%	50%	100%	-9.5	-9.5
	2030	3.49	211	14.74	455	547	15.6	12,130	14.0	190	2.3	0.2	-0.2	1.5	3,600	420	386	602	392	1,214	100%	100%	50%	100%	-9.5	-9.5
	2100	3.47	249	15.00	461	553	15.6	11,561	13.4	191	2.3	0.2	-0.1	1.4		427	376	614	397	1,244	100%	100%	50%	100%	-9.5	-9.5
10/18/95	0000	3.61	148	14.18	404	463	15.6	11,976	13.5	194	3.6	0.7	0.0	1.7	3,620	397	370	552	369	1,022	100%	100%	50%	25%	38.75	-9.5
	0030	3.88	158	14.77	400	499	15.6	12,332	13.5	194	3.5	0.7	0.0	1.8	3,590	401	374	561	373	1,045	100%	100%	50%	25%	38.75	-9.5
	0100	3.75	178	14.49	357	499	15.6	12,957	14.0	193	3.5	0.7	0.0	1.8	3,630	405	374	571	379	1,074	100%	100%	50%	25%	38.75	-9.5
	0130	3.73	178	14.43	338	504	15.6	11,464	14.0	194	3.5	0.6	-0.1	1.8	3,540	410	359	576	381	1,094	100%	100%	50%	25%	38.75	-9.5
	0200	3.72	191	14.43	426	539	15.6	12,218	14.0	192	3.6	0.7	-0.2	1.8	3,600	413	386	592	387	1,109	100%	100%	50%	25%	38.75	-9.5
	0230	3.36	204	14.45	367	567	15.6	11,530	13.5	192	3.6	0.7	-0.1	1.8	3,610	415	377	603	392	1,140	100%	100%	50%	25%	38.75	-9.5
	0300	3.67	159	14.46	394	480	15.6	12,712	14.0	191	3.5	0.7	-0.1	1.7	3,610	396	380	554	374	1,048	100%	100%	50%	25%	38.75	-9.5
	0330	3.71	173	14.52	396	500	15.6	12,199	13.5	188	3.5	0.6	-0.1	1.8	3,650	395	384	566	377	1,057	100%	100%	50%	25%	38.75	-9.6
	0400	3.75	168	14.62	364	508	15.6	11,157	13.5	191	3.6	0.7	-0.1	1.7	3,560	398	379	575	380	1,097	100%	100%	50%	25%	38.75	-9.5
	0430	3.16	338	16.04	370	561	15.6	11,646	13.5	189	3.0	0.4	0.0	1.4	3,590	403	387	587	386	1,159	100%	100%	50%	50%	38.75	-9.5
	0500	3.88	218	15.12	357	538	15.6	11,135	13.5	190	3.1	0.5	-0.2	1.4	3,680	408	401	605	392	1,183	100%	100%	50%	50%	38.75	-9.5
	0530	3.47	233	15.60	383	433	15.6	12,091	13.5	190	3.0	0.5	-0.1	1.5	3,550	400	389	551	377	1,087	100%	100%	50%	50%	38.75	-9.5
	0600	3.95	478	16.25	370	471	15.6	12,711	13.5	190	3.1	0.4	-0.1	1.5	3,690	396	387	570	377	1,130	100%	100%	50%	50%	38.75	-9.5
	0630	3.60	309	15.50	370	516	15.6	11,327	13.5	189	3.0	0.4	-0.1	1.5	3,580	401	388	582	380	1,170	100%	100%	50%	50%	38.75	-9.6
	0700	3.27	344	15.76	356	530	15.6	13,023	13.5	188	2.8	0.4	-0.1	1.4	3,410	405	381	594	384	1,204	100%	100%	50%	50%	38.75	-9.5
	0730	3.61	210	15.69	389	450	15.6	11,452	13.5	191	2.8	0.5	-0.1	1.4	3,510	399	380	554	375	1,100	100%	100%	50%	50%	38.75	-9.5
	0800	3.74	240	15.23	370	494	15.6	11,314	13.5	189	2.7	0.3	-0.2	1.4	3,590	398	380	578	378	1,161	100%	100%	50%	50%	38.75	-9.5
	0830	3.84	198	15.37	362	517	15.6	11,324	13.5	187	2.7	0.3	-0.3	1.4	3,560	403	370	593	384	1,182	100%	100%	50%	50%	38.75	-9.5
	1030	3.99	149	15.59	474	435	15.6	11,492	13.5	187	4.0	1.1	-0.2	2.1	3,590	396	370	558	371	1,033	100%	50%	50%	0%	38.5	-9.5
	1100	3.93	138	15.33	465	499	15.6	12,043	13.5	187	4.5	0.9	-0.2	2.1	3,570	402	371	572	379	1,074	100%	50%	50%	0%	38.5	-9.5
	1130	3.43	149	15.91	453	539	15.6	12,167	13.5	188	4.4	1.0	-0.2	2.3	3,570	407	371	580	384	1,095	100%	50%	50%	0%	38.5	-9.5
	1200	3.34	162	15.84	464	555	15.6	11,968	13.5	187	4.4	0.9	-0.2	2.2	3,580	412	356	589	390	1,098	100%	50%	50%	0%	38.5	-9.5
	1230	3.63	153	15.35	456	555	15.6	11,637	13.5	186	4.5	1.0	-0.2	2.3	3,600	416	380	598	395	1,122	100%	50%	50%	0%	38.5	-9.5
	1300	3.39	127	15.88	480	474	15.6	11,871	13.5	188	4.5	0.9	-0.2	2.2	3,520	411	356	560	384	1,037	100%	50%	50%	0%	38.5	-9.5
	1330	3.43	117	15.68	512	491	15.6	11,961	13.5	188	4.4	1.1	-0.3	2.2	3,600	413	365	571	385	1,067	100%	50%	50%	0%	38.5	-9.5
	1400	3.54	129	15.72	475	530	15.6	11,991	13.5	188	4.4	1.0	-0.3	2.2	3,520	417	375	579	389	1,082	100%	50%	50%	0%	38.5	-9.5
	1430	3.33	132	15.25	483	528	15.6	11,813	13.5	189	4.4	1.0	-0.3	2.1	3,600	421	379	589	392	1,100	100%	50%	50%	0%	38.5	-9.5
	1500	3.99	144	14.87	382	472	15.6	12,696	13.5	190	3.4	0.3	-0.3	1.5	3,740	413	378	568	389	1,093	100%	50%	50%	75%	39.5	-9.5
	1530	3.59	192	15.55	384	504	15.6	11,862	13.5	190	3.4	0.4	-0.2	1.8	3,610	412	372	574	383	1,128	100%	50%	50%	75%	39.5	-9.5
	1600	3.86	177	15.36	380	505	15.6	11,750	13.5	190	3.5	0.4	-0.2	1.5	3,560	419	378	591	389	1,153	100%	50%	50%	75%	39.5	-9.5
	1630	3.09	151	16.09	447	572	15.6	12,930	14.0	190	3.5	0.5	-0.2	1.8	3,660	426	366	607	395	1,158	100%	50%	50%	25%	39.5	-9.5
	1700	3.94	98	14.99	472	411	15.6	12,955	14.0	190	3.8	0.8	-0.2	2.0	3,650	415	365	561	386	1,073	100%	50%	50%	25%	39.5	-9.5
	1730	3.98	107	15.20	475	474	15.6	12,167	14.0	190	4.0	0.8	-0.2	2.0	3,610	413	372	573	385	1,088	100%	50%	50%	25%	39.5	-9.6
	1800	4.08	125	15.30	480	500	15.6	12,223	13.5	190	4.2	1.1	-0.2	2.0	3,750	416	382	564	389	1,106	100%	50%	50%	25%	39.5	-9.5
	1830	3.77	129	15.30	474	524	15.6	12,725	13.0	191	4.1	0.9	-0.2	2.0	3,780	419	378	584	393	1,127	100%	50%	50%	25%	39.5	-9.5
	1900	3.74	220	15.40	476	545	15.6	13,047	13.5	188	4.0	1.1	-0.2	2.0	3,720	422	386	600	395	1,134	100%	50%	50%	25%	39.5	-9.5
	1830	3.89	147	15.30	466	536	15.6	12,753	13.5	190	4.0	1.0	-0.2	2.0	3,720	425	390	604	398	1,143	100%	50%	50%	25%	39.5	-9.5
	2000	3.85	144	15.40	474	522	15.6	12,484	13.5	190	4.1	1.0	-0.2	1.8	3,680	429	388	612	402	1,157	100%	50%	50%	25%	39.5	-9.5
	2100	3.59	118	15.20	394	463	15.6	12,515	13.5	188	3.0	0.5	-0.2	1.7	3,580	412	387	575	381	1,134	100%	50%	50%	50%	39.5	-9.5
	2130	3.62	122	15.60	383	496	15.6	12,216	14.0	188	3.1	0.8	-0.2	1.7	3,600	416	392	587	386	1,145	100%	50%	50%	50%	39.5	-9.6
	2200	3.76	145	15.70	377	516	15.6	12,338	14.0	191	3.1	0.7	-0.2	1.7	3,620	423	373	600	392	1,171	100%	50%	50%	50%	39.5	-9.5
	2230	3.23	149	15.60	390	528	15.6	12,500	14.0	188	3.0	0.6	-0.2	1.7	3,650	424	381	602	395	1,185	100%	50%	50%	50%	39.5	-9.5
	2300	3.24	169	15.60	407	537	15.6	12,446	14.0	189	3.0	0.6	-0.2	1.6	3,660	429	378	616	400	1,208	100%	50%	50%	50%	39.5	-9.5
	2330	3.76	115	15.54	397	414	15.6	12,305	14.0	188	3.0	0.6	-0.2	1.7	3,620	409	365	564	380	1,103	100%	50%	50%	50%	39.5	-9.5
10/19/95	0000	3.59	119	15.40	401	464	15.6	11,718	13.5	189	3.0	0.6	-0.4	1.6	3,640	411	375	580	384	1,133	100%	50%	50%	50%	39.5	-9.5
	0030	3.49	128	15.67	396	503	15.6	12,339	13.0	185	3.9	0.5	-0.4	1.6	3,710	412	369	589	387	1,153	100%	50%	50%	50%	39.5	-9.5
	0100	3.44	147	16.35	393	527	15.6	12,039	13.0	184	3.0	0.5	-0.3	1.6	3,840	414	368	601	391	1,168	100%	50%	50%	50%	39.5	-9.5
	0200	3.46	110	15.32	517	481	15.6	12,353	13.5	183	4.2	1.2	-0.7	2.1	3,660	408	394	576	384	1,094	100%	50%	50%	50%	39.5	-9.5
	0230	3.38	110	15.47	516	508	15.6	12,418	13.0	187	4.6	1.2	-0.7	2.2	3,670	410	374	585	388	1,110	100%	0%	50%	0%	39.5	-9.5
	0300	3.17	123	15.93	547	529	15.6	12,824	13.0	184	4.7	1.2	-0.6	2.3	3,710	414	373	594	392	1,132	100%	0%	50%	0%	39.5	-9.5
	0330	3.51	137	15.91	543	546	15.6	12,535	13.5	184	4.7	1.2	-0.6	2.3	3,680	415	380	603	395	1,144	100%	0%	50%	0%	39.5	-9.5
	0400	3.85	107	15.41	536	455	15.6	12,689	13.5	184	4.8	1.2	-0.7	2.3	3,740	406	382	575	386	1,119	100%	0%	50%	0%	39.5	-9.5
	0430	3.79	115	15.37	526	487	15.6	12,434	13.0	185	4.7	1.2	-0.7	2.2	3,730	404	393	584	387	1,131	100%	0%	50%	0%	39.5	-9.5
	0500	3.32	128	15.47	524	512	15.6	12,634	13.0	184	4.7	1.2	-0.7	2.2	3,660	407	391	588	390	1,140	100%	0%	50%	0%	39.5	-9.5
	0530	3.46	138	15.35	555	536	15.6	12,608	13.0	179	4.7	1.1	-0.7	2.2	3,720	412	389	603	398	1,169	100%	0%	50%	0%	39.5	-9.5
	0600	3.34	121	15.50	549	472	15.6	12,987	13.0	183	4.8	1.1	-0.6	2.3	3,700	410	392	576	388	1,128	100%	0%	50%	0%	39.5	-9.5
	0900	3.69	137	15.18	425	486	15.6	11,878	13.5	183	4.2	1.0	-0.3	2.1	3,700	403	383	577	381	1,091	100%	0%	50%	25%	39.5	-9.5
	0930	3.67	145	15.22	429	498	15.6	12,305	13.5	186	4.2	1.1	-0.3	1.8	3,680	411	370	585	385	1,107	100%	0%	50%	25%	39.5	-9.5
	1000	3.70	158	15.22	426	525	15.6	11,771	13.5	187	4.2	1.1	-0.3	1.9	3,690	418	368	596	390	1,121	100%	0%	50%	25%	39.5	-9.5
	1030	3.82	158	15.36	426	531	15.6	12,786	13.5	188	4.1	1.1	-0.3	1.8	3,700	422	366	603	394	1,134	100%	0%	50%	25%	39.5	-9.5
	1100	3.78	113	15.09	435	457	15.6	12,101	13.5	186	4.0	1.0	-0.3	1.8	3,680	409	381	587	382	1,070	100%	0%	50%	25%	39.5	-9.5
	1130	3.16	112	15.89	444	508	15.6	12,555	13.5	185	4.0	1.1	-0.3	1.8	3,680	411	361	576	387	1,094	100%	0%	50%	25%	39.5	-9.5
	1200	3.41	128	15.76	425	514	15.6	12,650	13.5	185	4.1	1.1	-0.3	1.8	3,660	416	376	585	392	1,113	100%	0%	50%	25%	39.5	-9.5
	1230	3.56	130	15.72	436	531	15.6	12,086	13.5	184	4.1	0.9	-0.4	1.7	3,700	421	369	593	398	1,127	100%	0%	50%	25%	39.5	-9.5
	1300	2.90	138	15.61	427	547	15.6	11,985	13.5	181	4.1	1.0	-0.3	1.7	3,680	425	371	600	399	1,144	100%	0%	50%	25%	39.5	-9.5
	1330	3.84	115	15.28	435	459	15.6	12,268	13.0	182	3.8	0.7	-0.3	2.2	3,790	413	374	571	389	1,088	100%	0%	100%	0%	39.5	-9.5
	1400	3.56	131	15.34	445	502	15.6	12,553	13.0	185	3.7	0.8	-0.3	2.1	3,740	415	374	584	391	1,107	100%	0%	100%	0%	39.5	-9.5
	1430	3.43	146	15.31	451	515	15.6	12,572	13.0	185	3.7	0.8	-0.3	2.2	3,760	419	371	590	394	1,115	100%	0%	100%	0%	39.5	-9.5
	1500	3.39	149	15.70	466	542	15.6	12,233	13.0	183	3.8	0.8	-0.4	2.1	3,700	424	361	602	399	1,143	100%	0%	100%	0%	39.5	-9.5
	1530	3.40	114	15.38	458	484	15.6	12,252	13.0	184	3.7	0.8	-0.3	2.0	3,700	414	364	575	390	1,103	100%	0%	100%	0%	39.5	-9.5
	1600	3.58	132	15.20	454	506	15.6	12,177	13.0	182	3.7	0.8	-0.4	2.1	3,730	418	393	587	393	1,116	100%	0%	100%	0%	39.5	-9.5
	1630	3.92	142	15.30	466	516	15.6	11,876	13.0	190	3.7	0.7	-0.2	2.2	3,680	420	373	584	397	1,122	100%	0%	100%	0%	39.5	-9.5
	1700	3.33	98	15.50	470	424	15.6	13,777	13.0	191	3.6	0.6	-0.3	2.1	3,700	412	373	560	389	1,088	100%	0%	100%	0%	39.5	-9.5
	1730	3.58	101	15.20	475	470	15.6	12,017	13.5	181	3.7	0.9	-0.2	2.2	3,700	413	384	575	389	1,097	100%	0%	100%	0%	39.5	-9.5
	1830	3.33	91	15.40	480	436	15.6	12,010	13.0	186	3.9	0.8	-0.3	2.1	3,740	410	377	566	386	1,092	100%	0%	75%	0%	39.5	-9.5
	1900	3.72	100	15.10	473	470	15.6	12,040	13.0	182	4.0	0.8	-0.2	2.1	3,660	413	385	578	389	1,106	100%	0%	75%	0%	39.5	-9.5
	1930	3.49	112	15.20	518	495	15.6	11,628	13.0	182	3.9	0.6	-0.3	2.1	3,560	416	394	584	390	1,120	100%	0%	75%	0%	39.5	-9.5
	2000	4.06	125	14.80	462	502	15.6	12,093	13.0	186	3.9	0.8	-0.2	2.0	3,620	420	383	594	394	1,135	100%	0%	75%	0%	39.5	-9.5
	2030	3.58	135	15.20	467	528	15.6	12,094	13.0	184	4.0	0.8	-0.3	2.0	3,630	425	397	604	398	1,161	100%	0%	75%	0%	39.5	-9.5
	2100	3.80	88	15.40	454	422	15.6	12,151	13.0	183	3.9	0.8	-0.2	2.0	3,640	410	400	565	382	1,107	100%	0%	75%	0%	39.5	-9.5
	2130	3.27	111	15.80	449	482	15.6	12,399	13.0	183	3.8	0.7	-0.3	2.1	3,650	412	371	576	383	1,127	100%	0%	75%	0%	39.5	-9.5
	2200	3.13	120	15.60	462	511	15.6	12,300	13.0	187	3.9	0.8	-0.2	2.0	3,570	417	379	586	387	1,147	100%	0%	75%	0%	39.5	-9.5
	2230	3.16	135	15.50	475	531	15.6	12,270	13.0	187	3.9	0.8	-0.2	1.9	3,570	422	383	594	392	1,160	100%	0%	75%	0%	39.5	-9.5
	2300	3.93	117	15.50	438	420	15.6	11,886	14.0	181	3.8	0.6	-0.3	2.1	3,700	411	372	586	383	1,122	100%	0%	75%	25%	39.5	-9.5

Table B-1. Burner Characterization Summary

Date	Time	O_2 (%)	CO (ppm)	CO_2 (%)	NOx (ppm)	SO_2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb.Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	2330	3.88	116	14.95	444	461	15.6	12,166	14.0	185	3.6	0.6	-0.3	2.0	3,680	412	376	580	385	1,142	100%	0%	75%	25%	39.5	-9.5
10/20/95	0000	3.85	144	15.26	445	508	15.6	12,194	13.0	164	3.3	0.8	-0.5	1.9	3,720	4173	391	592	390	1,171	100%	0%	75%	25%	39.5	-9.5
	0030	3.65	168	15.49	438	543	15.6	11,974	13.5	165	3.2	0.7	-0.5	1.9	3,660	421	390	599	394	1,194	100%	0%	75%	25%	39.5	-9.6
	0100	3.57	139	16.76	439	468	15.6	12,127	13.0	164	3.1	0.7	-0.5	1.9	3,590	411	381	666	382	1,137	100%	0%	75%	25%	39.5	-9.5
	0130	3.47	129	15.49	435	495	15.6	11,916	13.0	164	3.1	0.8	-0.4	1.9	3,650	414	378	584	386	1,164	100%	0%	75%	25%	39.5	-9.5
	0200	3.51	151	15.61	446	532	15.6	11,927	13.0	183	3.1	0.7	-0.4	1.9	3,550	420	375	596	391	1,162	100%	0%	75%	25%	39.5	-9.5
	0230	3.60	165	15.27	452	541	15.6	11,837	13.0	184	3.1	0.7	-0.4	1.8	3,650	425	373	608	398	1,174	100%	0%	75%	25%	39.5	-9.5
	0300	3.69	113	15.31	454	452	15.6	12,597	13.0	184	3.1	0.7	-0.5	1.8	3,610	412	380	571	385	1,104	100%	0%	75%	25%	39.5	-9.5
	0400	3.46	127	15.66	583	509	15.6	12,485	13.5	182	5.9	1.6	-0.6	2.4	3,710	419	374	597	395	1,155	100%	0%	25%	0%	39.75	-9.5
	0430	3.47	92	15.72	585	416	15.6	12,708	13.5	188	5.8	1.7	-0.6	2.5	3,690	412	373	567	387	1,103	100%	0%	25%	0%	39.75	-9.5
	0500	3.33	106	15.76	585	473	15.6	12,657	13.5	187	5.8	1.7	-0.6	2.5	3,640	411	370	581	386	1,123	100%	0%	25%	0%	39.75	-9.5
	0530	3.47	120	15.33	598	501	15.6	12,736	13.5	184	6.0	1.6	-0.6	2.6	3,670	416	379	592	393	1,143	100%	0%	25%	0%	39.75	-9.5
	0600	3.57	131	15.80	595	516	15.6	12,606	13.5	187	6.0	1.7	-0.8	2.6	3,660	420	372	601	398	1,165	100%	0%	25%	0%	39.75	-9.5
	0630	3.81	96	15.32	580	443	15.6	12,179	13.5	184	6.0	1.7	-0.8	2.6	3,660	410	363	576	388	1,118	100%	0%	25%	0%	39.75	-9.5
	0700	3.43	108	15.17	563	482	15.6	12,596	13.5	181	5.8	1.6	-0.7	2.5	3,680	413	366	586	391	1,135	100%	0%	25%	0%	39.75	-9.5
	0730	3.94	126	15.16	596	500	15.6	12,572	13.5	180	5.7	1.7	-0.8	2.6	3,620	417	382	594	393	1,156	100%	0%	25%	0%	39.75	-9.5
	0800	3.33	98	15.65	586	460	15.6	12,500	13.5	182	5.7	1.7	-0.7	2.5	3,690	411	385	578	387	1,128	100%	0%	25%	0%	39.75	-9.5
	0830	3.07	111	15.26	545	492	15.6	12,522	13.5	184	4.7	1.3	-0.5	2.3	3,670	415	392	587	390	1,137	100%	0%	25%	25%	39.5	-9.5
	0900	3.47	116	15.70	548	509	15.6	12,039	13.5	179	4.8	1.3	-0.4	2.3	3,880	420	388	592	392	1,149	100%	0%	25%	25%	39.5	-9.5
	0930	3.59	129	15.26	538	521	15.6	12,243	13.5	180	4.7	1.4	-0.5	2.2	3,860	423	372	601	396	1,166	100%	0%	25%	25%	39.5	-9.5
	1000	3.33	101	16.35	634	470	15.6	11,950	13.5	182	4.7	1.4	-0.5	2.1	3,680	414	372	581	388	1,127	100%	0%	25%	25%	39.5	-9.5
	1030	3.52	111	15.32	547	492	15.6	12,703	13.5	185	4.7	1.6	-0.3	2.2	3,660	418	385	591	390	1,153	100%	0%	25%	25%	39.5	-9.5
	1100	3.41	125	15.42	542	513	15.6	12,081	13.5	182	4.7	1.5	-0.6	2.2	3,640	421	382	600	395	1,169	100%	0%	25%	25%	39.5	-9.5
	1130	3.39	104	15.55	543	470	15.6	12,462	13.5	184	4.7	1.6	-0.4	2.2	3,670	415	386	584	388	1,144	100%	0%	25%	25%	39.5	-9.5
	1200	3.50	115	15.66	551	492	15.6	12,461	13.5	184	4.7	1.6	-0.4	2.2	3,620	419	378	595	392	1,167	100%	0%	25%	25%	39.5	-9.5
	1230	3.41	127	15.40	555	518	15.6	12,102	13.6	182	4.7	1.4	-0.5	2.2	3,630	423	387	602	396	1,178	100%	0%	25%	25%	39.5	-9.5
	Combustion air temperature recorded by hand (and listed here) has been reading ~35F too high and was corrected prior to running on 10/24/95. Combustion air temperatures listed in the Summary Sheet is correct as it is obtained from a separate thermocouple																									
10/24/95	0800	3.50	122	15.40	398	481	15.6	12,105	13.5	170	3.9	1.1	0.0	2.1	3490	358	393	553	365	1,005	100%	100%	50%	0%	39.5	-9.5
	0930	3.60	131	15.80	419	493	15.6	11,630	13.5	167	4.0	1.2	-0.1	2.1	3460	363	384	580	371	1,019	100%	100%	50%	0%	39.5	-9.5
	1000	3.70	128	15.20	473	490	15.6	11,905	13.5	170	4.0	1.1	-0.1	2.1	3580	373	382	579	381	1,059	100%	100%	50%	0%	39.5	-9.5
	1030	3.62	130	15.70	431	496	15.6	11,698	13.5	165	4.0	1.1	-0.3	2.1	3590	378	388	586	387	1,075	100%	100%	50%	0%	39.5	-9.5
	1100	3.56	143	15.70	479	505	15.6	11,751	13.0	164	4.0	1.2	-0.1	2.1	3530	383	385	594	391	1,092	100%	100%	50%	0%	39.5	-9.5
	1130	3.30	119	16.20	398	520	15.6	11,960	13.0	164	4.1	1.1	-0.1	2.0	3550	388	378	605	397	1,118	100%	100%	50%	0%	39.5	-9.5
	1200	3.23	98	15.00	420	492	15.6	12,181	13.5	166	4.0	1.1	-0.1	2.1	3600	367	380	645	376	1,006	100%	100%	50%	0%	39.5	-9.5
	1230	3.64	101	15.40	481	495	15.6	11,907	13.5	164	4.2	1.2	0.0	2.4	3680	363	340	561	378	1,031	100%	100%	50%	0%	39.5	-9.5
	1300	3.25	93	15.70	490	504	15.6	12,018	13.5	166	4.3	1.3	-0.1	2.3	3720	369	356	574	384	1,054	100%	100%	50%	0%	39.5	-9.5
	1330	3.74	111	15.30	460	499	15.6	12,123	13.5	166	4.3	1.2	0.0	2.2	3680	373	344	581	387	1,067	100%	100%	50%	0%	39.5	-9.5
	1400	3.89	107	15.16	474	483	15.6	11,782	14.0	161	4.3	1.1	-0.1	2.4	3690	377	351	587	389	1,081	100%	100%	50%	0%	39.5	-9.5
	1430	3.60	110	15.36	488	493	15.6	12,073	14.0	164	4.3	1.2	-0.2	2.4	3810	380	346	597	392	1,105	100%	100%	50%	0%	39.5	-9.5
	1500	3.57	110	15.21	456	495	15.6	11,913	14.0	164	4.4	1.3	-0.2	2.4	3740	385	346	606	397	1,117	100%	100%	50%	0%	39.5	-9.5
	1530	3.52	110	15.50	436	490	15.6	12,016	14.0	166	4.4	1.2	-0.2	2.4	3740	369	345	561	380	1,093	100%	100%	50%	0%	39.5	-9.5
	1600	3.95	113	15.28	439	486	15.6	12,014	14.0	165	4.5	1.2	-0.2	2.2	3780	369	356	572	383	1,060	100%	100%	50%	0%	39.5	-9.5
	1630	3.63	137	15.60	521	527	15.6	11,995	14.0	165	4.5	1.2	-0.2	2.2	3740	373	354	581	386	1,078	100%	100%	50%	0%	39.5	-9.5
	1700	3.72	95	15.97	570	526	15.6	12,457	14.0	167	4.4	1.2	-0.2	2.3	3680	380	345	597	393	1,110	100%	100%	50%	0%	39.5	-9.5
	1730	3.57	128	15.50	525	529	15.6	11,780	14.0	168	4.4	1.1	-0.2	2.3	3660	383	347	600	395	1,117	100%	100%	50%	0%	39.5	-9.5
	1800	3.76	122	15.30	594	497	15.6	12,463	14.0	169	4.4	1.2	-0.2	2.4	3700	369	345	566	382	1,066	100%	100%	50%	0%	39.5	-9.5
	1830	3.95	111	15.70	626	507	15.6	11,921	14.0	168	4.4	1.1	-0.2	2.4	3740	372	345	580	386	1,087	100%	100%	50%	0%	39.5	-9.5
	1900	3.42	85	15.80	614	519	15.6	11,915	14.0	167	4.4	1.2	-0.2	2.2	3700	377	346	591	391	1,106	100%	100%	50%	0%	39.5	-9.5
	1930	3.50	117	15.50	675	504	15.6	12,022	14.0	171	4.5	1.2	-0.2	2.3	3670	373	348	573	386	1,080	100%	100%	50%	0%	39.5	-9.5
	2000	4.10	96	15.30	647	496	15.6	11,933	14.0	169	4.5	1.2	-0.2	2.3	3680	374	354	586	388	1,096	100%	100%	50%	0%	39.5	-9.5
10/25/95	0830	3.78	134	15.03	542	495	15.6	11,839	14.0	174	4.4	1.1	-0.1	2.3	3,660	375	293	603	389	1,118	100%	100%	50%	0%	39.5	-9
	0900	3.97	110	15.08	530	449	15.6	12,179	14.0	181	4.4	1.2	0.0	2.3	3,730	365	300	555	378	1,043	100%	100%	50%	0%	39.5	-9
	0930	3.65	116	15.30	524	484	15.6	12,241	14.0	176	4.4	1.4	0.0	2.4	3,800	359	306	567	377	1,058	100%	100%	50%	0%	39.5	-9
	1000	3.60	111	15.10	590	491	15.6	11,849	14.0	173	4.4	1.2	-0.1	2.5	3,720	362	304	579	382	1,087	100%	100%	50%	0%	39.5	-9
	1030	3.64	119	15.16	514	494	15.6	12,200	13.5	169	4.4	1.3	-0.1	2.4	3,730	366	309	586	384	1,088	100%	100%	50%	0%	39.5	-9
	1100	3.86	107	15.57	471	495	15.6	12,423	14.0	166	4.5	1.3	-0.1	2.4	3,760	369	305	593	388	1,129	100%	100%	50%	0%	39.5	-9
	1130	3.42	125	15.38	546	502	15.6	12,628	14.0	159	4.4	1.4	-0.1	2.3	3,790	371	315	604	393	1,130	100%	100%	50%	0%	39.5	-9
	1200	3.87	99	15.05	548	458	15.6	12,229	14.0	162	4.4	1.4	-0.1	2.3	3,810	359	324	565	376	1,077	100%	100%	50%	0%	39.5	-9
	1230	3.90	135	15.11	548	477	15.6	12,395	13.5	158	4.2	1.3	-0.1	2.3	3,800	356	311	576	379	1,083	100%	100%	50%	0%	39.5	-9
	1300	3.38	104	15.16	557	485	15.6	12,290	13.5	162	4.5	1.3	-0.1	2.4	3,710	363	310	581	382	1,103	100%	100%	50%	0%	39.5	-9
	1330	3.89	139	15.25	545	477	15.9	11,892	13.5	159	4.5	1.4	-0.1	2.4	3,770	365	295	590	386	1,110	100%	100%	50%	0%	39.5	-9
	1400	3.58	110	15.40	511	498	15.6	11,881	14.0	161	4.5	1.2	-0.2	2.4	3,780	371	312	600	381	1,120	100%	100%	50%	0%	39.5	-9
	1430	3.92	63	15.28	505	490	15.6	12,429	14.0	163	4.5	1.1	-0.2	2.2	3,700	366	403	570	384	1,087	100%	100%	50%	0%	39.5	-9
	1500	3.75	85	15.75	526	505	15.6	12,229	14.0	170	4.5	1.1	-0.2	2.3	3,680	371	407	583	387	1,098	100%	100%	50%	0%	39.5	-9
	1530	3.72	90	15.01	524	508	15.6	12,153	14.0	167	4.4	1.1	-0.1	2.3	3,620	376	401	593	390	1,117	100%	100%	50%	0%	39.5	-9
	1600	3.64	89	16.10	545	516	15.6	12,312	14.0	172	4.5	1.1	-0.2	2.3	3,660	381	403	601	394	1,135	100%	100%	50%	0%	39.5	-9
	1630	3.66	96	15.48	547	500	15.6	12,426	14.0	163	4.5	1.0	-0.2	2.4	3,650	384	400	608	398	1,142	100%	100%	50%	0%	39.5	-9
	1700	3.86	81	15.12	548	482	15.6	12,312	14.0	169	4.5	1.1	-0.2	2.3	3,730	370	399	577	385	1,092	100%	100%	50%	0%	39.5	-9
	1730	3.57	83	15.70	562	499	15.6	12,323	14.0	167	4.5	1.1	-0.2	2.4	3,680	374	387	585	386	1,112	100%	100%	50%	0%	39.5	-9
	1800	3.31	91	15.81	550	517	15.6	12,592	14.0	169	4.5	1.1	-0.2	2.3	3,740	377	397	598	391	1,133	100%	100%	50%	0%	39.5	-9
	1830	3.94	94	16.04	546	501	15.6	12,160	14.0	167	4.5	1.2	-0.2	2.3	3,750	382	397	603	395	1,142	100%	100%	50%	0%	39.5	-9
	1900	3.34	83	18.32	541	493	15.6	12,017	14.0	165	4.5	1.2	-0.2	2.4	3,670	375	398	571	390	1,100	100%	100%	50%	0%	39.5	-9
	1930	3.53	85	15.87	552	493	15.6	12,584	14.0	168	4.5	1.1	-0.2	2.4	3,550	372	393	584	387	1,115	100%	100%	50%	0%	39.5	-9
	2000	3.82	83	15.66	582	498	15.6	12,530	14.0	168	4.4	1.1	-0.2	2.3	3,660	375	395	594	390	1,129	100%	100%	50%	0%	39.5	-9
10/30/95	0600	3.53	170	15.60	330	502	15.6	11,400	13.5	158	4.3	1.1	-0.2	2.1	3,370	352	382	539	363	949	100%	0%	25%	0%	39.5	-9
	0630	3.53	155	16.50	383	527	15.6	11,800	13.5	159	4.1	1.2	-0.3	1.7	3,240	359	383	556	368	986	100%	0%	25%	0%	39.5	-9
	0700	4.03	165	15.60	387	501	15.6	11,900	13.5	159	4.3	1.1	-0.2	2.1	3,410	367	381	565	377	1,002	100%	0%	25%	0%	39.5	-9
	0730	3.97	148	15.20	362	505	15.6	11,600	14.0	159	4.3	1.1	-0.3	1.7	3,340	373	371	577	382	1,017	100%	0%	25%	0%	39.5	-9
	0800	3.69	124	15.41	360	513	15.6	11,904	13.0	159	4.8	1.2	-0.4	2.2	3,450	381	386	589	389	1,045	100%	0%	25%	0%	39.5	-9
	Repair chemical feed line into steam drum																									
	1830	3.11	126	16.10	450	533	15.6	11,457	13.0	179	4.7	1.3	-0.5	2.2	3,280	380	291	591	385	1,059	100%	0%	25%	0%	39.5	-9
	1900	2.66	151	16.29	482	554	15.6	12,039	13.0	178	5.3	1.5	-0.7	2.2	3,500	386	280	612	396	1,091	100%	0%	25%	0%	39.5	-9
	1930	3.53	93	15.38	471	506	15.6	11,777	13.5	180	5.2	1.6	-0.7	2.3	3,530	365	302	541	374	958	100%	0%	25%	0%	39.5	-9
	2000	3.80	127	15.86	431	503	15.6	12,084	13.5	180	5.3	1.7	-0.8	2.4	3,510	382	293	550	372	964	100%	0%	25%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2	CO	CO2	NOx	SO2	Firing Rate	Steam Flow	UV signal	Steam Press	Windbox P.	Static Pressure			Comb. Air	Comb.Air	Mill Air Flow	Boiler Outlet	BH. Inlet	Conv. Pass	Swirler Settings				Coal Gun	Gas Gun
		(%)	(ppm)	(%)	(ppm)	(ppm)	(MM Btu/h)	(lb/h)		(psig)	(in W.C.)	Primary	Secondary	Tertiary	(acfm)	(F)	(acfm)	(F)	(F)	(F)	Primary	Secondary	Tertiary	Radial Damp	Position	Position
	2030	3.54	104	15.95	465	509	15.6	12,192	13.5	191	5.3	1.7	-0.6	2.3	3,500	364	292	560	375	995	100%	0%	25%	0%	39.5	-9
	2100	3.60	112	15.48	481	500	15.6	12,066	13.5	191	5.3	1.7	-0.7	2.3	3,520	371	294	572	380	1,015	100%	0%	25%	0%	39.5	-9
	2130	3.24	148	16.17	490	519	15.6	12,137	13.5	190	5.3	1.5	-0.6	2.3	3,580	376	297	582	384	1,041	100%	0%	25%	0%	39.5	-9
	2200	3.87	118	15.75	488	503	15.6	12,071	13.5	190	5.3	1.6	-0.7	2.3	3,580	378	292	588	387	1,048	100%	0%	25%	0%	39.5	-9
	2230	3.13	114	16.22	520	523	15.6	12,046	13.5	191	5.3	1.6	-0.7	2.2	3,580	384	294	599	393	1,079	100%	0%	25%	0%	39.5	-9
	2300	3.45	121	15.98	504	516	15.6	12,389	13.5	191	5.2	1.6	-0.6	2.3	3,560	386	300	604	394	1,082	100%	0%	25%	0%	39.5	-9
	2330	3.69	105	15.62	519	481	15.6	13,076	13.5	191	5.5	1.6	-0.6	2.3	3,570	364	302	550	375	989	100%	0%	25%	0%	39.5	-9
10/31/95	0000	3.68	104	15.54	528	501	15.6	12,118	13.5	205	5.5	2.0	-0.4	2.4	3,600	367	313	569	380	1,011	100%	0%	25%	0%	39.5	-9
	0030	3.59	93	15.30	545	505	15.6	11,970	13.5	204	5.6	2.0	-0.5	2.4	3,690	370	313	575	383	1,027	100%	0%	25%	0%	39.5	-9
	0100	3.31	115	16.00	554	527	15.6	12,108	13.5	204	5.5	1.8	-0.5	2.4	3,670	372	304	581	385	1,041	100%	0%	25%	0%	39.5	-9
	0130	3.55	113	15.70	555	520	15.6	12,234	13.5	203	5.7	1.9	-0.4	2.5	3,670	376	316	591	389	1,062	100%	0%	25%	0%	39.5	-9
	0200	3.34	107	15.60	559	510	15.6	11,750	13.5	203	5.6	1.6	-0.5	2.4	3,620	379	294	602	394	1,078	100%	0%	25%	0%	39.5	-9
	0230	3.35	106	16.05	575	522	15.6	12,369	13.5	204	5.6	1.9	-0.5	2.5	3,620	382	302	607	397	1,099	100%	0%	25%	0%	39.5	-9
	0300	3.95	93	15.30	563	437	15.6	12,518	13.5	203	5.8	2.0	-0.4	2.5	3,620	369	304	551	385	996	100%	0%	25%	0%	39.5	-9
	0330	3.76	86	15.80	555	467	15.6	12,201	13.5	204	5.6	1.9	-0.5	2.5	3,680	363	309	562	378	1,008	100%	0%	25%	0%	39.5	-9
	0400	3.94	88	15.50	574	469	15.6	12,234	13.5	203	5.7	1.9	-0.5	2.4	3,670	367	297	573	381	1,030	100%	0%	25%	0%	39.5	-9
	0430	3.29	92	16.20	586	504	15.6	12,331	13.5	204	5.8	1.9	-0.4	2.4	3,640	371	299	582	386	1,052	100%	0%	25%	0%	39.5	-9
	0500	3.27	90	15.60	557	506	15.6	12,360	13.5	204	5.8	1.9	-0.5	2.5	3,670	374	303	591	389	1,073	100%	0%	25%	0%	39.5	-9
	0530	4.09	106	15.40	579	490	15.6	12,223	13.5	204	5.7	2.0	-0.4	2.6	3,700	377	310	599	394	1,075	100%	0%	25%	0%	39.5	-9
	0600	3.68	108	15.60	605	494	15.6	11,980	13.5	204	5.8	2.0	-0.5	2.5	3,780	381	300	608	387	1,103	100%	0%	25%	0%	39.5	-9
	0630	3.56	106	15.90	608	509	15.6	12,100	13.5	202	6.0	2.0	-0.6	2.6	3,690	383	300	616	400	1,116	100%	0%	25%	0%	39.5	-9
	0700	3.83	81	16.50	591	443	15.6	12,847	14.0	203	5.9	2.1	-0.5	2.6	3,720	367	309	558	382	1,021	100%	0%	25%	0%	39.5	-9
	0730	3.93	80	15.60	612	469	15.6	12,724	13.5	202	5.9	1.8	-0.4	2.5	3,720	362	304	570	382	1,040	100%	0%	25%	0%	39.5	-9
	0800	4.04	83	15.42	649	484	15.6	12,452	13.5	201	5.7	1.7	-0.6	2.2	3,760	364	317	580	385	1,060	100%	0%	25%	0%	39.5	-9
	0830	4.39	87	15.06	582	439	15.6	12,705	13.0	202	5.7	1.7	-0.6	2.3	3,710	366	385	560	386	1,008	100%	0%	25%	0%	39.5	-9
	0900	3.90	84	15.14	501	482	15.6	12,223	13.5	203	5.0	1.2	-0.6	1.8	3,600	367	386	569	384	1,008	100%	0%	25%	0%	39.5	-9
	0930	3.82	80	15.54	501	486	15.6	12,315	13.0	201	5.0	1.2	-0.6	1.9	3,670	367	381	577	384	1,040	100%	0%	25%	0%	39.5	-9
	1000	3.27	87	15.58	508	508	15.6	12,210	13.0	200	5.0	1.2	-0.6	1.9	3,620	373	376	585	388	1,059	100%	0%	25%	0%	39.5	-9
	1030	3.34	90	16.06	513	498	15.6	12,351	13.0	201	5.0	1.2	-0.6	2.0	3,620	375	384	593	393	1,073	100%	0%	25%	0%	39.5	-9
	1100	3.60	88	15.71	569	480	15.6	12,069	13.0	200	5.0	1.3	-0.6	1.9	3,620	381	386	602	398	1,075	100%	0%	25%	0%	39.5	-9
	1130	3.60	76	15.50	479	435	15.6	12,388	13.0	201	5.2	1.4	-0.4	2.0	3,610	368	370	567	382	1,023	100%	0%	25%	0%	39.5	-9
	1200	3.68	78	15.64	570	406	15.6	12,310	13.0	200	5.2	1.4	-0.4	1.8	3,650	366	368	574	383	1,032	100%	0%	25%	0%	39.5	-9
	1230	3.73	85	15.67	516	419	15.6	12,116	13.0	200	5.2	1.6	-0.5	1.9	3,660	368	374	585	387	1,047	100%	0%	25%	0%	39.5	-9
	1300	3.72	81	15.92	509	349	15.6	12,777	13.0	199	5.2	1.5	-0.6	1.9	3,650	371	365	592	391	1,071	100%	0%	25%	0%	39.5	-9
	1330	3.46	84	15.73	501	345	15.6	12,148	13.0	199	5.2	1.6	-0.6	1.9	3,630	376	373	602	397	1,085	100%	0%	25%	0%	39.5	-9
	1400	3.96	67	15.35	522	292	15.6	12,098	13.0	200	5.2	1.6	-0.5	1.9	3,680	371	375	567	387	1,024	100%	0%	25%	0%	39.5	-9
	1430	3.74	68	15.59	499	312	15.6	12,023	13.0	199	5.1	1.2	-0.7	1.9	3,620	366	378	575	385	1,048	100%	0%	25%	0%	39.5	-9
	1500	3.64	70	15.59	508	334	15.6	11,860	13.0	200	4.9	1.2	-0.7	1.9	3,590	370	376	583	390	1,059	100%	0%	25%	0%	39.5	-9
	1530	3.31	75	15.50	535	345	15.6	12,079	13.0	199	4.9	1.2	-0.7	1.9	3,610	374	372	595	395	1,063	100%	0%	25%	0%	39.5	-9
	1630	3.49	58	15.25	548	298	15.6	12,073	13.0	201	5.0	1.3	-0.7	1.9	3,690	373	363	572	390	1,046	100%	0%	25%	0%	39.5	-9
	1700	4.19	81	15.72	533	450	15.6	12,321	13.0	202	4.9	1.3	-0.7	1.8	3,700	375	374	582	395	1,057	100%	0%	25%	0%	39.5	-9
	1730	2.82	86	15.78	556	480	15.6	12,212	13.0	203	4.9	1.3	-0.7	1.9	3,620	379	367	589	395	1,073	100%	0%	25%	0%	39.5	-9
	1800	3.67	75	16.04	547	446	15.6	12,737	13.0	202	4.9	1.3	-0.7	1.8	3,640	369	373	564	385	1,039	100%	0%	25%	0%	39.5	-9
	1830	3.69	78	15.73	549	480	15.6	12,067	13.0	202	5.0	1.2	-0.7	1.9	3,700	3.71	386	576	389	1,049	100%	0%	25%	0%	39.5	-9
	1900	3.55	81	15.87	550	488	15.6	12,730	13.0	203	5.0	1.3	-0.7	1.9	3,700	376	387	585	393	1,067	100%	0%	25%	0%	39.5	-9
	1930	3.14	87	15.77	564	513	15.6	12,394	13.0	203	5.1	1.3	-0.7	2.0	3,550	380	366	597	397	1,090	100%	0%	25%	0%	39.5	-9
	2000	3.25	76	15.51	562	461	15.6	12,246	13.0	202	5.2	1.6	-0.7	2.3	3,610	369	371	567	385	1,045	100%	0%	25%	0%	39.5	-9
	2100	3.03	80	15.91	486	486	15.6	12,291	13.0	203	5.1	1.7	-0.7	2.2	3,650	375	370	584	391	1,065	100%	0%	25%	0%	39.5	-9
	2130	3.47	84	15.72	486	486	15.6	12,120	13.0	202	5.1	1.7	-0.7	2.3	3,620	380	360	593	395	1,078	100%	0%	25%	0%	39.5	-9
	2200	3.81	85	15.46	440	440	15.6	12,040	13.0	202	5.3	1.6	-0.7	2.4	3,580	369	359	567	385	1,047	100%	0%	25%	0%	39.5	-9
	2230	3.44	79	15.56	472	472	15.6	12,658	13.0	202	5.4	1.6	-0.7	2.3	3,670	372	366	578	388	1,071	100%	0%	25%	0%	39.5	-9
	2300	3.65	81	16.08	483	483	15.6	12,681	13.0	203	5.3	1.7	-0.7	2.3	3,610	378	361	585	392	1,080	100%	0%	25%	0%	39.5	-9
	2330	3.66	83	15.85	488	488	15.6	12,072	13.0	202	5.3	1.7	-0.7	2.3	3,680	381	355	594	396	1,093	100%	0%	25%	0%	39.5	-9
11/1/95	0000	3.57	76	15.30	484	484	15.6	12,305	13.0	203	5.4	1.7	-0.7	2.2	3,590	371	373	574	386	1,062	100%	0%	25%	0%	39.5	-9
	0030	3.34	75	15.90	491	491	15.6	12,564	13.5	204	5.9	1.4	-1.1	2.3	3,600	374	374	580	389	1,071	100%	0%	25%	0%	39.5	-9
	0100	3.40	77	16.60	562	503	15.6	12,456	13.5	204	5.3	1.4	0.0	2.9	3,720	377	355	589	393	1,092	100%	0%	25%	0%	39.5	-9
	0130	3.59	84	15.90	575	511	15.6	12,633	13.5	205	5.6	1.5	-0.7	3.2	3,524	384	363	600	399	1,116	100%	0%	25%	0%	39.5	-9
	0200	3.64	69	15.80	577	446	15.6	12,699	13.5	204	5.4	1.6	-1.2	2.5	3,510	370	365	564	383	1,056	100%	0%	25%	0%	39.5	-9
	0230	3.77	75	15.60	576	485	15.6	12,529	13.0	204	5.5	1.5	-0.7	2.7	3,670	373	370	579	387	1,080	100%	0%	25%	0%	39.5	-9
	0300	3.58	78	15.80	586	503	15.6	12,703	13.5	204	5.5	1.9	0.0	2.5	3,770	377	367	590	393	1,099	100%	0%	25%	0%	39.5	-9
	0330	3.62	90	15.70	583	518	15.6	12,294	13.5	203	5.5	1.5	-0.8	3.0	3,780	380	365	599	397	1,115	100%	0%	25%	0%	39.5	-9
	0400	3.78	73	15.70	563	428	15.6	12,597	13.5	203	6.2	2.2	-0.7	2.7	3,740	369	354	560	384	1,071	100%	0%	25%	0%	39.5	-9
	0430	3.85	56	15.66	563	316	15.6	12,191	13.5	202	5.5	2.0	-0.6	2.7	3,820	368	385	578	386	1,089	100%	0%	25%	0%	39.5	-9
	0500	3.70	93	15.64	574	570	15.6	12,418	13.5	202	5.9	1.8	-0.4	3.2	3,510	373	365	588	392	1,103	100%	0%	25%	0%	39.5	-9
	0530	3.86	100	15.95	571	595	15.6	12,198	13.5	202	5.8	2.2	-0.8	2.1	3,530	378	347	599	397	1,119	100%	0%	25%	0%	39.5	-9
	0600	3.13	83	15.60	570	513	15.6	12,187	13.5	202	5.9	2.8	-0.4	1.9	3,770	368	375	560	386	1,071	100%	0%	25%	0%	39.5	-9
	0630	3.76	91	15.60	600	547	15.6	12,347	13.5	203	5.1	2.5	-0.5	2.0	3,530	370	368	575	387	1,082	100%	0%	25%	0%	39.5	-9
	0700	3.52	95	15.60	558	571	15.6	12,441	13.5	204	5.4	2.8	0.1	2.0	3,540	375	359	587	391	1,109	100%	0%	25%	0%	39.6	-9
	0730	3.42	84	15.40	570	464	15.6	12,352	13.5	204	6.2	1.8	-1.1	2.2	3,470	379	361	596	396	1,119	100%	0%	25%	0%	39.5	-9
	0800	3.20	80	15.59	556	453	15.6	12,393	13.5	204	6.4	1.0	0.7	2.0	3,610	372	360	575	387	1,092	100%	0%	25%	0%	39.6	-9
Unplugging boiler draft pressure line; CE making burner changes																										
	1200	3.36	114	15.15	422	475	15.6	11,989	13.5	203	4.3	2.3	-0.5	2.0	3,410	374	395	572	384	1,109	100%	100%	50%	0%	32.5	-1
Replace bearing on ash screw																										
	2200	3.47	120	16.18	441	521	15.6	11,639	14.0	204	3.8	1.0	-0.6	2.1	3,470	382	339	590	388	1,088	100%	100%	60%	0%	-9	-9
	2230	3.87	128	15.39	393	508	15.6	11,982	14.0	204	3.4	0.7	-0.5	1.8	3,630	385	330	602	394	1,089	100%	100%	50%	50%	-9	-9
	2300	3.86	100	15.10	395	492	15.6	12,097	14.0	204	3.4	0.7	-0.6	1.7	3,753	363	322	550	374	959	100%	100%	50%	50%	-9	-9
	2330	3.39	99	15.73	437	523	15.6	11,726	14.0	203	3.3	0.7	-0.5	1.8	3,487	365	328	557	375	998	100%	100%	50%	50%	-9	-9
11/2/95	0000	3.45	117	15.70	427	528	15.6	11,752	14.0	204	3.3	0.7	-0.5	1.6	3,457	370	328	569	381	1,033	100%	100%	50%	50%	-9	-9
	0030	2.96	109	16.30	465	548	15.6	12,491	14.0	205	3.2	0.7	-0.4	1.4	3,603	376	323	581	387	1,065	100%	100%	50%	50%	-9	-9
	0100	3.73	159	15.60	350	527	15.6	11,431	14.0	203	3.2	0.8	-0.5	1.5	3,408	380	329	584	390	1,110	100%	100%	50%	50%	-9	-9
	0130	3.30	142	15.80	410	528	15.6	11,482	14.0	204	3.2	0.7	-0.3	1.4	3,553	383	319	592	391	1,071	100%	100%	50%	50%	-9	-9
	0200	3.07	141	15.70	353	526	15.5	11,342	14.0	202	3.2	0.8	-0.4	1.3	3,478	386	324	600	395	1,137	100%	100%	50%	50%	-9	-9
	0230	3.28	140	16.40	440	533	15.5	12,497	14.0	204	3.2	0.7	-0.3	1.3	3,530	389	317	608	397	1,130	100%	100%	50%	50%	-9	-9
	0300	3.68	118	15.48	428	415	15.6	11,197	14.0	203	3.4	0.7	-0.4	1.2	3,540	373	335	538	386	983	100%	100%	50%	50%	-9	-9
	0330	3.87	119	15.50	430	491	15.6	12,223	14.0	203	3.4	0.8	-0.2	1.8	3,588	366	320	556	378	1,012	100%	100%	50%	50%	-9	-9
	0400	3.87	123	15.50	376	498	15.6	11,947	14.0	203	3.4	0.7	-0.3	1.8	3,625	369	323	569	379	1,073	100%	100%	50%	50%	-9	-9
	0430	3.88	116	15.40	401	498	15.6	12,069	14.0	203	3.6	0.8	-0.2	1.6	3,682	374	327	577	382	1,068	100%	100%	50%	50%	-9	-9
	0500	3.49	136	15.60	423	511	15.6	11,780	14.0	203	3.3	0.7	-0.4	1.7	3,497	378	333	564	386	1,066	100%	100%	50%	50%	-9	-9
	0530	3.37	107	15.60	488	517	15.6	12,000	14.0	203	3.5	0.8	-0.3	1.7	3,601	383	327	597	391	1,093	100%	100%	50%	50%	-9	-9
	0600	3.73	116	15.70	445	508	15.6	11,899	14.0	203	3.3	0.8	-0.3	1.7	3,747	388	337	602	397	1,109	100%	100%	50%	50%	-9	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	0630	3.42	112	15.60	421	479	15.6	12,568	14.0	204	3.3	0.8	-0.5	1.8	3,545	369	319	556	376	1,042	100%	100%	50%	50%	-9	-9
	0700	3.98	106	15.60	412	487	15.6	11,798	14.0	203	3.2	0.9	-0.3	1.8	3,640	370	328	567	379	1,065	100%	100%	50%	50%	-9	-9
	0730	3.63	117	15.70	500	506	15.6	12,084	13.5	204	3.3	1.1	-0.3	1.7	3,504	375	325	576	364	1,047	100%	100%	50%	50%	-9	-9
	0800	3.21	124	15.81	492	510	15.6	11,786	13.0	203	3.2	0.7	-0.3	1.9	3,550	381	328	585	387	1,070	100%	100%	50%	60%	-9	-9
	0830	3.75	115	15.63	506	506	15.6	11,988	13.0	203	3.3	0.7	-0.3	1.6	3,640	364	320	593	390	1,063	100%	100%	50%	50%	38	-9
	0900	3.68	127	15.54	512	512	15.6	11,987	13.0	202	3.6	0.6	-0.3	1.6	3,770	390	309	608	397	1,142	100%	100%	50%	50%	38	-9
	0930	3.43	99	15.66	467	467	15.6	12,200	13.0	203	3.4	0.7	-0.2	1.6	3,740	371	331	667	379	1,023	100%	100%	50%	50%	38	-9
	1030	3.42	139	15.40	498	498	15.6	12,218	13.0	203	3.2	0.6	-0.2	1.5	3,620	379	417	574	386	1,110	100%	100%	50%	50%	38	-9
	1100	3.99	134	15.07	499	499	15.6	11,832	13.0	201	3.2	0.5	-0.2	1.6	3,650	384	414	585	390	1,129	100%	100%	50%	50%	38	-9
	1130	3.79	156	15.46	512	512	15.6	11,919	13.0	201	3.2	0.6	-0.2	1.5	3,630	389	406	596	395	1,152	100%	100%	50%	50%	38	-9
	1200	3.42	138	15.24	468	468	15.6	12,188	13.0	202	3.2	0.6	-0.2	1.5	3,620	374	396	555	380	1,066	100%	100%	50%	50%	38	-9
	1230	3.58	172	15.31	495	495	15.6	12,236	13.0	201	3.2	0.5	-0.2	1.5	3,570	376	402	570	383	1,102	100%	100%	50%	50%	38	-9
	1300	3.33	159	15.47	512	512	15.6	12,496	13.0	201	3.2	0.5	-0.2	1.6	3,560	383	391	562	388	1,133	100%	100%	50%	50%	38	-9
	1330	3.81	174	15.58	404	512	15.6	12,069	13.0	201	3.2	0.5	-0.2	1.5	3,570	388	397	592	393	1,153	100%	100%	50%	50%	38	-9
	1400	3.83	155	15.40	397	458	15.6	11,986	13.0	200	3.2	0.5	-0.3	1.5	3,590	375	382	560	379		100%	100%	50%	50%	38	-9
	1430	3.72	150	15.64	400	486	15.6	12,133	13.0	201	3.2	0.5	-0.3	1.5	3,600	378	390	572	384	1,109	100%	100%	50%	50%	38	-9
	1500	3.45	170	15.78	399	503	15.6	11,579	13.0	199	3.2	0.5	-0.3	1.5	3,600	385	389	586	390	1,137	100%	100%	50%	50%	38	-9
	1530	3.27	181	15.64	422	525	15.6	11,789	13.0	201	3.3	0.5	-0.3	1.5	3,570	391	397	599	395	1,172	100%	100%	50%	50%	38	-9
	1600	3.22	194	15.82	392	423	15.6	12,237	13.0	202	3.2	0.5	-0.2	1.5	3,557	382	392	520	386	1,070	100%	100%	50%	50%	38	-9
	1630	3.58	163	15.49	389	462	15.6	11,126	13.0	199	3.2	0.5	-0.2	1.5	3,576	383	391	565	382	1,095	100%	100%	50%	50%	38	-9
	1700	3.32	164	15.56	415	498	15.6	11,961	13.0	200	3.3	0.5	-0.3	1.5	3,523	383	387	584	388	1,139	100%	100%	50%	50%	38	-9
	1730	3.12	306	15.54	393	512	15.6	11,328	13.0	199	3.3	0.5	-0.3	1.5	3,550	389	398	593	393	1,163	100%	100%	50%	50%	38	-9
	1800	3.09	169	15.69	411	528	15.6	11,828	13.0	199	3.3	0.5	-0.2	1.5	3,629	394	387	605	398	1,183	100%	100%	50%	50%	38	-9
	1830	3.55	147	15.72	415	465	15.6	12,023	13.0	201	3.3	0.4	-0.3	1.5	3,540	377	396	568	380	1,101	100%	100%	50%	50%	-9	-9
	1900	3.51	145	15.40	409	491	15.6	11,957	13.0	200	3.3	0.5	-0.3	1.5	3,673	380	402	578	385	1,122	100%	100%	50%	50%	-9	-9
	1930	3.49	136	15.66	435	510	15.6	12,184	13.0	200	3.3	0.3	-0.3	1.6	3,664	386	407	590	390	1,154	100%	100%	50%	50%	-9	-9
	2000	3.75	148	15.48	415	505	15.6	11,703	13.0	200	3.3	0.3	-0.3	1.5	3,670	391	399	601	394	1,164	100%	100%	50%	50%	-9	-9
	2030	3.51	115	15.35	437	462	15.6	11,812	13.0	200	3.3	0.4	-0.3	1.5	3,583	378	400	568	381	1,104	100%	100%	50%	50%	-9	-9
	2100	3.38	125	15.41	434	487	15.6	11,981	13.0	200	3.3	0.4	-0.3	1.5	3,631	380	394	580	385	1,136	100%	100%	50%	50%	-9	-9
	2130	3.44	137	15.73	428	497	15.6	11,749	13.0	200	3.3	0.3	-0.3	1.6	3,521	385	390	591	390	1,156	100%	100%	50%	50%	-9	-9
	2200	3.24	152	15.82	435	515	15.6	11,825	13.0	199	3.3	0.3	-0.4	1.5	3,682	390	382	601	394	1,179	100%	100%	50%	50%	-9	-9
	2230	3.49	112	15.53	415	441	15.6	11,870	13.0	200	3.3	0.3	-0.3	1.5	3,569	377	393	562	379	1,088	100%	100%	50%	50%	-9	-9
	2300	3.41	115	15.60	446	480	15.6	11,943	13.0	200	3.3	0.3	-0.3	1.5	3,571	380	390	580	384	1,125	100%	100%	50%	50%	-9	-9
	2330	3.27	129	15.40	435	496	15.6	12,052	13.0	201					3,613	384	391	580	388	1,144	100%	100%	50%	50%	-9	-9
11/3/95	0000	3.53	152	15.60	448	520	15.6	12,083	13.0	201	3.4	0.6	-0.2	1.5	3,592	391	387	602	394	1,175	100%	100%	50%	50%	-9	-9
	0030	3.44	159	15.80	455	526	15.6	11,995	13.0	201	3.3	0.5	-0.2	1.5	3,636	394	395	610	398	1,197	100%	100%	50%	50%	-9	-9
	0100	4.39	131	14.80	343	367	15.6	10,519	13.0	200	3.3	0.5	-0.1	1.5	3,582	376	397	548	381	1,028	100%	100%	50%	50%	-9	-9
	0130	3.79	155	15.00	332	392	15.6	10,129	13.0	199	3.3	0.5	-0.2	1.4	3,510	377	389	561	382	1,085	100%	100%	50%	50%	-9	-9
	0200	3.84	139	15.70	391	479	15.6	12,001	13.0	201	3.3	0.5	-0.2	1.5	3,536	381	392	578	384	1,103	100%	100%	50%	50%	-9	-9
	0230	3.48	154	15.00	379	500	15.6	12,328	13.0	200	3.3	0.6	-0.2	1.6	3,539	388	390	591	389	1,118	100%	100%	50%	50%	-9	-9
	0300	3.16	157	15.80	399	522	15.6	12,304	13.0	201	3.3	0.7	-0.3	1.6	3,594	392	382	601	393	1,146	100%	100%	50%	50%	-9	-9
	0330	3.68	173	15.60	404	517	15.6	11,515	13.0	199	3.3	0.7	-0.2	1.6	3,528	398	388	611	397	1,171	100%	100%	50%	50%	-9	-9
	0400	3.17	195	16.20	403	525	15.6	12,173	13.0	201	3.3	0.7	-0.2	1.5	3,571	401	392	620	400	1,195	100%	100%	50%	50%	-9	-9
	0430	3.50	150	15.60	400	452	15.6	11,997	13.0	200	3.3	0.6	-0.2	1.5	3,557	374	382	556	373	1,068	100%	100%	50%	50%	-9	-9
	0500	3.27	124	15.50	406	472	15.6	11,672	13.0	198	3.4	0.7	-0.1	1.7	3,549	377	395	572	379	1,097	100%	100%	50%	50%	-9	-9
	0530	3.66	128	15.70	422	481	15.6	11,769	13.0	199	3.3	0.7	-0.2	1.7	3,575	381	384	581	382	1,119	100%	100%	50%	50%	-9	-9
	0600	3.63	153	16.40	433	509	15.6	12,267	13.0	199	3.4	0.6	-0.2	1.6	3,530	387	375	595	388	1,150	100%	100%	50%	50%	-9	-9
	0630	3.25	156	15.90	442	526	15.6	12,246	13.0	201	3.3	0.6	-0.3	1.7	3,536	394	387	606	393	1,176	100%	100%	50%	50%	-9	-9
	0700	3.35	142	15.70	438	530	15.6	11,773	13.0	199	3.4	0.7	-0.3	1.6	3,622	398	389	612	397	1,190	100%	100%	50%	50%	-9	-9
	0730	3.23	148	15.90	435	530	15.6	12,136	13.0	199	3.3	0.7	-0.2	1.6	3,552	402	389	624	401	1,212	100%	100%	50%	50%	-9	-9
	0800	3.44	110	15.85	446	452	15.6	11,842	13.0	201	3.0	0.5	-0.3	1.5	3,530	376	398	564	378	1,089	100%	100%	50%	50%	-9	-9
	0830	3.93	102	15.38	421	468	15.6	11,774	13.0	201	3.0	0.5	-0.3	1.5	3,520	379	387	577	380	1,111	100%	100%	50%	50%	-9	-9
	0900	3.68	202	15.67	419	504	15.6	12,089	13.0	199	3.0	0.5	-0.4	1.5	3,570	383	402	587	385	1,137	100%	100%	50%	50%	-9	-9
	0930	3.50	152	15.62	413	514	15.6	12,316	13.0	200	3.0	0.5	-0.3	1.5	3,530	388	387	598	389	1,157	100%	100%	50%	50%	38	-9
	1000	3.68	139	15.40	421	518	15.6	12,400	13.0	200	3.0	0.5	-0.3	1.5	3,560	391	394	609	394	1,173	100%	100%	50%	50%	38	-9
	1030	3.70	140	15.29	399	427	15.6	12,215	13.0	200	3.0	0.5	-0.3	1.5	3,460	373	391	555	375	1,063	100%	100%	50%	50%	38	-9
	1100	3.63	127	15.50	397	463	15.6	12,550	13.0	201	3.0	0.5	-0.3	1.5	3,490	374	390	572	376	1,100	100%	100%	50%	50%	38	-9
	1130	3.79	172	15.18	390	497	15.6	12,385	13.0	201	3.0	0.5	-0.3	1.5	3,470	380	409	588	381	1,132	100%	100%	50%	50%	38	-9
	1200	3.88	162	15.48	398	514	15.6	12,069	13.0	202	3.0	0.5	-0.3	1.5	3,820	388	390	600	386	1,161	100%	100%	50%	50%	38	-9
	1230	3.41	135	15.80	493	549	15.6	11,983	13.0	202	3.5	1.0	-0.3	2.0	3,680	394	389	623	395	1,193	100%	100%	50%	0%	38	-9
	1300	3.86	98	16.48	492	461	15.6	12,622	13.5	202	4.2	1.0	-0.3	2.1	3,580	378	395	570	380	1,085	100%	100%	50%	0%	38	-9
	1330	3.40	106	15.98	502	492	15.6	11,888	13.5	201	3.8	0.9	0.1	2.1	3,530	376	361	572	379	1,087	100%	100%	50%	0%	38	-9
	1400	3.46	118	15.53	510	510	15.6	12,009	13.5	202	4.3	0.9	-0.2	2.1	3,640	379	376	589	385	1,106	100%	100%	50%	0%	38	-9
	1430	3.91	135	15.50	538	523	15.6	11,970	13.5	202	4.4	0.9	-0.2	2.2	3,660	384	398	594	390	1,118	100%	100%	50%	0%	38	-9
	1500	3.77	137	15.22	531	516	15.6	12,288	13.5	201	4.3	0.9	-0.2	2.1	3,560	389	395	600	392	1,126	100%	100%	50%	0%	38	-9
	1530	3.94	104	15.83	508	430	15.6	11,882	13.5	201	4.3	0.9	-0.2	2.1	3,540	374	405	566	377	1,075	100%	100%	50%	0%	38	-9
	1600	3.39	104	15.81	527	488	15.6	12,542	13.5	201	4.3	0.9	-0.2	2.2	3,564	377	400	578	381	1,093	100%	100%	50%	0%	38	-9
	1630	3.91	120	16.38	519	507	15.6	12,251	13.5	201	4.3	0.9	-0.2	2.2	3,611	380	393	591	388	1,108	100%	100%	50%	0%	38	-9
	1700	3.22	136	15.50	535	531	15.6	12,401	13.5	201	4.3	0.9	-0.2	2.2	3,863	386	403	599	393	1,121	100%	100%	50%	0%	38	-9
	1730	3.86	105	15.70	530	433	15.6	12,218	13.5	200	4.3	0.8	-0.3	2.2	3,733	374	383	569	382	1,089	100%	100%	50%	0%	38	-9
	1800	3.44	111	15.64	544	484	15.6	12,300	13.5	200	4.3	0.8	-0.3	2.2	3,653	375	390	585	388	1,108	100%	100%	50%	0%	38	-9
	1830	3.48	116	15.60	566	506	15.6	12,077	13.5	200	4.3	0.8	-0.3	2.2	3,598	377	350	591	388	1,120	100%	100%	50%	0%	38	-9
	1900	3.95	131	16.10	548	534	15.6	12,523	13.5	201	4.3	0.8	-0.2	2.2	3,721	382	350	603	394	1,144	100%	100%	50%	0%	38	-9
	1930	3.61	98	15.58	556	441	15.6	11,915	14.0	202	4.3	0.9	-0.2	2.2	3,674	371	364	572	381	1,092	100%	100%	50%	0%	-9	-9
	2000	6.61	112	15.51	573	473	15.6	12,297	14.0	200	4.3	0.9	-0.2	2.2	3,781	370	354	583	383	1,102	100%	100%	50%	0%	-9	-9
	2030	3.79	121	15.61	553	500	15.6	11,897	14.0	200	4.3	0.9	-0.2	2.2	3,680	375	362	592	388	1,114	100%	100%	50%	0%	-9	-9
	2100	3.92	140	15.13	549	508	15.6	12,278	14.0	200	4.3	0.9	-0.2	2.2	3,706	379	371	599	391	1,125	100%	100%	50%	0%	-9	-9
	2130	3.36	138	15.69	576	533	15.6	12,107	14.0	200	4.3	0.9	-0.2	2.2		384	358	610	397	1,163	100%	100%	50%	0%	-9	-9
	2200	3.65	136	15.62	537	469	15.6	12,057	14.0	200	4.3	0.9	-0.2	2.2	3,693	368	365	577	382	1,090	100%	100%	50%	0%	-9	-9
	2230	3.94	129	15.63	529	498	15.6	12,150	14.0	200	4.3	0.9	-0.3	2.1	3,748	371	364	382	388	1,113	100%	100%	50%	0%	-9	-9
	2300	3.53	110	15.26	533	513	15.6	11,838	14.0	200	4.3	0.9	-0.3	2.2	3,784	375	364	386	393	1,128	100%	100%	50%	0%	-9	-9
	2330	3.99	91	15.14	544	463	15.6	11,842	13.5	199	4.3	0.9	-0.2	2.2	3,680	366	362	376	383	1,088	100%	100%	50%	0%	-9	-9
11/4/95	0030	3.81	104	15.30	532	517	15.6	12,010	13.0	200	4.3	1.0	-0.2	2.3	3,697	374	369	598	393	1,129	100%	100%	50%	0%	-9	-9
	0100	3.78	111	15.10	536	526	15.6	12,255	13.0	201	4.5	1.1	-0.2	2.2	3,713	381	366	610	398	1,158	100%	100%	50%	0%	-9	-9
	0130	3.49	88	15.10	533	426	15.6	12,077	13.0	203	4.4	1.2	-0.3	2.3	3,710	367	363	570	379	1,091	100%	100%	50%	0%	-9	-9
	0200	3.98	95	15.30	541	473	15.6	12,055	13.0	203	4.4	1.2	-0.2	2.4	3,702	371	370	583	382	1,107	100%	100%	50%	0%	-9	-9
	0230	3.64	93	15.50	519	518	15.6	12,002	13.0	202	4.4	1.1	-0.2	2.3	3,577	377	364	598	389	1,138	100%	100%	50%	0%	-9	-9
	0300	3.27	84	15.80	570	505	15.6	11,749	13.0	201	4.4	1.1	-0.2	2.3	3,563	379	387	601	391	1,144	100%	100%	50%	0%	-9	-9
	0330	3.41	89	15.60	591	528	15.6	11,895	13.0	202	4.3	1.2	-0.2	2.3	3,617	385	366	610	398	1,181	100%	100%	50%	0%	-9	-9
	0400	3.78	60	15.70	590	338	15.6	11,711	13.0	202	4.2	1.2	-0.1	2.3	3,808	383	369	555	376	1,095	100%	100%	50%	0%	-9	-9

Table B-1. Burner Characterization Summary

Date	Time	O2	CO	CO2	NOx	SO2	Firing Rate	Steam Flow	UV signal	Steam Press	Windbox P.	Static Pressure			Comb. Air	Comb.Air	Mill Air Flow	Boiler Outlet	BH. Inlet	Conv. Pass	Swirler Settings				Coal Gun	Gas Gun
		(%)	(ppm)	(%)	(ppm)	(ppm)	(MM Btu/h)	(lb/h)		(psig)	(in W.C.)	Primary	Secondary	Tertiary	(acfm)	(F)	(acfm)	(F)	(F)	(F)	Primary	Secondary	Tertiary	Radial Damp	Position	Position
	0430	3.39	67	15.50	591	462	15.6	11,777	13.0	202	4.3	1.4	-0.2	2.2	3,540	370	377	579	380	1,115	100%	100%	50%	0%	-9	-9
	0500	3.31	88	16.10	585	489	15.6	12,148	13.5	202	4.5	1.3	-0.3	2.3	3,559	374	369	591	386	1,142	100%	100%	50%	0%	-9	-9
	0530	3.88	95	15.70	598	495	15.6	11,752	13.5	202	4.6	1.3	-0.2	2.4	3,622	382	374	603	393	1,166	100%	100%	50%	0%	-9	-9
	0600	3.89	108	15.30	597	506	15.8	12,120	13.5	202	4.6	1.1	-0.2	2.3	3,660	387	376	615	398	1,183	100%	100%	50%	0%	-9	-9
	0630	3.39	61	15.70	582	421	15.6	11,941	13.5	202	4.6	1.1	-0.2	2.3	3,550	368	378	572	377	1,102	100%	100%	50%	0%	-9	-9
	0700	3.83	81	15.60	588	460	15.6	11,535	13.5	201	4.5	1.2	-0.2	2.4	3,488	371	380	584	382	1,128	100%	100%	50%	0%	-9	-9
	0730	3.81	91	15.90	592	489	15.6	11,868	13.5	202	4.4	1.2	-0.2	2.2	3,559	375	369	592	388	1,152	100%	100%	50%	0%	-9	-9
	0800	3.46	98	15.80	583	508	15.6	12,129	13.5	202	4.4	1.3	-0.2	2.3	3,604	383	371	607	393	1,176	100%	100%	50%	0%	-9	-9
	0830	3.75	109	15.70	559	497	15.6	11,949	14.0	202	4.4	1.2	-0.2	2.3	3,593	389	379	614	397	1,190	100%	100%	50%	0%	-9	-9
	0900	3.84	60	15.50	550	318	15.6	11,640	14.0	204	4.4	1.1	-0.2	2.3	3,533	370	379	560	379	1,102	100%	100%	50%	0%	-9	-9
	0930	3.88	86	15.40	534	434	15.6	11,559	14.0	202	4.4	1.1	-0.2	2.2	3,542	370	372	578	380	1,115	100%	100%	50%	0%	-9	-9
	1000	3.99	95	15.20	559	449	15.6	11,436	14.0	202	4.6	1.2	-0.1	2.2	3,553	375	385	592	386	1,135	100%	100%	50%	0%	-9	-9
	1030	3.39	102	15.60	558	504	15.6	11,917	14.0	201	4.6	1.3	-0.1	2.3		381	375	605	393	1,171	100%	100%	50%	0%	38	-9
	1100	3.74	130	15.80	564	524	15.6	11,936	13.5	202	4.4	1.2	0.0	2.2	3,545	387	385	613	398	1,187	100%	100%	50%	0%	38	-9
	1130	3.78	88	15.80	567	428	15.6	12,027	13.5	202	4.5	1.2	-0.1	2.3	3,476	369	360	571	379	1,105	100%	100%	50%	0%	38	-9
	1200	3.80	100	15.70	578	466	15.6	11,992	14.0	201	4.4	1.2	-0.2	2.2	3,543	373	363	583	383	1,128	100%	100%	50%	0%	38	-9
	1230	3.24	101	16.17	577	515	15.6	11,986	14.0	202	4.3	1.1	-0.2	2.4	3,520	378	361	596	388	1,160	100%	100%	50%	0%	38	-9
	1300	3.69	112	15.73	582	512	15.6	11,663	13.5	201	4.3	1.0	-0.1	2.3	3,590	384	348	607	394	1,175	100%	100%	50%	0%	38	-9
	1330	3.59	70	15.91	566	419	15.6	12,340	13.5	202	4.2	1.0	-0.2	2.3	3,560	371	359	565	382	1,108	100%	100%	50%	0%	38	-9
	1400	3.01	103	15.69	568	467	15.6	11,746	13.5	201	4.2	1.1	-0.2	2.3	3,550	371	357	582	384	1,122	100%	100%	50%	0%	38	-9
	1430	2.58	97	16.21	586	515	15.6	11,863	13.5	200	4.3	1.0	-0.2	2.3	3,560	376	360	594	388	1,158	100%	100%	50%	0%	38	-9
	1500	3.52	114	15.49		478	15.6	11,919	13.5	201	4.2	1.5	-0.2	2.2	3,540	381	366	604	394	1,171	100%	100%	50%	0%	38	-9
	1530	3.72	111	15.89		390	15.6	11,818	13.5	203	4.3	1.2	-0.1	2.4	3,560	369	361	573	381	1,106	100%	100%	50%	0%	38	-9
	1600	3.75	102	15.45		428	15.6	11,847	13.5	201	4.2	1.1	-0.2	2.3	3,590	373	376	585	386	1,126	100%	100%	50%	0%	38	-9
	1630	3.47	107	15.83		460	15.6	12,068	13.5	200	4.0	0.8	-0.2	2.1	3,440	377	376	592	389	1,155	100%	100%	50%	0%	38	-9
	1700	3.76	399	15.51		486	15.6	11,802	13.5	201	4.1	1.2	-0.2	2.0	3,510	382	374	605	395	1,177	100%	100%	50%	0%	38	-9
	1730	3.53	80	15.50		386	15.6	12,227	13.5	202	4.2	1.0	-0.3	2.1	3,520	369	369	571	380	1,129	100%	100%	50%	0%	38	-9
	1800	3.43	103	15.81		447	15.6	11,782	13.5	200	4.1	1.1	-0.2	2.1	3,530	372	370	585	384	1,147	100%	100%	50%	0%	38	-9
	1830	3.55	116	15.89		475	15.6	11,975	13.5	201	4.1	1.1	-0.2	2.1	3,560	377	361	597	390	1,182	100%	100%	50%	0%	38	-9
	1900	3.01	153	16.24		543	15.6	12,083	13.5	200	4.2	1.0	-0.2	2.1	3,510	383	361	609	395	1,218	100%	100%	50%	0%	38	-9
	1930	3.49	80	15.98		458	15.6	12,270	13.5	201	4.1	1.0	-0.2	2.1	3,570	370	362	573	380	1,147	100%	100%	50%	0%	38	-9
	2000	3.66	91	15.84		495	15.6	11,823	13.5	200	4.1	1.0	-0.2	2.0	3,550	371	377	588	385	1,168	100%	100%	50%	0%	38	-9
	2030	3.32	590	16.05		522	15.6	11,616	13.5	200	4.1	1.1	-0.2	2.0	3,580	375	368	596	389	1,179	100%	100%	50%	0%	38	-9
	2100	3.50	118	16.35		541	15.6	11,720	13.5	201	4.1	1.0	-0.2	2.0	3,550	380	369	609	395	1,208	100%	100%	50%	0%	38	-9
	2130	3.22	549	16.52		478	15.6	12,491	13.5	200	4.1	1.0	-0.2	2.1	3,580	368	344	574	381	1,137	100%	100%	50%	0%	38	-9
	2200	3.24	112	16.19		516	15.6	12,205	13.5	200	4.1	1.1	-0.2	2.0	3,540	373	348	590	387	1,164	100%	100%	50%	0%	38	-9
	2230	3.56	117	15.66		507	15.6	12,306	13.5	200	4.2	1.0	-0.2	2.1	3,540	377	361	602	392	1,190	100%	100%	50%	0%	38	-9
	2300	3.91	96	15.29		430	15.6	12,151	13.5	200	4.1	1.1	-0.4	2.1	3,550	367	373	573	381	1,130	100%	100%	50%	0%	38	-9
	2330	3.72	116	15.63		473	15.6	11,702	13.5	200	4.2	1.1	-0.3	2.2	3,540	370	368	588	386	1,152	100%	100%	50%	0%	38	-9
11/5/95	0000	3.74	136	15.30		504	15.6	12,394	14.0	201					3,582	379	376	603	393	1,191	100%	100%	50%	0%	-9	-9
	0030	3.82	140	15.40		507	15.6	11,460	14.0	201					3,563	383	369	614	397	1,198	100%	100%	50%	0%	-9	-9
	0100	4.01	90	15.50		251	15.6	13,010	14.0	202	4.3	1.2	-0.3	2.1	3,527	365	362	559	380	1,129	100%	100%	50%	0%	-9	-9
	0130	3.89	98	15.70		378	15.6	1,938	14.0	202	4.2	1.1	-0.3	2.1	3,598	371	366	561	380	1,150	100%	100%	50%	0%	-9	-9
	0200	3.43	117	15.70		442	15.6	11,806	14.0	201	4.2	1.2	-0.3	2.1	3,548	378	361	595	386	1,175	100%	100%	50%	0%	-9	-9
	0230	3.76	132	15.60		471	15.6	11,889	14.0	201	4.3	1.1	-0.3	2.1	3,558	381	366	606	393	1,193	100%	100%	50%	0%	-9	-9
	0300	3.08	136	16.10		522	15.6	12,750	14.0	202	4.2	1.1	-0.3	2.2	3,575	386	362	615	398	1,208	100%	100%	50%	0%	-9	-9
	0330	3.41	90	15.90		424	15.6	11,778	14.5	202	4.2	1.1	-0.3	2.1	3,635	367	359	572	377	1,131	100%	100%	50%	0%	-9	-9
	0400	3.28	110	16.10		492	15.6	11,917	14.0	202	4.3	1.2	-0.1	2.2	3,545	373	353	589	384	1,172	100%	100%	50%	0%	-9	-9
	0430	3.55	122	16.00		515	15.6	12,184	14.0	201	4.2	1.1	-0.2	2.1	3,613	379	358	602	390	1,194	100%	100%	50%	0%	-9	-9
	0500	3.17	127	15.70		544	15.6	11,928	14.0	202	4.3	1.2	-0.3	2.2	3,439	384	365	612	396	1,216	100%	100%	50%	0%	-9	-9
	0530	3.26	135	16.10		555	15.6	11,464	14.0	201	4.3	1.3	-0.3	2.2	3,616	388	367	621	400	1,228	100%	100%	50%	0%	-9	-9
	0600	3.22	92	16.00		457	15.6	11,638	14.0	202	4.2	1.1	-0.2	2.1	3,584	369	367	577	379	1,163	100%	100%	50%	0%	-9	-9
	0630	3.62	107	15.80		502	15.6	12,254	14.0	200	4.3	1.2	-0.2	2.2	3,602	373	375	592	385	1,190	100%	100%	50%	0%	-9	-9
	0700	3.91	111	15.80		504	15.6	12,737	14.0	202	4.3	1.2	-0.3	2.2	3,542	380	379	605	391	1,221	100%	100%	50%	0%	-9	-9
	0730	3.66	124	15.50		516	15.6	12,242	14.0	201	4.2	1.3	-0.3	2.2	3,584	384	378	610	395	1,214	100%	100%	50%	0%	-9	-9
	0800	3.46	92	15.40		336	15.6	12,034	14.0	202	4.3	1.2	-0.2	2.1	3,567	369	373	570	377	1,142	100%	100%	50%	0%	-9	-9
	0830	3.59	91	15.40		411	15.6	12,144	14.0	203	4.4	1.2	-0.3	2.2	3,527	373	375	584	380	1,171	100%	100%	50%	0%	-9	-9
	0900	3.87	114	15.37		470	15.6	12,219	14.0	202	4.2	1.1	-0.2	2.1	3,550	377	358	598	387	1,189	100%	100%	50%	0%	-9	-9
	0930	3.52	119	15.47		508	15.6	11,954	14.0	202	4.1	1.2	-0.2	2.1	3,590	382	364	610	394	1,221	100%	100%	50%	0%	-9	-9
	1000	3.60	116	15.66		404	15.6	12,288	14.0	203	4.2	1.1	-0.2	2.1	3,550	370	366	569	379	1,149	100%	100%	50%	0%	38	-9
	1030	3.82	98	15.88		450	15.6	12,273	13.5	202	4.2	1.1	-0.2	2.1	3,580	372	370	586	382	1,175	100%	100%	50%	0%	38	-9
	1100	3.41	113	15.67		463	15.6	12,111	14.0	202	4.2	1.0	-0.3	2.1	3,570	378	364	597	388	1,201	100%	100%	50%	0%	38	-9
	1130	3.14	128	15.99		495	15.6	11,869	14.0	201	4.2	1.1	-0.2	2.0	3,540	383	373	608	395	1,225	100%	100%	50%	0%	38	-9
	1200	3.52	90	15.80		362	15.6	11,616	14.0	201	4.2	1.1	-0.2	2.1	3,600	370	385	567	381	1,150	100%	100%	50%	0%	38	-9
	1230	3.31	114	15.82		452	15.6	11,892	14.0	199	4.2	1.1	-0.3	2.1	3,540	374	374	584	385	1,179	100%	100%	50%	0%	38	-9
	1300	3.46	126	15.26		465	15.6	11,402	13.5	200	4.1	1.1	-0.2	2.1	3,620	380	396	597	391	1,196	100%	100%	50%	0%	38	-9
	1330	3.39	132	15.40		499	15.6	11,883	13.5	200	4.2	1.1	-0.2	2.0	3,630	385	381	607	396	1,221	100%	100%	50%	0%	38	-9
	1400	3.37	96	15.64		380	15.6	12,076	13.5	201	4.1	1.1	-0.2	2.1	3,570	373	382	568	381	1,151	100%	100%	50%	0%	38	-9
	1430	3.07	117	15.66		443	15.6	11,966	14.0	200	4.1	1.1	-0.3	2.1	3,520	376	383	585	384	1,180	100%	100%	50%	0%	38	-9
	1500	3.39	122	15.42		503	15.6	11,664	14.0	201	4.1	1.1	-0.3	2.1	3,560	383	378	599	390	1,211	100%	100%	50%	0%	38	-9
	1530	3.74	138	15.71		512	15.6	12,180	13.5	201	4.1	1.0	-0.2	2.1	3,540	386	371	609	396	1,237	100%	100%	50%	0%	38	-9
	1600	4.14	94	15.60		399	15.6	11,671	13.5	200	4.2	1.1	-0.2	2.2	3,530	371	372	569	381	1,167	100%	100%	50%	0%	38	-9
	1630	3.33	107	15.78		425	15.6	12,252	13.6	200	4.1	1.2	-0.2	2.1	3,540	375	369	587	386	1,206	100%	100%	50%	0%	38	-9
	1700	3.67	117	15.69	Anal. repaired	435	15.6	11,732	13.5	200	4.1	1.0	-0.2	2.1	3,580	380	380	601	392	1,231	100%	100%	50%	0%	38	-9
	1730	3.54	126	15.59	485	497	15.6	11,985	13.5	200	4.2	1.0	-0.2	2.0	3,570	385	372	611	397	1,254	100%	100%	50%	0%	38	-9
	1800	3.57	107	15.73	469	423	15.6	12,264	13.6	200	4.3	1.0	-0.3	2.1	3,550	371	367	574	380	1,197	100%	100%	50%	0%	38	-9
	1830	3.56	121	15.50	467	465	15.6	11,855	13.6	198	4.2	1.1	-0.2	2.0	3,570	374	374	591	386	1,235	100%	100%	50%	0%	38	-9
	1900	3.92	194	15.56	467	559	15.6	11,697	13.5	200	4.2	1.0	-0.2	2.1	3,590	380	384	604	393	1,255	100%	100%	50%	0%	38	-9
	1930	3.49	116	15.66	495	552	15.6	11,742	13.6	199	4.1	1.0	-0.3	2.0	3,560	386	381	614	398	1,278	100%	100%	50%	0%	38	-9
	2000	3.24	110	15.43	489	512	15.6	12,355	13.5	201	4.2	1.0	-0.3	2.1	3,550	370	380	573	381	1,212	100%	100%	50%	0%	38	-9
	2030	3.57	129	15.51	489	522	15.6	11,900	13.5	200	4.3	1.1	-0.3	2.0	3,550	375	372	589	386	1,234	100%	100%	50%	0%	38	-9
	2100	3.67	143	15.53	498	543	15.6	11,702	13.5	199	4.2	1.1	-0.3	2.0	3,580	379	362	601	392	1,266	100%	100%	50%	0%	38	-9
	2130	3.68	192	15.94	502	560	15.6	12,237	13.5	200	4.2	1.0	-0.3	2.0	3,540	385	373	613	397	1,277	100%	100%	50%	0%	38	-9
	2200	3.61	123	15.87	483	503	15.6	12,406	13.5	199	4.2	1.0	-0.3	2.1	3,570	370	377	571	379	1,220	100%	100%	50%	0%	38	-9
	2230	3.55	114	15.83	489	520	15.6	12,098	13.5	199	4.2	1.0	-0.3	2.1	3,560	374	376	591	386	1,234	100%	100%	50%	0%	38	-9
	2300	2.83	129	16.26	602	570	15.6	12,138	13.5	200	4.2	1.0	-0.2	2.0	3,530	379	374	601	391	1,265	100%	100%	50%	0%	38	-9
	2330	3.11	129	15.81	491	556	15.6	11,765	14.0	199	4.2	1.0	-0.2	2.0	3,570	384	390	610	398	1,281	100%	100%	50%	0%	38	-9
11/6/95	0000	3.98	109	15.53	494	500	15.6	11,691	14.0	200	4.1	1.0	-0.2	2.0	3,550	370	383	575	379	1,241	100%	100%	50%	0%	38	-9
	0030	3.57	129	15.50	485	523	15.6	11,998	14.0	199	4.1	1.0	-0.2	2.0	3,480	375	372	589	385	1,265	100%	100%	50%	0%	38	-9
	0100	3.58	119	15.24	491	537	15.6	12,280	14.0	200	4.2	1.0	-0.2	2.0	3,480	381	382	602	346	1,286	100%	100%	50%	0%	38	-9

Table B-1. Burner Characterization Summary

Date	Time	O2	CO	CO2	NOx	SO2	Firing Rate	Steam Flow	UV signal	Steam Press	Windbox P.	Static Pressure			Comb. Air	Comb. Air	Mill Air Flow	Boiler Outlet	BH. Inlet	Conv. Pass	Swirler Settings			Radial Damp	Coal Gun	Gas Gun
		(%)	(ppm)	(%)	(ppm)	(ppm)	(MM Btu/h)	(lb/h)		(psig)	(in W.C.)	Primary	Secondary	Tertiary	(scfm)	(F)	(scfm)	(F)	(F)	(F)	Primary	Secondary	Tertiary		Position	Position
	0130	3.77	120	15.38	487	474	15.6	12,251	14.0	199	4.2	1.0	-0.2	2.0	3,550	370	384	568	340	1,243	100%	100%	50%	0%	38	-9
	0200	3.96	118	16.19	488	503	15.6	11,621	14.0	200	4.1	1.0	-0.2	2.0	3,530	373	384	583	342	1,264	100%	100%	50%	0%	38	-9
	0230	3.79	124	15.20	490	529	15.6	11,709	14.0	199	4.2	1.0	-0.2	2.0	3,470	378	399	597	344	1,309	100%	100%	50%	0%	38	-9
	0300	3.39	137	15.85	497	549	15.6	11,941	14.0	200	4.2	1.0	-0.3	2.0	3,540	378	378	595	347	1,282	100%	100%	50%	0%	38	-9
	0330	3.52	171	15.97	485	546	15.6	12,110	14.0	199	4.2	1.0	-0.2	2.0	3,580	363	383	607	348	1,304	100%	100%	50%	0%	38	-9
	0400	3.44	120	16.17	506	484	15.6	11,851	14.0	200	4.1	1.0	-0.2	2.0	3,550	371	380	578	343	1,275	100%	100%	50%	0%	38	-9
	0430	3.59	121	15.88	492	511	15.6	11,988	14.0	198	4.1	1.0	-0.2	2.0	3,610	375	374	594	343	1,306	100%	100%	50%	0%	38	-9
	0500	3.62	109	15.53	493	507	15.6	11,869	14.0	200	4.2	1.0	-0.2	2.0	3,540	373	375	595	343	1,292	100%	100%	50%	0%	38	-9
	0530	3.40	115	15.53	498	524	15.6	12,000	14.0	200	4.2	1.0	-0.2	2.0	3,560	380	380	606	346	1,317	100%	100%	50%	0%	38	-9
	0600	3.51	86	15.66	500	477	15.6	12,281	14.0	200	4.1	1.0	-0.2	2.1	3,530	371	385	581	353	1,287	100%	100%	50%	0%	38	-9
	0630	3.72	107	15.72	493	495	15.6	12,215	14.0	200	4.1	1.0	-0.2	2.2	3,600	375	369	591	386	1,263	100%	100%	50%	0%	38	-9
	0700	3.83	118	15.80	499	508	15.6	12,001	14.0	199	4.3	1.0	-0.2	2.1	3,530	380	383	602	392	1,286	100%	100%	50%	0%	38	-9
	0730	3.56	100	16.50	479	488	15.6	11,900	14.0	199	4.2	1.0	-0.2	2.0	3,590	374	371	575	383	1,249	100%	100%	50%	0%	38	-9
	0800	3.57	122	15.55	520	493	15.6	11,988	14.0	201	4.2	1.0	-0.1	2.0	3,580	376	367	582	388	1,222	100%	100%	50%	0%	38	-9
	0830	3.68	253	15.29	535	517	15.6	11,902	13.5	200	4.2	1.0	-0.2	2.0	3,520	380	371	604	394	1,235	100%	100%	50%	0%	38	-9
	0900	3.72	114	14.81	524	452	15.6	12,082	13.5	201	4.2	1.1	-0.2	2.1	3,480	370	368	569	380	1,187	100%	100%	50%	0%	38	-9
	0930	3.33	119	15.40	524	491	15.6	12,095	13.5	200	4.2	1.0	-0.2	2.0	3,560	373	382	589	386	1,209	100%	100%	50%	0%	38	-9
	1000	3.20	123	15.36	533	512	15.6	11,890	13.5	200	4.2	1.0	-0.3	2.1	3,540	379	361	599	391	1,277	100%	100%	50%	0%	38	-9
	1030	3.40	189	15.82	477	496	15.6	12,043	14.0	201	4.2	1.1	-0.2	2.1	3,480	387	369	601	392	1,274	100%	100%	50%	0%	38	-9
	Shut down at 1230 due to ash observed emitting from the stack. Subsequently found six bags had holes and were replaced.																									
11/13/95	0500	4.01	151	15.13	315	402	15.6	11,317	13.5	206	3.5	0.7	-0.3	1.9	3,394	337	392	521	350	893	100%	100%	50%	0%	39.5	-9
	0530	3.52	144	15.35	355	446	15.6	11,530	13.5	205	3.6	0.7	-0.3	1.9	3,350	346	381	536	360	919	100%	100%	50%	0%	39.5	-9
	Shutdown because rotary valve between baghouse hopper and ash screw was not operating. Replaced fuses, repaired O2 analyzer (span), and drier.																									
	1330	3.71	147	15.25	341	497	15.6	11,628	13.5	205	3.5	0.8	-0.1	1.9	3,450	365	397	565	373	990	100%	100%	50%	0%	39.5	-9
	1400	3.87	124	15.44	334	493	15.6	11,551	13.5	205	3.5	0.8	-0.1	1.9	3,450	372	385	574	379	1,011	100%	100%	50%	0%	39.5	-9
	1430	3.63	125	15.07	360	487	15.6	11,632	13.5	205	3.5	0.8	-0.1	1.8	3,460	376	388	583	383	1,014	100%	100%	50%	0%	39.5	-9
	1500	3.55	133	15.29	345	505	15.6	11,542	13.5	204	3.5	0.8	-0.2	1.8	3,420	380	391	590	388	1,043	100%	100%	50%	0%	39.5	-9
	1530	3.64	133	15.03	361	495	15.6	11,511	13.5	204	3.5	0.8	-0.2	1.7	3,500	385	390	602	394	1,060	100%	100%	50%	0%	39.5	-9
	1600	3.85	107	15.87	349	490	15.6	12,224	13.5	205	3.6	0.9	-0.3	1.9	3,440	364	389	525	357	932	100%	100%	50%	0%	39.5	-9
	1630	3.78	103	15.27	348	487	15.6	11,804	13.0	203	3.4	0.8	-0.3	1.8	3,300	355	381	536	364	949	100%	100%	50%	0%	39.5	-9
	1700	3.62	121	15.05	388	494	15.6	12,030	13.0	203	3.5	0.8	-0.3	2.0	3,440	360	405	550	372	985	100%	100%	50%	0%	39.5	-9
	1730	3.53	109	15.60	370	509	15.6	11,848	13.0	204	3.5	0.9	-0.3	2.0	3,330	369	401	560	378	991	100%	100%	50%	0%	39.5	-9
	1800	2.93	112	15.80	378	517	15.6	12,122	13.5	206	3.5	0.8	-0.3	1.8	3,437	376	397	571	382	1,017	100%	100%	50%	0%	39.5	-9
	1830	3.26	110	15.70	378	510	15.6	11,989	13.5	207	3.5	0.8	-0.3	1.9	3,403	378	396	578	385	1,027	100%	100%	50%	0%	39.5	-9
	1900	3.62	122	15.70	403	508	15.6	12,104	13.5	207	3.5	0.8	-0.3	1.9	3,520	383	390	591	391	1,075	100%	100%	50%	0%	39.5	-9
	1930	3.39	114	15.70	406	511	15.6	11,804	13.5	206	3.6	0.8	-0.2	2.0	3,449	386	387	598	395	1,081	100%	100%	50%	0%	39.5	-9
	2000	3.86	92	15.20	410	462	15.6	12,386	13.5	206	3.5	0.8	-0.3	1.9	3,524	363	375	538	369	967	100%	100%	50%	0%	39.5	-9
	2030	3.88	114	15.00	369	471	15.6	12,399	13.0	207	3.5	0.8	-0.3	1.9	3,508	363	397	544	369	973	100%	100%	50%	0%	39.5	-9
	2100	3.52	98	14.80	398	466	15.6	12,055	14.0	206	3.4	1.0	-0.2	2.0	3,400	369	384	557	375	1,004	100%	100%	50%	0%	39.5	-9
	2130	3.78	113	15.30	359	488	15.6	12,114	13.5	205	3.4	0.9	-0.2	1.9	3,408	371	389	563	380	1,020	100%	100%	50%	0%	39.5	-9
	2200	3.58	104	15.70	435	502	15.6	12,381	13.5	207	3.5	0.8	-0.3	2.0	3,444	380	390	582	388	1,045	100%	100%	50%	0%	39.6	-9
	2230	3.59	105	15.15	416	493	15.6	12,464	14.0	207	3.6	0.8	-0.3	2.0	3,410	383	380	586	390	1,049	100%	100%	50%	0%	39.6	-9
	2300	3.14	111	15.50	428	489	15.6	11,940	14.0	205	3.5	0.8	-0.3	2.0	3,425	387	383	593	395	1,070	100%	100%	50%	0%	39.5	-9
	2330	3.73	112	15.20	372	460	15.6	12,229	13.5	206	3.5	0.8	-0.3	2.1	3,327	364	374	537	369	968	100%	100%	50%	0%	39.6	-9
11/14/95	0000	3.66	76	15.50	399	475	15.6	12,314	13.5	206	3.5	0.7	-0.3	2.1	3,466	365	385	546	373	999	100%	100%	50%	0%	39.5	-9
	0030	3.68	105	15.29	371	474	15.6	12,038	13.5	204	3.4	0.7	-0.3	2.2	3,314	367	381	556	375	1,017	100%	100%	50%	0%	39.5	-9
	0100	3.69	102	15.09	379	475	15.6	12,271	13.5	207	3.5	0.8	-0.3	2.0	3,504	372	374	567	380	1,036	100%	100%	50%	0%	39.5	-9
	0130	3.79	114	14.88	388	483	15.6	12,169	13.5	205	3.5	0.9	-0.3	2.1	3,509	378	380	577	385	1,059	100%	100%	50%	0%	39.5	-9
	0200	3.51	118	15.76	403	496	15.6	12,000	13.5	205	3.5	0.7	-0.3	2.0	3,415	385	385	590	393	1,086	100%	100%	50%	0%	39.5	-9
	0230	3.89	88	14.88	410	446	15.6	12,271	13.5	206	3.5	0.7	-0.3	2.1	3,388	365	393	540	373	979	100%	100%	50%	0%	39.5	-9
	0300	3.84	201	15.65	400	482	15.6	12,219	13.5	206	3.5	0.8	-0.4	2.1	3,341	365	386	550	376	1,088	100%	100%	50%	0%	39.5	-9
	0330	3.87	155	15.05	384	479	15.6	12,012	13.5	205	3.5	0.7	-0.4	2.1	3,336	369	389	561	380	1,028	100%	100%	50%	0%	39.5	-9
	0400	4.02	113	15.05	402	481	15.6	11,954	13.5	205	3.4	0.7	-0.4	2.1	3,413	373	390	572	384	1,045	100%	100%	50%	0%	39.5	-9
	0430	3.86	326	15.66	387	491	15.6	12,139	13.5	205	3.6	0.8	-0.4	2.1	3,407	377	385	581	388	1,070	100%	100%	50%	0%	39.6	-9
	0500	3.64	122	15.10	395	466	15.6	12,281	13.5	206	3.6	0.8	-0.4	2.1	3,427	381	391	589	392	1,085	100%	100%	50%	0%	39.5	-9
	0530	3.57	132	15.26	404	478	15.6	12,420	13.5	206	3.6	0.8	-0.4	2.1	3,433	363	386	544	371	989	100%	100%	50%	0%	39.5	-9
	0600	3.56	97	15.35	430	466	15.6	12,603	13.5	206	3.6	0.8	-0.4	2.1	3,567	364	381	554	375	1,018	100%	100%	50%	0%	39.5	-9
	0630	3.76	95	15.60	450	478	15.6	12,434	13.0	205	3.7	1.0	-0.2	2.1	3,450	370	386	569	382	1,044	100%	100%	50%	0%	39.5	-9
	0700	3.71	240	15.42	402	469	15.6	12,128	13.0	206	3.8	1.0	-0.3	2.1	3,470	374	378	578	386	1,060	100%	100%	50%	0%	39.5	-9
	0730	3.52	116	14.99	443	479	15.6	12,027	13.0	205	3.8	1.0	-0.3	2.0	3,450	377	373	588	389	1,077	100%	100%	50%	0%	39.5	-9
	0800	Moisture/oil in the sample line was detected at 2300. SO2 values were dropping off during the 8 to 4 shift and it was subsequently found that the line was plugged. Therefore, analyzer values from 0800 to 2300 are not reported.					15.6	12,194	12.5	206	3.7	1.0	-0.3	2.0	3,470	383	387	595	395	1,103	100%	100%	50%	0%	39.5	-9
	0830						15.6	12,106	13.0	205	3.7	1.1	-0.3	2.0	3,430	365	377	541	375	986	100%	100%	50%	0%	39.5	-9
	0900						15.6	12,269	13.0	206	3.6	1.1	-0.3	2.0	3,390	364	376	551	373	1,010	100%	100%	50%	0%	39.5	-9
	0930						15.6	12,032	13.0	204	3.2	0.5	-0.3	1.7	3,270	368	384	561	378	1,043	100%	100%	50%	0%	39.5	-9
	1000						15.6	12,073	13.0	205	3.2	0.5	-0.3	1.6	3,350	374	385	573	382	1,065	100%	100%	50%	0%	39.6	-9
	1030						15.6	12,147	14.0	205	3.3	0.5	-0.4	1.7	3,410	380	378	591	390	1,124	100%	100%	50%	0%	39.5	-9
	1100						15.6	12011	13.5	206	3.3	0.5	-0.4	1.7	3,450	386	376	602	395	1,140	100%	100%	50%	0%	39.5	-9
	1130						15.6	12,100	14.0	204	3.4	0.7	-0.3	1.7	3,380	369	381	542	377	1,020	100%	100%	50%	0%	39.6	-9
	1200						15.6	12,198	13.5	205	3.3	0.7	-0.3	1.7	3,380	365	384	552	376	1,028	100%	100%	50%	0%	39.5	-9
	1230						15.6	12,154	13.5	205	3.3	0.7	-0.4	1.7	3,420	370	388	565	379	1,056	100%	100%	50%	0%	39.5	-9
	1300						15.6	12,218	13.5	205	3.3	0.6	-0.3	1.6	3,410	374	383	577	384	1,097	100%	100%	50%	0%	39.5	-9
	1330						15.6	12,304	13.5	205	3.3	0.6	-0.3	1.7	3,430	377	372	585	388	1,110	100%	100%	50%	0%	39.5	-9
	1400						15.6	11,841	13.5	204	3.6	0.9	-0.3	2.0	3,570	382	384	597	394	1,128	100%	100%	50%	0%	39.5	-9
	1430						15.6	12,223	13.5	203	3.5	0.9	-0.2	1.8	3,450	365	386	553	375	1,038	100%	100%	50%	0%	39.5	-9
	1500						15.6	12,014	13.5	204	3.6	0.7	-0.2	1.9	3,370	366	369	561	378	1,056	100%	100%	50%	0%	39.5	-9
	1530						15.6	12,337	13.5	206	3.6	0.7	-0.1	1.9	3,460	371	375	572	383	1,064	100%	100%	50%	0%	39.5	-9
	1600						15.6	12,210	14.0	205	3.5	0.8	-0.2	1.9	3,470	376	380	584	388	1,091	100%	100%	50%	0%	39.5	-9
	1630						15.6	11,832	14.0	205	3.5	0.8	-0.2	1.9	3,440	380	377	592	392	1,119	100%	100%	50%	0%	39.5	-9
	1700						15.6	12,228	14.0	205	3.3	0.8	-0.2	1.9	3,528	383	383	600	397	1,128	100%	100%	50%	0%	39.5	-9
	1730						15.6	12,222	14.0	206	3.7	0.9	-0.2	2.0	3,555	367	372	553	378	1,042	100%	100%	50%	0%	39.5	-9
	1800						15.6	12,064	14.0	205	3.7	1.0	-0.3	2.2	3,490	370	371	567	382	1,054	100%	100%	50%	0%	39.5	-9
	1830						15.6	12,186	14.0	206	3.7	1.0	-0.2	2.0	3,440	373	379	578	385	1,090	100%	100%	50%	0%	39.5	-9
	1900						15.6	12,087	14.0	205	3.7	1.0	-0.2	2.0	3,640	378	372	589	390	1,110	100%	100%	50%	0%	39.5	-9
	1930						15.6	12,129	14.0	205	4.0	1.0	-0.3	2.0	3,470	381	381	598	394	1,115	100%	100%	50%	0%	39.5	-9
	2000						15.6	12,535	14.0	206	3.6	1.0	-0.2	2.1	3,647	368	377	563	381	1,042	100%	100%	50%	0%	39.5	-9
	2030						15.6	12,444	14.0	206	4.0	1.0	-0.3	2.0	3,670	371	381	575	386	1,079	100%	100%	50%	0%	39.5	-9
	2100						15.6	12,225	14.0	204	3.9	1.0	-0.2	2.1	3,580	375	378	583	389	1,096	100%	100%	50%	0%	39.5	-9
	2130						15.6	12,305	14.0	204	3.7	1.0	-0.2	2.0	3,600	379	384	589	391	1,111	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	2200						15.6	11,972	14.0	205	3.6	0.9	-0.2	2.0	3,466	383	390	594	394	1,114	100%	100%	50%	0%	39.5	-9
	2230						15.6	12,538	14.0	204	3.6	1.0	-0.2	2.0	3,415	386	379	600	396	1,140	100%	100%	50%	0%	39.5	-9
	Shut down due for analyzer repair.																									
11/16/95	0330	3.73	120	15.19	388	452	15.6	11,639	13.5	207	3.6	0.8	-0.3	1.7	3,472	344	370	544	360	961	100%	100%	50%	0%	39.5	-9
	0400	4.10	156	15.80	374	427	15.6	11,706	13.5	205	3.5	1.0	-0.4	1.8	3,380	356	366	554	369	987	100%	100%	50%	0%	39.5	-9
	0430	3.54	123	15.42	375	487	15.6	11,809	13.5	204	3.5	0.9	-0.4	1.8	3,450	364	380	565	376	1,017	100%	100%	50%	0%	39.5	-9
	0500	3.85	107	15.35	354	525	15.6	11,643	13.5	204	3.5	0.9	-0.4	1.8	3,438	371	378	576	382	1,046	100%	100%	50%	0%	39.5	-9
	0530	3.42	104	15.95	378	536	15.6	12,145	13.5	206	3.5	0.9	-0.4	1.8	3,462	377	394	585	388	1,060	100%	100%	50%	0%	39.5	-9
	0600	4.22	89	15.39	356	494	15.6	11,834	13.5	204	3.6	0.8	-0.3	1.8	3,476	363	387	528	372	960	100%	100%	50%	0%	39.5	-9
	0630	4.34	56	15.68	350	500	15.6	12,255	13.5	206	3.6	0.8	-0.3	1.8	3,449	358	379	547	369	993	100%	100%	50%	0%	39.5	-9
	0700	3.81	86	15.16	357	508	15.6	11,897	13.5	204	3.6	0.8	-0.3	1.8	3,437	363	376	558	374	1,015	100%	100%	50%	0%	39.5	-9
	0730	3.55	93	15.88	362	520	15.6	12,135	13.5	204	3.6	1.0	-0.3	1.7	3,490	368	380	566	379	1,036	100%	100%	50%	0%	39.5	-9
	0800	3.54	83	15.73	393	509	15.6	11,731	13.5	205	3.8	1.2	-0.2	1.9	3,390	375	394	579	386	1,050	100%	100%	50%	0%	39.5	-9
	0830	3.85	86	16.29	389	522	15.6	12,402	13.5	206	3.9	1.2	-0.3	2.0	3,460	379	385	587	390	1,074	100%	100%	50%	0%	39.5	-9
	0900	3.98	82	15.57	404	509	15.6	11,919	13.5	205	4.0	1.0	-0.3	2.0	3,470	383	390	595	393	1,088	100%	100%	50%	0%	39.5	-9
	0930	4.05	115	16.03	450	450	15.6	12,327	13.5	207	3.7	0.9	-0.3	2.0	3,370	383	393	541	370	990	100%	100%	50%	0%	39.5	-9
	1000	3.34	89	15.80	471	471	15.6	12,458	13.5	206	3.7	0.8	-0.3	2.0	3,350	363	398	553	373	1,015	100%	100%	50%	0%	39.5	-9
	1030	3.47	84	15.89	479	479	15.6	12,261	13.5	207	3.7	0.9	-0.3	2.0	3,370	370	408	564	379	1,042	100%	100%	50%	0%	39.5	-9
	1100	3.48	83	15.55	487	487	15.6	12,080	13.5	207	3.7	0.9	-0.3	2.0	3,390	374	398	575	383	1,075	100%	100%	50%	0%	39.5	-9
	1130	3.90	87	15.61	489	489	15.6	12,051	13.0	205	3.7	0.9	-0.3	1.9	3,340	379	396	584	388	1,090	100%	100%	50%	0%	39.5	-9
	1200	3.77	94	15.59	499	499	15.6	12,067	13.5	206	3.6	0.8	-0.4	1.9	3,330	383	398	593	392	1,111	100%	100%	50%	0%	39.5	-9
	1230	3.84	109	15.62	494	494	15.6	11,892	13.5	205	3.7	0.8	-0.4	1.9	3,340	388	409	599	395	1,146	100%	100%	50%	0%	39.5	-9
	1300	3.81	96	15.40	443	443	15.6	12,441	13.5	207	3.6	0.9	-0.3	1.8	3,280	368	386	547	373	1,036	100%	100%	50%	0%	39.5	-9
	1330	3.24	96	15.75	412	478	15.6	11,761	13.5	206	3.5	0.8	-0.3	1.7	3,230	370	397	558	375	1,068	100%	100%	50%	0%	39.5	-9
	1400	3.18	113	15.57	411	483	15.6	12,081	13.0	204	3.5	0.8	-0.3	1.6	3,280	374	395	570	380	1,097	100%	100%	50%	0%	39.5	-9
	1430	3.35	150	15.85	417	486	15.6	11,666	13.0	204	3.5	0.8	-0.3	1.7	3,270	379	404	580	384	1,115	100%	100%	50%	0%	39.5	-9
	1500	3.71	102	15.36	429	487	15.6	11,679	13.5	205	3.6	0.8	-0.3	1.6	3,270	384	407	589	390	1,133	100%	100%	50%	0%	39.5	-9
	1530	3.61	118	16.03	440	494	15.6	11,983	13.0	206	3.5	0.8	-0.3	1.6	3,250	390	398	599	395	1,149	100%	100%	50%	0%	39.5	-9
	1600	3.84	102	15.53	426	415	15.6	11,683	14.0	204	3.4	0.8	-0.3	1.6	3,230	369	399	546	372	1,047	100%	100%	50%	0%	39.5	-9
	1630	3.69	139	15.90	460	454	15.6	11,997	14.0	203	3.4	0.8	-0.3	1.6	3,200	370	408	560	375	1,053	100%	100%	50%	0%	39.5	-9
	1700	3.44	91	16.00	462	475	15.6	11,741	14.0	205	3.5	1.0	-0.4	1.8	3,270	375	402	572	380	1,089	100%	100%	50%	0%	39.5	-9
	1730	3.83	154	15.40	450	478	15.6	11,782	14.0	205	3.5	0.9	-0.4	1.7	3,280	378	410	578	384	1,096	100%	100%	50%	0%	39.5	-9
	1800	3.69	158	15.80	458	485	15.6	11,591	14.0	203	3.6	1.0	-0.3	1.7	3,300	383	411	589	389	1,117	100%	100%	50%	0%	39.5	-9
	1830	3.73	152	15.50	462	486	15.6	11,526	13.0	204	3.6	0.9	-0.2	1.8	3,237	388	408	597	394	1,137	100%	100%	50%	0%	39.5	-9
	1900	3.81	120	15.60	473	487	15.6	10,884	13.0	203	3.6	1.0	-0.2	1.9	3,256	392	402	610	398	1,165	100%	100%	50%	0%	39.5	-9
	1930	3.63	174	15.40	445	422	15.6	11,887	13.5	206	3.5	1.0	-0.2	1.8	3,200	369	395	554	373	1,054	100%	100%	50%	0%	39.5	-9
	2000	3.49	120	15.60	447	430	15.6	11,233	13.5	204	3.5	1.0	-0.2	1.8	3,143	372	397	566	377	1,079	100%	100%	50%	0%	39.5	-9
	2030	3.83	228	15.80	438	444	15.6	11,386	13.5	204	3.5	0.9	-0.2	1.9	3,203	376	399	574	381	1,105	100%	100%	50%	0%	39.5	-9
	2100	3.69	216	15.40	450	430	15.6	11,566	13.5	205	3.4	0.8	-0.3	1.8	3,245	381	392	586	386	1,139	100%	100%	50%	0%	39.5	-9
	2130	3.58	196	15.50	436	432	15.6	11,642	13.5	205	3.4	0.8	-0.3	1.9	3,169	387	385	599	392	1,158	100%	100%	50%	0%	39.5	-9
	2200	4.10	133	15.30	450	437	15.6	11,763	13.5	205	3.4	0.9	-0.3	1.9	3,250	392	392	612	400	1,189	100%	100%	50%	0%	39.5	-9
	2230	4.00	119	15.40	436	SO2 analyzer	15.6	11,645	13.5	205	3.5	0.8	-0.3	1.9	3,251	367	392	553	371	1,057	100%	100%	50%	0%	39.5	-9
	2300	3.50	126	15.50	440	not working	15.6	11,794	13.5	205	3.5	0.9	-0.2	1.8	3,052		394	560	371	1,075	100%	100%	50%	0%	39.5	-9
	2330	3.33	165	15.80	438	properly.	15.6	11,505	13.5	205	3.5	0.9	-0.3	1.9	3,026	376	389	574	379	1,131	100%	100%	50%	0%	39.5	-9
11/17/95	0000	3.82	123	15.20	439		15.6	11,786	14.0	204	3.5	0.9	-0.3	1.9	3,120	386	390	593	390	1,145	100%	100%	50%	0%	39.5	-9
	0030	3.87	147	15.30	450		15.6	11,558	14.0	204	3.5	0.9	-0.3	1.8	3,200	391	397	601	395	1,158	100%	100%	50%	0%	39.5	-9
	0100	4.10	90	15.17	458		15.6	12,006	14.0	205	3.5	1.0	-0.3	1.8	2,420	372	403	554	375	1,053	100%	100%	50%	0%	39.5	-9
	0130	3.93	101	15.30	452		15.6	11,648	14.0	203	3.5	1.0	-0.3	1.7	3,160	373	394	566	379	1,076	100%	100%	50%	0%	39.5	-9
	0200	3.54	150	15.50	448		15.6	11,869	14.0	203	3.5	0.8	-0.3	1.5	3,360	378	396	575	382	1,104	100%	100%	50%	0%	39.5	-9
	0230	3.69	154	16.50	446		15.6	11,629	14.0	204	3.5	0.8	-0.3	1.5	3,160	385	391	585	388	1,124	100%	100%	50%	0%	39.5	-9
	0300	3.45	227	15.60	430		15.6	11,606	14.0	203	3.5	0.8	-0.3	1.6	3,140	392	394	595	395	1,154	100%	100%	50%	0%	39.5	-9
	0330	3.54	171	15.20	426		15.6	11,621	14.0	204	3.4	0.7	-0.2	1.5	3,270	395	389	604	399	1,172	100%	100%	50%	0%	39.5	-9
	0400	3.73	87	15.10	433		15.6	11,578	14.0	202	3.5	0.8	-0.2	1.6	3,220	374	388	557	378	1,078	100%	100%	50%	0%	39.5	-9
	0430	3.73	72	14.80	416		15.6	11,742	14.0	203	3.5	0.7	-0.3	1.8	3,350	374	382	574	382	1,100	100%	100%	50%	0%	39.5	-9
	0500	3.97	109	15.00	411		15.6	11,666	14.0	202	3.6	0.7	-0.3	1.7	3,420	379	379	584	389	1,116	100%	100%	50%	0%	39.5	-9
	0530	3.64	127	15.40	351		15.6	12,239	14.0	204	3.7	0.6	-0.3	2.0	3,410	383	390	593	393	1,138	100%	100%	50%	0%	39.5	-9
	0600	3.60	124	15.40	479		15.6	12,068	14.0	204	3.7	1.0	-0.3	1.7	3,260	388	387	602	398	1,156	100%	100%	50%	0%	39.5	-9
	0630	3.91	72	15.30	443		15.6	11,922	14.0	203	3.7	1.0	-0.3	1.7	3,310	370	387	561	378	1,083	100%	100%	50%	0%	39.5	-9
	0700	3.45	120	15.14	407		15.6	12,204	14.0	203	3.7	1.0	-0.3	1.7	3,410	373	386	575	384	1,108	100%	100%	50%	0%	39.5	-9
	0730	3.56	115	15.30	354		15.6	11,995	14.0	203	3.7	1.0	-0.3	1.7	3,420	378	393	584	386	1,122	100%	100%	50%	0%	39.5	-9
	0800	3.34	130	15.63	317		15.6	12,142	13.5	204	3.7	0.9	-0.3	1.8	3,420	385	387	594	395	1,150	100%	100%	50%	0%	39.5	-9
	0830	3.97	133	15.10	398		15.6	11,766	13.5	204	3.6	0.9	-0.3	1.8	3,250	371	383	546	377	1,082	100%	100%	50%	0%	39.5	-9
	0900	3.44	136	15.40	402		15.6	11,892	13.5	205	3.5	0.8	-0.3	1.9	3,270	373	389	563	378	1,099	100%	100%	50%	0%	39.5	-9
	0930	Analyzers being checked out					15.6	11,961	13.5	205	3.5	0.8	-0.3	1.8	3,370	378	384	580	383	1,127	100%	100%	50%	0%	39.5	-9
	1000						15.6	11,832	13.5	203	4.0	1.0	-0.3	2.0	3,520	385	381	601	395	1,156	100%	100%	50%	0%	39.5	-9
	1030	3.27	68	15.64	531	502	15.6	11,326	14.0	206	3.8	0.9	-0.3	1.9	3,460	374	384	551	384	1,082	100%	100%	50%	0%	39.5	-9
	1100	3.39	59	16.02	503	529	15.6	12,376	13.5	205	3.9	0.9	-0.3	1.9	3,560	374	401	575	382	1,102	100%	100%	50%	0%	39.5	-9
	1130	3.02	56	16.17	445	532	15.6	12,080	13.5	203	4.0	1.0	-0.3	2.1	3,590	370	386	584	388	1,123	100%	100%	50%	0%	39.5	-9
	1200	3.52	83	16.53	560	551	15.6	12,339	13.5	204	4.0	1.0	-0.4	2.2	3,590	383	388	594	393	1,145	100%	100%	50%	0%	39.5	-9
	1230	4.00	50	15.47	549	503	15.6	12,112	13.5	203	4.1	0.9	-0.4	2.2	3,560	369	394	560	378	1,092	100%	100%	50%	0%	39.5	-9
	1300	3.88	53	15.63	555	514	15.6	11,863	13.5	203	4.0	0.9	-0.3	2.2	3,550	374	392	578	385	1,105	100%	100%	50%	0%	39.5	-9
	1330	3.50	52	15.90	572	516	15.6	11,877	13.5	204	4.2	1.0	-0.4	2.2	3,590	378	398	588	390	1,123	100%	100%	50%	0%	39.5	-9
	1400	3.19	57	15.79	548	509	15.6	11,804	13.5	204	4.2	1.0	-0.3	2.2	3,550	369	384	564	379	1,094	100%	100%	50%	0%	39.5	-9
11/22/95	1630	3.69	131	15.81		520	15.6	12,336	14.0	207	3.5	0.8	-0.3	1.7	3,420	377	380	599	384		100%	100%	50%	0%	39.5	-9
	1700	3.90	132	15.50		502	15.6	12,307	13.5	205	3.6	0.6	-0.3	1.8	3,350	389	378	608	393		100%	100%	50%	0%	39.5	-9
	1730	4.22	133	14.81	395	479	15.6	12673	13.5	206	3.4	0.6	-0.3	1.8	3,360	380	393	547	366		100%	100%	50%	0%	39.5	-9
	1800	3.98	134	14.88	400	480	15.6	12,285	13.5	205	3.5	0.6	-0.3	1.8	3,410	360	390	554	370		100%	100%	50%	0%	39.5	-9
	1830	4.35	138	15.28	408	490	15.6	13,037	13.5	206	3.5	0.6	-0.3	1.8	3,350	363	391	558	371		100%	100%	50%	0%	39.5	-9
	1900	4.11	123	14.76	412	485	15.6	12,894	13.5	206	3.5	0.6	-0.3	1.8	3,360	367	390	563	373		100%	100%	50%	0%	39.5	-9
	1930	4.22	139	15.19	424	488	15.6	12,610	13.5	206	3.6	0.6	-0.3	1.8	3,420	372	389	571	378		100%	100%	50%	0%	39.5	-9
	2000	3.81	137	15.26	440	505	15.6	12,426	13.5	204	3.5	0.6	-0.3	1.8	3,340	377	394	581	383		100%	100%	50%	0%	39.5	-9
	2030	4.09	136	14.67	444	500	15.6	12,711	13.5	204	3.5	0.6	-0.3	1.8	3,360	379	382	590	384		100%	100%	50%	0%	39.5	-9
	2100	3.73	138	15.39	443	506	15.6	12,555	13.5	204	3.5	0.6	-0.3	1.8	3,360	382	376	600	388		100%	100%	50%	0%	39.5	-9
	2130	3.90	130	15.61	445	502	15.6	13,088	13.0	204	3.6	0.7	-0.3	1.8	3460	383	384	608	389		100%	100%	50%	0%	39.5	-9
	2200	3.60	159	14.79	468	468	15.6	13,059	13.0	205	3.6	0.7	-0.3	1.8	3420	358	400	548	365		100%	100%	50%	0%	39.5	-9
	2230	3.80	132	14.73	430	402	15.6	13,132	13.0	205	3.6	0.7	-0.3	1.8	3,460	367	394	558	367		100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2	CO	CO2	NOx	SO2	Firing Rate	Steam Flow	UV signal	Steam Press	Windbox P.	Static Pressure			Comb. Air	Comb.Air	Mill Air Flow	Boiler Outlet	BH. Inlet	Conv. Pass	Swirler Settings				Coal Gun	Gas Gun
		(%)	(ppm)	(%)	(ppm)	(ppm)	(MM Btu/h)	(lb/h)		(psig)	(in W.C.)	Primary	Secondary	Tertiary	(acfm)	(F)	(acfm)	(F)	(F)	(F)	Primary	Secondary	Tertiary	Radial Damp	Position	Position
11/28/95	1000	3.81	814	16.01	370	513	15.6	12,276	13.0	202	3.5	0.8	-0.2	1.5	3,280	343	392	550	363		100%	100%	50%	0%	39.5	-9
	1030	3.90	232	15.20	370	513	15.6	12,134	13.0	202	3.5	1.0	-0.2	1.7	3,420	363	386	565	375		100%	100%	50%	0%	39.5	-9
	1100	3.87	222	15.60	380	514	15.6	12,167	13.0	204	3.6	0.9	-0.2	1.8	3,450	373	387	577	383		100%	100%	50%	0%	39.5	-9
	1130	3.39	174	15.40	390	507	15.6	12,282	13.0	202	3.7	1.0	-0.2	1.8	3,390	380	398	586	388		100%	100%	50%	0%	39.5	-9
	1200	3.87	183	15.00	390	509	15.6	12,505	13.0	202	3.7	1.1	-0.2	1.8	3,420	385	389	595	393		100%	100%	50%	0%	39.5	-9
	1230	3.97	201	15.40	400	514	15.6	12,680	13.0	202	3.5	1.0	-0.2	1.8	3,420	390	389	605	397		100%	100%	50%	0%	39.5	-9
	1300	4.07	207	15.60	380	506	15.6	12,847	13.0	203	3.7	1.0	-0.2	1.8	3,430	367	395	546	374		100%	100%	50%	0%	39.5	-9
	1330	3.86	196	15.00	400	519	15.6	12,865	13.0	204	3.7	1.0	-0.2	1.8	3,440	366	397	557	375		100%	100%	50%	0%	39.5	-9
	1400	3.91	198	15.30	380	535	15.6	12,821	13.0	203	3.7	1.0	-0.2	1.8	3,360	371	381	568	379		100%	100%	50%	0%	39.5	-9
11/29/95	1100	3.89	200	15.10	410	476	15.6	11,371	14.0	202	3.4	1.0	-0.2	1.7	3,270	349	317	565	363		100%	100%	50%	0%	36.5	-9
	1130	3.55	203	15.60	390	597	15.6	12,447	14.0	204	3.5	1.0	-0.2	1.8	3,310	365	303	576	374		100%	100%	50%	0%	36.5	-9
	1200	3.32	202	15.50	400	528	15.6	12,645	14.0	204	3.5	1.0	-0.2	1.8	3,320	373	310	584	380		100%	100%	50%	0%	36.5	-9
	1230	3.75	244	15.35	380	514	15.6	12,741	14.0	203	3.5	1.0	-0.2	1.8	3,330	381	328	594	386		100%	100%	50%	0%	36.5	-9
	1300	3.56	223	15.23	370	508	15.6	12,516	14.0	203	3.5	1.0	-0.2	1.8	3,330	387	309	599	390		100%	100%	50%	0%	36.5	-9
	1330	3.99	194	15.14	400	499	15.6	12,654	14.0	203	3.5	1.0	-0.2	1.7	3,250	391	320	605	392		100%	100%	50%	0%	36.5	-9
	1400	3.99	166	14.89	370	485	15.6	12,560	14.0	204	3.4	1.0	-0.3	1.8	3,290	369	325	533	370		100%	100%	50%	0%	36.5	-9
	1430	3.77	205	15.04	390	468	15.6	12,659	14.0	204	3.5	1.0	-0.2	1.7	3,270	361	310	548	365		100%	100%	50%	0%	36.5	-9
11/30/95	0900	3.72	257	15.40	440	528	15.6	12,735	13.0	204	3.7	1.0	-0.2	1.8	3,360	362	295	572	387		100%	100%	50%	0%	39.5	-9
	0930	3.55	186	15.60	440	489	15.6	12,904	13.0	202	3.6	1.0	-0.3	1.8	3,360	374	297	587	378		100%	100%	50%	0%	39.5	-9
	1000	3.81	124	15.50	470	498	15.6	12,796	13.0	202	3.7	1.0	-0.2	1.7	3,330	380	306	595	383		100%	100%	50%	0%	39.5	-9
	1030	3.59	140	15.40	450	454	15.6	12,386	14.0	202	3.6	1.0	-0.2	1.8	3,340	385	302	605	389		100%	100%	50%	0%	39.5	-9
	1100	3.87	138	15.50	420	463	15.6	12,888	14.0	201	3.6	1.0	-0.2	1.7	3,400	388	321	610	393		100%	100%	50%	0%	39.5	-9
	1130	3.93	133	15.40	410	471	15.6	13,073	14.0	203	3.6	1.0	-0.2	1.7	3,350	393	318	615	397		100%	100%	50%	0%	39.5	-9
Leak developed	1200	4.15	175	14.90	350	424	15.6	12,693	14.0	203	3.5	1.0	-0.2	1.7	3,050	363	317	536	363		100%	100%	50%	0%	39.5	-9
in gas sample	1230	3.85	203	15.50	360	445	15.6	12,497	14.0	202	3.3	1.0	-0.2	1.7	3,070	362	303	551	364		100%	100%	50%	0%	39.5	-9
line @ 1200	1300	3.91	245	14.80	340	462	15.6	12,676	14.0	202	3.3	1.0	-0.2	1.6	3,030	368	303	565	368		100%	100%	50%	0%	39.5	-9
hours?	1330	3.64	311	15.60	370	482	15.6	12,194	14.0	202	3.3	1.0	-0.2	1.5	3,110	372	302	582	373		100%	100%	50%	0%	39.5	-9
	1400	3.43	327	16.40	410	484	15.6	12,800	14.0	203	2.9	0.9	-0.2	1.8	3,140	383	300	685	382		100%	100%	50%	0%	39.5	-9
	1435	4.30	291	14.80	270	421	15.6	12,237	14.0	206	2.6	1.0	-0.2	1.2	2,740	386	407	517	380		100%	100%	50%	0%	39.5	-9
	1500	4.03	1211	15.30	250	456	15.6	12,400	14.0	204	2.5	0.9	-0.3	1.4	2,900	368	391	565	365		100%	100%	50%	0%	39.5	-9
	1530	3.83	1916	14.80	230	494	15.6	10,860	14.0	201	2.4	0.5	-0.2	1.0	2,360	375	383	578	375		100%	100%	50%	0%	39.5	-9
	1600	4.51	642	15.50	250	431	15.6	12,226	14.0	204	2.5	0.7	-0.2	1.0	2,780	374	330	523	370		100%	100%	50%	0%	39.5	-9
	Shut down because CO was high and combustion air flow was decreasing. It was suspected that a leak developed in the sample line.																									
12/13/95	1600	4.11	131	15.12	342	478	15.6	12,546	14.0	205	4.0	0.8	-0.4	1.8	3,740	369	371	609	388		100%	100%	50%	0%	39.5	-9
Continuous/	1630	4.41	75	15.00	346	472	15.6	12,793	14.0	206	4.1	0.8	-0.3	1.8	3,590	359	376	534	372		100%	100%	50%	0%	39.5	-9
Deposition	1700	4.10	76	15.39	360	507	15.6	12,589	14.0	206	3.9	0.8	-0.3	1.9	3,560	354	360	564	368		100%	100%	50%	0%	39.5	-9
	1730	3.93	73	15.13	368	511	15.6	12,899	14.0	206	3.9	0.8	-0.3	1.9	3,600	360	381	569	375		100%	100%	50%	0%	39.5	-9
	1800	3.83	68	15.35	376	516	15.6	12,964	14.0	206	3.8	0.8	-0.3	1.8	3,580	366	357	580	381		100%	100%	50%	0%	39.5	-9
	1830	4.00	65	15.16	398	501	15.6	12,516	14.0	206	3.9	0.8	-0.3	1.8	3,560	371	366	588	385		100%	100%	50%	0%	39.5	-9
	1900	4.42	67	14.62	395	502	15.6	12,302	14.0	205	3.9	0.8	-0.3	1.9	3,600	375	369	600	390		100%	100%	50%	0%	39.5	-9
	1930	4.37	61	15.04	396	482	15.6	12,528	14.0	206	4.1	0.9	-0.3	1.9	3,570	357	372	546	373		100%	100%	50%	0%	39.5	-9
	2000	4.35	63	15.14	393	505	15.6	12,502	14.0	205	4.0	0.9	-0.3	1.9	3,580	356	377	560	374		100%	100%	50%	0%	39.5	-9
	2030	3.88	59	14.66	403	502	15.6	12,642	14.0	204	4.0	0.9	-0.3	1.9	3,570	363	375	574	380		100%	100%	50%	0%	39.5	-9
	2100	4.15	61	14.98	425	514	15.6	13,025	14.0	207	4.0	0.8	-0.3	1.9	3,610	367	376	583	384		100%	100%	50%	0%	39.5	-9
	2130	4.12	56	15.52	398	522	15.6	12,871	14.0	208	4.1	0.8	-0.3	1.9	3,600	372	370	587	386		100%	100%	50%	0%	39.5	-9
	2200	4.35	61	14.99	416	526	15.6	12,678	14.0	203	4.1	0.8	-0.3	1.9	3,510	373	378	597	389		100%	100%	50%	0%	39.5	-9
	2230	4.19	56	15.14	413	493	15.6	13,666	14.0	204	4.1	0.8	-0.3	1.9	3,530	361	370	543	379		100%	100%	50%	0%	39.5	-9
	2300	3.98	54	15.32	419	529	15.6	12,923	14.0	204	4.0	0.8	-0.3	1.9	3,560	359	371	560	376		100%	100%	50%	0%	39.5	-9
	2330	3.65	55	15.39	424	531	15.6	12,792	14.0	205	4.0	0.8	-0.3	1.9	3,510	364	373	572	382		100%	100%	50%	0%	39.5	-9
12/14/95	0000	3.54	58	15.29	439	536	15.6	12,543	14.0	206	3.5	0.8	-0.2	1.9	3,129	359	372	581	388		100%	100%	50%	0%	39.5	-9
	0030	3.76	60	15.49	423	533	15.6	12,906	14.0	206	3.5	0.8	-0.2	1.9	3,470	372	369	585	389		100%	100%	50%	0%	39.5	-9
	0100	3.94	70	15.32	435	522	15.6	12,702	14.0	206	3.5	0.8	-0.2	1.9	3,450	377	381	592	392		100%	100%	50%	0%	39.5	-9
	0130	3.33	74	15.98	443	535	15.6	12,848	14.0	204	3.6	0.9	-0.2	1.8	3,470	383	374	603	398		100%	100%	50%	0%	39.5	-9
	0200	3.67	67	15.13	413	495	15.6	12,828	14.0	206	3.5	0.8	-0.2	1.9	3,360	366	368	550	378		100%	100%	50%	0%	39.5	-9
	0230	3.55	81	16.14	408	533	15.6	13,002	14.0	205	3.5	0.8	-0.2	1.9	3,380	364	377	561	378		100%	100%	50%	0%	39.5	-9
	0300	3.54	84	16.00	433	547	15.6	12,868	14.0	204	3.4	0.7	-0.2	1.8	3,390	369	382	571	382		100%	100%	50%	0%	39.5	-9
	0330	3.81	78	15.51	448	523	15.6	12,819	14.0	205	3.4	0.7	-0.2	1.8	3,390	373	376	561	387		100%	100%	50%	0%	39.5	-9
	0400	3.68	76	15.81	463	538	15.6	12,714	14.0	203	3.4	0.7	-0.2	1.8	3,470	378	388	591	391		100%	100%	50%	0%	39.5	-9
	0430	3.48	75	15.68	465	539	15.6	12,654	14.0	204	3.4	0.7	-0.2	1.8	3,440	382	378	600	386		100%	100%	50%	0%	39.5	-9
	0500	3.64	70	15.60	458	499	15.6	12,691	14.0	206	3.4	0.6	-0.2	1.8	3,420	368	385	554	376		100%	100%	50%	0%	39.5	-9
	0530	3.37	74	15.56	450	520	15.6	12,845	14.0	205	3.4	0.7	-0.2	1.9	3,440	368	379	565	379		100%	100%	50%	0%	39.5	-9
	0600	3.97	71	15.73	471	523	15.6	12,380	14.0	205	3.4	0.7	-0.2	1.8	3,460	372	367	575	386		100%	100%	50%	0%	39.5	-9
	0630	3.67	70	15.76	472	534	15.6	12,892	13.5	204	3.4	0.7	-0.2	1.8	3,410	375	377	584	390		100%	100%	50%	0%	39.5	-9
	0700	3.63	75	15.68	478	540	15.6	12,644	13.5	201	3.4	0.7	-0.2	1.8	3,450	378	367	593	391		100%	100%	50%	0%	39.5	-9
	0730	3.68	76	15.73	447	519	15.6	13,062	13.5	202	3.5	0.7	-0.2	1.8	3,410	365	367	554	379		100%	100%	50%	0%	39.5	-9
	0800	3.48	73	15.91	461	523	15.6	12,916	13.5	204	3.6	0.7	-0.2	1.8	3,420	365	373	566	380		100%	100%	50%	0%	39.5	-9
	0830	3.62	74	15.80	478	531	15.6	12,653	13.5	204	3.5	0.7	-0.2	1.9	3,450	368	376	575	384		100%	100%	50%	0%	39.5	-9
	0900	3.54	76	15.60	487	532	15.6	12,638	14.0	202	3.6	0.8	-0.2	2.0	3,470	373	375	583	387		100%	100%	50%	0%	39.5	-9
	0930	3.56	69	15.70	495	530	15.6	12,545	14.0	202	3.8	0.9	-0.1	2.0	3,510	377	377	593	392		100%	100%	50%	0%	39.5	-9
	1000	3.43	72	15.90	530	540	15.6	13,069	14.0	205	3.8	0.9	-0.1	2.0	3,370	381	375	600	397		100%	100%	50%	0%	39.5	-9
	1030	3.92	71	16.20	511	511	15.6	12,538	14.0	205	3.8	0.8	-0.2	2.0	3,350	368	373	561	380		100%	100%	50%	0%	39.5	-9
	1100	3.61	66	15.60	523	521	15.6	12,748	14.0	204	3.7	0.9	-0.2	1.9	3,480	370	378	574	383		100%	100%	50%	0%	39.5	-9
	1130	3.05	72	15.90	528	541	15.6	13,004	14.0	205	3.6	0.8	-0.2	1.9	3,440	374	379	584	386		100%	100%	50%	0%	39.5	-9
	1200	3.40	72	16.10	525	543	15.6	13,037	14.0	206	3.6	0.8	-0.2	1.8	3,520	377	362	590	391		100%	100%	50%	0%	39.5	-9
	1230	3.61	79	15.70	504	537	15.6	12,627	14.0	204	3.7	0.8	-0.2	1.9	3,440	382	370	599	395		100%	100%	50%	0%	39.5	-9
	1300	3.53	80	15.90	513	521	15.6	13,080	14.0	206	3.6	0.9	-0.2	1.9	3,480	387	380	564	379		100%	100%	50%	0%	39.5	-9
	1330	3.16	69	15.80	524	529	15.6	13,088	14.0	206	3.6	0.9	-0.2	1.8	3,450	371	379	576	385		100%	100%	50%	0%	39.5	-9
	1400	3.82	69	15.60	525	521	15.6	12,386	14.0	205	3.6	0.8	-0.2	1.8	3,460	375	368	581	389		100%	100%	50%	0%	39.5	-9
	1430	2.91	69	16.10	482	535	15.6	12,899	14.0	206					3,433	381	375	590	395		100%	100%	50%	0%	39.5	-9
	1500	3.52	66	16.10	501	485	15.6	12,621	14.0	206	3.6	0.8	-0.2	2.0	3,378	370	375	555	383		100%	100%	50%	0%	39.5	-9
	1530	3.16	73	15.80	504	544	15.6	12,947	14.0	205	3.6	0.9	-0.2	2.0	3,471	372	383	570	384		100%	100%	50%	0%	39.5	-9
	1600	2.85	77	16.10	496	520	15.6	12,605	14.0	205	3.6	0.8	-0.3	1.7	3,450	377	381	581	388		100%	100%	50%	0%	39.5	-9
	1630	2.95	64	16.10	478	543	15.6	12,813	14.0	205	3.6	0.8	-0.3	1.8	3,404	381	374	589	391		100%	100%	50%	0%	39.5	-9
	1700	2.89	65	15.97	548	551	15.6	12,800	14.0	204	3.7	0.7	-0.2	1.9	3,458	382	367	600	394		100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure: Primary	Static Pressure: Secondary	Static Pressure: Tertiary	Comb. Air (acfm)	Comb.Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings: Primary	Swirler Settings: Secondary	Swirler Settings: Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	1730	3.04	77	15.75	477	466	15.6	14,290	14.0	205	3.6	0.8	-0.3	1.8	3,481	371	382	524	392		100%	100%	50%	0%	39.5	-9
	1800	3.55	77	15.46	483	532	15.6	12,810	14.0	204	3.6	0.8	-0.3	1.8	3,541	370	387	573	382		100%	100%	50%	0%	39.5	-9
	1830	3.25	84	16.03	472	544	15.6	12,575	14.0	205	3.7	0.8	-0.3	1.8	3,491	375	374	582	386		100%	100%	50%	0%	39.5	-9
	1900	3.44	78	16.10	468	546	15.6	12,865	14.0	205	3.6	0.8	-0.3	1.9	3,520	378	362	591	391		100%	100%	50%	0%	39.5	-9
	1930	3.22	66	15.92	477	468	15.6	13,315	14.0	206	3.7	0.8	-0.3	1.8	3,448	369	371	540	383		100%	100%	50%	0%	39.5	-9
	2000	3.13	78	16.13	469	531	15.6	12,766	14.0	202	3.5	0.8	-0.3	1.7	3,465	371	369	570	392		100%	100%	50%	0%	39.5	-9
	2030	3.02	89	16.00	468	557	15.6	13,092	14.0	204	3.5	0.8	-0.3	1.7	3,366	378	364	584	389		100%	100%	50%	0%	39.5	-9
	2100	3.07	81	15.95	470	543	15.6	13,074	14.0	204	3.6	0.8	-0.3	1.8	3,442	380	370	590	391		100%	100%	50%	0%	39.5	-9
	2130	3.11	80	16.05	465	595	15.6	13,055	14.0	204	3.6	0.8	-0.3	1.8	3,440	373	369	574	382		100%	100%	50%	0%	39.5	-9
	2200	2.93	86	16.38	461	559	15.6	13,081	14.0	202	3.8	0.8	-0.3	1.8	3,407	374	367	579	383		100%	100%	50%	0%	39.5	-9
	2230	2.91	76	15.83	478	538	15.6	12,665	14.0	202	3.7	0.8	-0.3	1.9	3,437	379	370	587	388		100%	100%	50%	0%	39.5	-9
	2300	2.96	88	15.70	492	542	15.6	13,340	14.0	205	3.7	0.8	-0.3	1.9	3,516	382	370	599	393		100%	100%	50%	0%	39.5	-9
	2330	3.42	72	15.65	481	526	15.6	13,144	14.0	204	3.7	0.8	-0.3	1.9	3,483	370	365	571	379		100%	100%	50%	0%	39.5	-9
12/15/95	0000	3.28	74	15.96	482	530	15.6	13,102	13.5	203	3.6	0.8	-0.3	1.8	3,500	375	368	584	386		100%	100%	50%	0%	39.5	-9
	0030	3.19	79	16.10	492	547	15.6	13,144	13.5	204	3.7	0.8	-0.2	1.9	3,610	379	375	598	393		100%	100%	50%	0%	39.5	-9
	0100	3.46	73	16.21	510	534	15.6	12,877	13.0	204	3.8	0.9	-0.2	2.0	3,650	384	374	605	397		100%	100%	50%	0%	39.5	-9
	0130	3.21	80	16.29	478	474	15.6	12,125	13.5	206	3.7	0.9	-0.2	2.0	3,500	388	367	555	379		100%	100%	50%	0%	39.5	-9
	0200	3.51	73	15.12	542	497	15.6	13,109	13.5	204	3.7	0.9	-0.2	2.0	3,640	371	375	578	384		100%	100%	50%	0%	39.5	-9
	0230	3.53	76	16.10	519	529	15.6	12,746	13.5	204	3.8	0.9	-0.2	2.1	3,630	377	373	587	390		100%	100%	50%	0%	39.5	-9
	0300	3.33	75	15.29	525	517	15.6	12,703	13.0	205	3.6	0.9	-0.2	2.1	3,610	383	368	599	396		100%	100%	50%	0%	39.5	-9
	0330	3.35	79	15.77	508	493	15.6	13,457	13.0	206	3.7	0.9	-0.3	2.1	3,570	371	367	556	384		100%	100%	50%	0%	39.5	-9
	0400	3.43	83	15.51	501	524	15.6	13,144	13.0	204	3.7	0.9	-0.2	2.1	3,540	376	378	576	387		100%	100%	50%	0%	39.5	-9
	0430	3.96	77	15.43	531	511	15.6	12,878	13.0	202	3.7	0.9	-0.3	2.1	3,560	381	378	586	392		100%	100%	50%	0%	39.5	-9
	0500	3.84	81	15.80	490	534	15.6	12,682	13.0	203	3.7	0.9	-0.3	2.0	3,620	386	381	596	397		100%	100%	50%	0%	39.5	-9
	0530	3.43	81	16.57	498	475	15.6	13,211	13.0	206	3.5	0.8	-0.3	2.1	3,500	370	364	548	382		100%	100%	50%	0%	39.5	-9
	0600	3.57	82	15.23	531	518	15.6	13,504	13.0	203	3.6	0.8	-0.3	2.0	3,570	374	366	573	383		100%	100%	50%	0%	39.5	-9
	0630	3.56	79	15.50	523	529	15.6	13,225	13.0	201	3.6	0.8	-0.3	2.0	3,510	380	372	584	391		100%	100%	50%	0%	39.5	-9
	0700	3.83	91	15.55	538	527	15.6	12,856	13.0	200	3.6	0.9	-0.3	2.0	3,570	386	376	594	397		100%	100%	50%	0%	39.5	-9
	0730	3.75	84	15.46	535	506	15.6	13,134	13.0	199	3.6	0.8	-0.2	2.0	3,560	373	375	566	384		100%	100%	50%	0%	39.5	-9
	0800	3.25	85	16.20	535	532	15.6	13,364	13.0	200	3.6	0.6	-0.2	2.0	3,540	377	374	580	389		100%	100%	50%	0%	39.5	-9
	0830	3.59	91	15.90	524	528	15.6	13,288	13.0	200	3.7	1.0	-0.2	2.0	3,625	381	374	589	393		100%	100%	50%	0%	39.5	-9
	0900	3.10	93	16.30	545	543	15.6	13,440	14.0	199	3.6	0.9	-0.2	2.0	3,555	386	372	602	399		100%	100%	50%	0%	39.5	-9
	0930	3.45	78	15.70	536	468	15.6	13,571	14.0	200	3.6	0.8	-0.2	2.0	3,575	372	367	565	391		100%	100%	50%	0%	39.5	-9
	1000	3.41	83	15.90	549	505	15.6	13,437	14.0	201	3.5	1.0	-0.2	2.0	3,560	377	360	580	388	1,117	100%	100%	50%	0%	39.5	-9
		Cold junction reference was adjusted which resulted in temperatures increasing ~11°F.																								
	1030	2.82	80	16.30	468	520	15.6	13,755	14.0	200	3.6	1.0	-0.1	2.1	3,567	381	361	586	393	1,136	100%	100%	50%	0%	39.5	-9
	1100	3.30	103	16.50	533	542	15.6	13,703	13.5	201	3.6	1.0	-0.2	2.0	3,550	388	376	601	400	1,158	100%	100%	50%	0%	39.5	-9
	1130	2.93	69	16.40	559	479	15.6	13,762	13.5	200	3.6	1.0	-0.2	2.0	3,562	371	372	565	381	1,117	100%	100%	50%	0%	39.5	-9
	1200	3.66	82	15.80	543	503	15.6	13,665	13.5	199	3.6	0.9	-0.2	2.1	3,575	377	366	577	386	1,122	100%	100%	50%	0%	39.5	-9
	1230	3.64	92	16.00	556	512	15.6	13,744	13.5	202	3.6	1.0	-0.2	2.0	3,591	381	375	583	392	1,137	100%	100%	50%	0%	39.5	-9
	1300	3.56	131	15.73	547	531	15.6	12,909	13.5	200	3.6	1.0	-0.1	2.1	3,597	388	383	601	399	1,160	100%	100%	50%	0%	39.5	-9
	1330	4.11	137	15.20	540	450	15.6	12,465	14.0	201	3.6	0.9	-0.2	2.2	3,595	370	395	553	382	1,090	100%	100%	50%	0%	39.5	-9
	1400	3.98	65	15.80	479	526	15.6	12,432	14.0	203	3.6	0.9	-0.2	2.1	3,407	377	386	571	384	1,116	100%	100%	50%	0%	39.5	-9
	1430	3.54	78	16.00	498	550	15.6	12,746	14.0	204	3.6	1.0	-0.2	2.0	3,425	382	382	580	389	1,135	100%	100%	50%	0%	39.5	-9
	1500	3.50	111	15.50	482	551	15.6	12,801	14.0	201	3.6	0.9	-0.2	2.1	3,385	386	375	590	393	1,161	100%	100%	50%	0%	39.5	-9
	1530	3.59	131	16.20	459	562	15.6	12,810	14.0	202	3.6	0.9	-0.2	1.9	3,439	388	378	595	394	1,175	100%	100%	50%	0%	39.5	-9
	1600	3.90	130	15.88	472	568	15.6	12,812	14.0	203	3.5	0.8	-0.3	1.8	3,449	392	384	605	397	1,194	100%	100%	50%	0%	39.5	-9
	1630	3.74	113	15.18	425	495	15.6	12,595	14.0	201	3.6	0.8	-0.3	1.8	3,412	373	389	554	377	1,083	100%	100%	50%	0%	39.5	-9
	1700	3.95	111	15.40	433	533	15.6	12,409	14.0	203	3.6	0.8	-0.3	1.8	3,532	377	394	571	385	1,122	100%	100%	50%	0%	39.5	-9
	1730	3.87	245	15.66	572	572	15.6	12,270	14.0	202	3.6	0.8	-0.3	1.8	3,443	382	382	584	390	1,147	100%	100%	50%	0%	39.5	-9
	1800	3.68	103	15.31	566	566	15.6	12,691	14.0	202	3.5	0.9	-0.3	1.7	3,453	386	388	594	394	1,173	100%	100%	50%	0%	39.5	-9
	1830	3.64	176	15.49	553	553	15.6	11,573	14.0	201	3.6	0.8	-0.3	1.9	3,419	371	379	557	376	1,097	100%	100%	50%	0%	39.5	-9
	1900	3.56	137	15.72	556	556	15.6	12,664	14.0	203	3.6	0.8	-0.3	1.8	3,435	377	381	573	383	1,125	100%	100%	50%	0%	39.5	-9
	1930	3.61	114	15.66	558	558	15.6	12,862	14.0	202	3.6	0.8	-0.3	1.8	3,516	381	387	583	389	1,151	100%	100%	50%	0%	39.5	-9
	2000	3.26	103	15.24	445	569	15.6	11,690	14.0	202	3.8	0.7	-0.2	1.7	3,471	385	382	594	392	1,169	100%	100%	50%	0%	39.5	-9
	2030	3.98	626	15.88	443	433	15.6	12,540	14.0	206	3.6	0.8	-0.2	1.7	3,431	369	387	529	380	1,080	100%	100%	50%	0%	39.5	-9
	2100	3.66	92	15.86	457	530	15.6	11,896	14.0	200	3.5	0.8	-0.3	1.7	3,442	374	390	569	381	1,114	100%	100%	50%	0%	39.5	-9
	2130	3.36	107	15.37	447	555	15.6	12,451	14.0	203	3.6	0.8	-0.3	1.7	3,443	376	366	579	386	1,139	100%	100%	50%	0%	39.5	-9
	2200	3.60	129	15.76	441	578	15.6	13,105	14.0	200	3.6	0.7	-0.3	1.8	3,470	384	377	593	392	1,169	100%	100%	50%	0%	39.5	-9
	2230	3.64	210	15.64	420	447	15.6	10,813	14.0	202	3.6	0.7	-0.3	1.8	3,499	385	377	513	370	1,074	100%	100%	50%	0%	39.5	-9
	2300	4.01	247	15.40	449	535	15.6	13,204	14.0	202	3.6	0.8	-0.3	1.8	3,518	371	364	505	379	1,104	100%	100%	50%	0%	39.5	-9
	2330	3.64	219	15.53	493	558	15.6	12,590	14.0	203	3.6	0.9	-0.3	2.0	3,447	376	369	579	385	1,135	100%	100%	50%	0%	39.5	-9
12/16/95	0000	3.17	183	15.54	448	585	15.6	14,128	14.0	199	3.7	0.8	-0.3	2.0	3,430	383	375	590	390	1,170	100%	100%	50%	0%	39.5	-9
	0030	3.50	124	15.71	441	577	15.6	13,275	13.5	205	3.7	0.9	-0.3	2.0	3,440	367	362	602	391	1,193	100%	100%	50%	0%	39.5	-9
	0100	3.55	283	16.01	460	533	15.6	13,297	13.5	208	3.5	0.8	-0.3	1.9	3,460	372	376	552	380	1,095	100%	100%	50%	0%	39.5	-9
	0130	3.46	113	15.66	461	557	15.6	12,444	13.5	198	3.6	0.8	-0.2	2.0	3,450	375	378	571	383	1,125	100%	100%	50%	0%	39.5	-9
	0200	3.34	208	15.38	457	578	15.6	12,715	13.5	203	3.6	0.8	-0.2	1.9	3,440	380	375	584	388	1,152	100%	100%	50%	0%	39.5	-9
	0230	3.42	414	15.91	450	686	15.6	12,918	13.5	198	3.6	0.8	-0.3	2.0	3,470	384	379	594	393	1,184	100%	100%	50%	0%	39.5	-9
	0300	3.27	154	15.76	436	531	15.6	13,091	13.5	203	3.6	0.8	-0.2	2.0	3,470	371	370	552	379	1,096	100%	100%	50%	0%	39.5	-9
	0330	3.43	228	16.01	453	573	15.6	11,910	13.5	200	3.6	0.8	-0.2	1.9	3,460	376	385	574	383	1,131	100%	100%	50%	0%	39.5	-9
	0400	3.10	109	15.80	449	673	15.6	12,133	13.5	197	3.5	0.8	-0.2	1.9	3,480	382	389	586	389	1,155	100%	100%	50%	0%	39.5	-9
	0430	3.25	95	15.63	455	590	15.6	13,477	13.5	201	3.7	0.9	-0.2	2.0	3,480	386	379	598	393	1,186	100%	100%	50%	0%	39.5	-9
	0500	3.35	285	16.04	477	549	15.6	12,650	13.5	196	3.5	0.8	-0.3	2.0	3,420	371	369	556	379	1,104	100%	100%	50%	0%	39.5	-9
	0530	3.35	105	15.66	473	569	15.6	11,669	13.5	196	3.5	0.8	-0.3	1.9	3,430	376	383	575	383	1,143	100%	100%	50%	0%	39.5	-9
	0600	3.46	111	15.42	471	584	15.6	13,114	13.5	197	3.5	0.8	-0.3	2.0	3,440	381	372	587	388	1,171	100%	100%	50%	0%	39.5	-9
	0630	3.51	93	16.13	500	573	15.6	12,839	13.5	197	3.5	0.9	-0.3	1.9	3,510	368	361	601	395	1,209	100%	100%	50%	0%	39.5	-9
	0700	3.25	80	15.67	481	514	15.6	12,453	13.5	195	3.7	0.9	-0.3	1.9	3,500	370	380	558	378	1,113	100%	100%	50%	0%	39.5	-9
	0730	3.17	221	15.42	481	570	15.6	13,591	13.5	204	3.6	1.0	-0.2	2.0	3,490	375	383	575	383	1,136	100%	100%	50%	0%	39.5	-9
	0800	3.79	79	15.00	509	558	15.6	13,204	13.5	200	3.6	1.0	-0.2	2.0	3,440	379	375	584	387	1,170	100%	100%	50%	0%	39.5	-9
	0830	3.46	136	15.38	469	571	15.6	13,279	13.0	203	3.6	1.0	-0.2	2.0	3,490	384	375	593	391	1,178	100%	100%	50%	0%	39.5	-9
	0900	3.70	127	15.66	536	529	15.6	13,379	13.0	201	3.7	0.9	-0.2	2.0	3,560	374	385	566	380	1,139	100%	100%	50%	0%	39.5	-9
	0930	3.49	91	15.38	540	571	15.6	13,442	13.0	200	3.7	0.9	-0.2	2.0	3,530	378	375	576	385	1,172	100%	100%	50%	0%	39.5	-9
	1000	3.42	357	16.19	530	581	15.6	12,656	13.5	198	3.6	1.0	-0.2	2.0	3,460	382	371	583	389	1,185	100%	100%	50%	0%	39.5	-9
	1030	3.71	84	15.34	529	553	15.6	12,621	13.0	198	3.7	1.0	-0.3	2.0	3,490	386	377	593	394	1,205	100%	100%	50%	0%	39.5	-9
	1100	3.87	106	15.13	500	504	15.6	12,780	13.5	193	3.7	1.0	-0.3	2.0	3,510	371	379	558	379	1,145	100%	100%	50%	0%	39.5	-9
	1130	3.55	116	15.63	550	550	15.6	13,434	13.5	198	3.7	1.0	-0.2	2.0	3,520	378	378	574	384	1,169	100%	100%	50%	0%	39.5	-9
	1200	3.57	166	15.60	581	561	15.6	13,957	13.5	195	3.6	1.0	-0.2	1.9	3,520	385	381	586	390	1,195	100%	100%	50%	0%	39.5	-9
	1230	3.79	89	15.20	546	546	15.6	13,271	13.5	200	3.6	1.1	-0.2	2.0	3,402	387	382	593	393	1,215	100%	100%	50%	0%	39.5	-9
	1300	3.44	98	15.40	562	562	15.6	12,830	13.5	198	3.6	1.0	-0.2	2.0	3,490	391	385	601	398	1,232	100%	100%	50%	0%	39.5	-9
	1330	3.68	125	15.60	518	518	15.6	13,571	14.0	198	3.7	1.0	-0.2	2.1	3,546	373	372	587	380	1,186	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press. (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	1400	3.78	102	15.30	519	519	15.6	13,585	14.0	196	3.7	1.0	-0.2	2.0	3,507	378	370	576	384	1,190	100%	100%	50%	0%	39.5	-9
	1430	3.09	95	15.50	540	540	15.6	13,297	14.0	201	3.7	1.0	-0.2	2.0	3,425	383	373	588	390	1,220	100%	100%	50%	0%	39.5	-9
	1500	3.23	102	15.60	503	563	15.6	12,474	14.0	195	3.7	1.0	-0.1	2.0	3,537	386	376	594	394	1,211	100%	100%	50%	0%	39.5	-9
	1530	3.84	92	15.90	524	557	15.6	13,285	13.5	200	3.9	1.0	-0.2	2.0	3,577	390	382	604	397	1,234	100%	100%	50%	0%	39.5	-9
	1600	3.96	92	15.60	483	494	15.6	13,108	14.0	194	3.7	0.9	-0.2	1.9	3,571	372	372	563	379	1,164	100%	100%	50%	0%	39.5	-9
	1630	3.53	153	15.40	485	524	15.6	12,639	14.0	197	3.8	1.0	-0.1	2.0	3,491	377	378	576	384	1,169	100%	100%	50%	0%	39.5	-9
	1700	3.63	129	15.60	492	565	15.6	13,321	14.0	200	3.9	1.0	-0.1	2.0	3,516	382	370	592	390	1,202	100%	100%	50%	0%	39.5	-9
	1730	3.68	124	15.70	506	569	15.6	12,804	14.0	197	4.0	1.1	-0.2	2.0	3,597	380	376	600	395	1,219	100%	100%	50%	0%	39.5	-9
	1800	3.42	135	15.70	479	585	15.6	13,491	14.0	201	4.0	1.0	-0.2	2.0	3,534	390	371	609	399	1,232	100%	100%	50%	0%	39.5	-9
	1830	4.00	73	15.40	513	481	15.6	12,381	14.0	190	3.8	0.9	-0.2	2.0	3,635	369	380	562	378	1,169	100%	100%	50%	0%	39.5	-9
	1900	3.28	82	15.20	530	537	15.6	13,365	14.0	198	3.8	0.9	-0.2	2.0	3,528	376	376	580	386	1,194	100%	100%	50%	0%	39.5	-9
	1930	3.72	416	15.40	457	565	15.6	12,416	14.0	196	3.7	1.0	-0.2	2.0	3,427	380	370	583	388	1,187	100%	100%	50%	0%	39.5	-9
	2000	3.65	451	15.90	474	581	15.6	13,469	13.5	198	3.7	1.0	-0.2	2.0	3,401	383	369	596	393	1,220	100%	100%	50%	0%	39.5	-9
	2030	3.90	248	15.70	449	587	15.6	12,946	13.5	198	3.7	0.9	-0.2	1.9	3,492	388	368	607	397	1,245	100%	100%	50%	0%	39.5	-9
	2100	3.91	142	15.60	448	472	15.6	14,290	14.0	206	3.7	0.9	-0.2	2.0	3,447	366	375	553	379	1,135	100%	100%	50%	0%	39.5	-9
	2130	3.61	123	15.20	491	551	15.6	13,333	14.0	201	3.7	1.0	-0.2	2.0	3,438	374	371	581	384	1,181	100%	100%	50%	0%	39.5	-9
	2200	3.33	329	15.80	447	587	15.6	12,503	13.5	195	3.7	0.9	-0.1	1.9	3,509	380	380	590	390	1,195	100%	100%	50%	0%	39.5	-9
	2230	3.33	417	16.00	471	607	15.6	12,905	13.5	199	3.7	1.0	-0.2	2.0	3,310	388	378	611	398	1,228	100%	100%	50%	0%	39.5	-9
	2300	3.36	74	15.10	537	506	15.6	12,627	14.0	191	3.7	1.0	-0.2	2.0	3,381	369	381	561	379	1,138	100%	100%	50%	0%	39.5	-9
	2330	3.95	70	15.30	500	536	15.6	12,937	14.0	202	3.6	1.0	-0.2	1.9	3,324	375	367	578	385	1,164	100%	100%	50%	0%	39.5	-9
12/17/95	0000	3.74	77	15.53	530	569	15.6	12,749	13.5	200	3.6	0.9	-0.2	2.0	3,450	382	374	591	392	1,175	100%	100%	50%	0%	39.5	-9
	0030	4.01	98	14.77	506	566	15.6	13,001	13.5	196	3.6	0.9	-0.2	2.0	3,450	365	387	599	396	1,180	100%	100%	50%	0%	39.5	-9
	0100	3.45	63	15.44	515	481	15.6	14,290	13.5	201	3.6	1.0	-0.2	1.9	3,400	369	381	547	383	1,131	100%	100%	50%	0%	39.5	-9
	0130	3.78	79	15.50	510	555	15.6	12,644	13.5	197	3.6	0.9	-0.2	1.9	3,430	375	384	577	385	1,157	100%	100%	50%	0%	39.5	-9
	0200	4.07	92	15.43	520	561	15.6	12,101	13.5	197	3.5	0.9	-0.3	1.9	3,430	380	377	587	390	1,177	100%	100%	50%	0%	39.5	-9
	0230	3.91	90	15.40	514	554	15.6	13,225	13.5	204	3.5	0.8	-0.3	1.8	3,450	384	385	597	394	1,193	100%	100%	50%	0%	39.5	-9
	0300	4.15	257	15.95	476	478	15.6	14,322	13.5	204	3.6	0.9	-0.3	2.0	3,430	368	378	551	382	1,129	100%	100%	50%	0%	39.5	-9
	0330	3.15	164	15.88	486	544	15.6	13,042	13.5	198	3.6	0.9	-0.2	2.0	3,490	375	375	560	386	1,155	100%	100%	50%	0%	39.5	-9
	0400	3.89	136	15.43	525	561	15.6	12,603	13.5	198	3.7	0.9	-0.2	2.0	3,410	381	382	594	391	1,163	100%	100%	50%	0%	39.5	-9
	0430	3.65	93	15.57	508	549	15.6	12,604	13.5	202	3.6	0.9	-0.2	2.0	3,410	385	383	605	396	1,202	100%	100%	50%	0%	39.5	-9
	0500	3.19	281	15.73	432	508	15.6	12,310	13.5	192	3.5	0.8	-0.2	1.8	3,300	367	387	556	377	1,126	100%	100%	50%	0%	39.5	-9
	0530	3.01	466	16.03	458	549	15.6	12,604	13.5	199	3.4	0.7	-0.2	1.8	3,340	376	384	585	384	1,170	100%	100%	50%	0%	39.5	-9
	0600	3.71	242	15.50	477	560	15.6	12,870	13.5	197	3.4	0.8	-0.2	1.8	3,330	380	381	598	389	1,195	100%	100%	50%	0%	39.5	-9
	0622	Valve between steam drum and convective pass sootblower inoperative (can not be closed)																								
	0630	3.27	231	15.97	479	591	15.6	12,484	13.5	191	3.6	0.7	-0.2	1.8	3,380	368	379	618	397	1,235	100%	100%	50%	0%	39.5	-9
	0700	3.67	100	15.08	485	504	15.6	12,807	14.0	190	3.5	0.6	-0.2	1.9	3,410	368	391	564	377	1,139	100%	100%	50%	0%	39.5	-9
	0730	3.75	428	15.58	449	560	15.6	13,169	13.5	195	3.4	0.7	-0.2	1.8	3,280	374	382	575	381	1,172	100%	100%	50%	0%	39.5	-9
	0800	4.24	120	15.83	493	576	15.6	12,389	13.5	192	3.6	0.6	-0.2	1.9	3,450	379	381	604	389	1,210	100%	100%	50%	0%	39.5	-9
	0830	3.64	107	16.08	515	586	15.6	13,446	13.5	195	3.5	0.8	-0.2	1.8	3,430	388	384	616	397	1,232	100%	100%	50%	0%	39.5	-9
	0900	3.71	354	15.10	447	469	15.6	13,953	13.5	208	3.4	0.8	-0.2	1.8	3,300	366	380	551	376	1,119	100%	100%	50%	0%	39.5	-9
	0930	3.64	207	15.51	424	538	15.6	12,508	13.5	190	3.4	0.8	-0.2	1.7	3,350	372	379	577	379	1,167	100%	100%	50%	0%	39.5	-9
	1000	3.76	143	15.95	432	557	15.6	12,601	13.6	193	3.5	0.8	-0.1	2.0	3,350	379	385	598	387	1,202	100%	100%	50%	0%	39.5	-9
	1030	3.61	466	16.93	429	580	15.6	13,011	13.5	197	3.5	0.8	-0.2	1.8	3,390	385	376	609	393	1,226	100%	100%	50%	0%	39.5	-9
	1100	3.51	80	15.19	442	473	15.6	12,804	13.5	199	3.5	0.8	-0.2	1.9	3,380	369	377	561	376	1,133	100%	100%	50%	0%	39.5	-9
	1130	3.92	134	15.26	448	512	15.6	13,121	13.5	202	3.5	0.8	-0.3	1.9	3,400	375	382	580	382	1,161	100%	100%	50%	0%	39.5	-9
	1200	3.48	192	15.53	418	545	15.6	12,847	13.5	198	3.5	0.8	-0.2	1.8	3,290	381	376	592	389	1,239	100%	100%	50%	0%	39.5	-9
	1230	3.51	252	15.60	433	573	15.6	13,114	13.5	202	3.4	0.8	-0.2	1.9	3,320	386	378	600	392	1,255	100%	100%	50%	0%	39.5	-9
	1300	3.71	226	15.70	436	583	15.6	12,671	13.5	198	3.5	0.8	-0.2	1.8	3,324	395	382	619	400	1,282	100%	100%	50%	0%	39.5	-9
	1330	3.78	160	15.70	439	506	15.6	12,986	14.5	202	3.5	0.8	-0.1	1.9	3,335	370	387	560	377	1,167	100%	100%	50%	0%	39.5	-9
	1400	3.50	183	15.70	419	549	15.6	13,118	14.0	205	3.5	0.8	-0.2	1.8	3,406	378	389	579	382	1,198	100%	100%	50%	0%	39.5	-9
	1430	4.22	122	15.50	431	547	15.6	11,980	14.0	200	3.5	0.8	-0.2	1.8	3,361	385	388	594	389	1,214	100%	100%	50%	0%	39.5	-9
	1500	3.95	200	15.80	436	573	15.6	12,084	14.0	196	3.6	0.9	-0.1	1.8	3,308	392	385	610	394	1,241	100%	100%	50%	0%	39.5	-9
	1530	3.54	182	16.20	422	578	15.6	12,638	14.0	197	3.6	0.8	-0.2	1.8	3,350	397	379	622	400	1,250	100%	100%	50%	0%	39.5	-9
	1600	3.65	624	15.20	425	484	15.6	12,456	14.0	193	3.8	0.8	-0.2	1.7	3,355	369	380	551	374	1,144	100%	100%	50%	0%	39.5	-9
	1630	3.33	234	15.70	419	534	15.6	12,369	14.0	198	3.5	0.8	-0.2	1.7	3,250	378	388	576	384	1,172	100%	100%	50%	0%	39.5	-9
	1700	3.84	140	15.30	425	553	15.6	12,300	14.0	196	3.5	0.8	-0.2	1.8	3,365	385	380	593	391	1,198	100%	100%	50%	0%	39.5	-9
	1730	3.71	134	15.30	437	575	15.6	12,290	13.5	198	3.5	0.7	-0.2	1.7	3,417	392	382	611	396	1,230	100%	100%	50%	0%	39.5	-9
	1800	3.93	88	15.20	435	496	15.6	12,007	14.0	192	3.6	0.7	-0.1	1.8	3,413	371	378	560	378	1,150	100%	100%	50%	0%	39.5	-9
	1830	3.95	259	15.70	436	557	15.6	13,013	14.0	198	3.5	0.7	-0.2	1.8	3,289	377	383	580	385	1,177	100%	100%	50%	0%	39.5	-9
	1900	3.60	124	15.20	457	556	15.6	12,338	14.0	193	3.5	0.7	-0.2	1.8	3,315	383	383	592	390	1,192	100%	100%	50%	0%	39.5	-9
	1930	4.02	170	15.30	444	574	15.6	12,491	13.5	195	3.5	0.7	-0.2	1.8	3,369	389	385	605	396	1,200	100%	100%	50%	0%	39.5	-9
	2000	3.88	215	15.80	411	498	15.6	12,185	14.0	191	3.6	0.6	-0.2	1.7	3,231	367	379	555	374	1,137	100%	100%	50%	0%	39.5	-9
	2030	3.46	564	15.20	420	582	15.6	13,192	14.0	199	3.6	0.6	-0.2	1.8	3,301	378	382	583	382	1,165	100%	100%	50%	0%	39.5	-9
	2100	3.67	406	15.60	417	568	15.6	12,119	14.0	193	3.6	0.6	-0.2	1.7	3,261	384	376	598	389	1,194	100%	100%	50%	0%	39.5	-9
	2130	3.29	263	15.20	429	593	15.6	13,029	14.0	194	3.5	0.9	-0.2	1.8	3,416	390	378	615	395	1,199	100%	100%	50%	0%	39.5	-9
	2200	3.85	150	15.30	420	486	15.6	12,549	13.5	190	3.5	0.8	-0.1	1.7	3,309	365	378	551	371	1,117	100%	100%	50%	0%	39.5	-9
	2230	3.63	177	15.40	422	540	15.6	12,899	14.0	198	3.4	0.9	-0.2	1.7	3,237	374	369	579	379	1,156	100%	100%	50%	0%	39.5	-9
	2300	3.74	275	15.50	430	560	15.6	13,069	14.0	198	3.5	0.9	-0.2	1.7	3,272	383	376	595	387	1,151	100%	100%	50%	0%	39.5	-9
	2330	3.84	176	15.40	428	527	15.6	12,479	14.0	195	3.4	0.9	-0.2	1.7	3,204	389	380	613	393	1,191	100%	100%	50%	0%	39.5	-9
12/18/95	0000	3.55	341	15.60	418	588	15.6	12,682	14.0	195	3.5	0.9	-0.2	1.7	3,273	395	382	627	400	1,208	100%	100%	50%	0%	39.5	-9
	0030	3.64	101	15.00	429	517	15.6	12,348	14.0	198	3.4	0.8	-0.2	1.7	3,375	378	394	564	382	1,127	100%	100%	50%	0%	39.5	-9
	0100	3.64	198	15.80	427	554	15.6	12,802	14.0	199	3.4	0.9	-0.2	1.8	3,273	381	380	592	387	1,173	100%	100%	50%	0%	39.5	-9
	0130	3.57	413	15.70	430	575	15.6	13,146	14.0	199	3.4	0.9	-0.2	1.7	3,378	386	377	610	392	1,187	100%	100%	50%	0%	39.5	-9
	0200	3.84	122	15.20	423	555	15.6	13,353	14.0	188	3.4	0.9	-0.2	1.7	3,346	389	384	620	397	1,208	100%	100%	50%	0%	39.5	-9
	0230	3.85	196	15.50	417	482	15.6	12,755	14.0	190	3.4	0.9	-0.2	1.8	3,330	385	382	554	372	1,090	100%	100%	50%	0%	39.5	-9
	0300	3.56	580	15.60	419	557	15.6	13,073	14.0	197	3.4	0.9	-0.2	1.8	3,260	377	360	587	363	1,129	100%	100%	50%	0%	39.5	-9
	0330	3.87	257	15.70	413	555	15.6	12,558	14.0	192	3.4	1.0	-0.2	1.8	3,350	360	380	597	388	1,149	100%	100%	50%	0%	39.5	-9
	0400	3.58	764	15.60	413	569	15.6	13,108	14.0	189	3.4	1.0	-0.2	1.7	3,262	395	384	619	395	1,181	100%	100%	50%	0%	39.5	-9
	0430	4.08	656	15.50	412	544	15.6	12,201	14.0	193	3.4	0.9	-0.2	1.7	3,257	365	375	593	393	1,154	100%	100%	50%	0%	39.5	-9
	0500	4.00	355	15.20	411	474	15.6	13,266	14.0	202	3.5	0.8	-0.2	1.7	3,303	363	377	560	375	1,115	100%	100%	50%	0%	39.5	-9
	0530	3.25	685	15.50	391	555	15.6	12,825	13.5	199	3.5	0.8	-0.2	1.7	3,128	375	387	584	381	1,181	100%	100%	50%	0%	39.5	-9
	0600	3.85	360	15.30	408	571	15.6	12,877	14.0	188	3.4	0.7	-0.2	1.8	3,330	385	374	621	395	1,222	100%	100%	50%	0%	39.5	-9
	0630	4.00	365	15.30	415	466	15.6	12,835	14.0	188	3.6	0.8	-0.2	1.8	3,328	359	376	554	370	1,114	100%	100%	50%	0%	39.5	-9
	0700	3.59	324	15.20	419	544	15.6	12,923	14.0	199	3.6	0.7	-0.1	1.8	3,325	373	387	586	380	1,147	100%	100%	50%	0%	39.5	-9
	0730	3.73	298	15.70	413	587	15.6	12,171	13.5	195	3.5	0.7	-0.2	1.7	3,367	382	382	604	390	1,170	100%	100%	50%	0%	39.5	-9
	0800	3.28	302	15.73	420	580	15.6	12,638	14.0	192	3.3	0.7	-0.2	1.7	3,330	389	374	621	395	1,194	100%	100%	50%	0%	39.5	-9
	0830	3.99	168	15.28	426	491	15.6	13,240	13.5	197	3.3	0.8	-0.3	1.6	3,330	373	384	559	380	1,092	100%	100%	50%	0%	39.5	-9
	0900	3.95	191	15.05	425	525	15.6	12,696	13.5	189	3.3	0.7	-0.2	1.8	3,330	375	382	584	382	1,158	100%	100%	50%	0%	39.5	-9
	0930	3.25	132	15.38	446	569	15.6	13,469	13.5	196	3.3	0.7	-0.2	1.8	3,340	381	381	606	389	1,188	100%	100%	50%	0%	39.5	-9
	1000	3.20	168	15.74	437	577	15.6	13,318	14.0	200	3.3	0.7	-0.3	1.7	3,300	388	385	619	395	1,204	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	1030	3.53	218	15.8	446	514	15.6	13,425	13.5	191	3.3	0.7	-0.2	1.7	3300	372	373	566	378	1,155	100%	100%	50%	0%	39.5	-9
	1100	3.59	52	15.40	441		15.6	13,387	13.5	193	3.3	0.7	-0.3	1.7	3,380	376	378	589	385	1,177	100%	100%	50%	0%	39.5	-9
	1130	3.87	107	16.04	443		15.6	13,391	13.5	194	3.3	0.8	-0.3	1.8	3,350	383	377	604	391	1,191	100%	100%	50%	0%	39.5	-9
	1200	3.55	121	15.23	453	561	15.6	13,385	13.5	198	3.3	0.8	-0.2	1.8	3,350	389	375	614	396	1,202	100%	100%	50%	0%	39.5	-9
	1230	4.05	176	15.63	433	479	15.6	13,758	13.5	206	3.4	0.8	-0.2	1.8	3,390	370	381	584	379	1,111	100%	100%	50%	0%	39.5	-9
	1300	3.32	121	15.51	439	534	15.6	12,738	13.5	192	3.3	0.8	-0.2	1.8	3,350	375	384	583	383	1,144	100%	100%	50%	0%	39.5	-9
	1330	3.81	121	15.20	438	554	15.6	13,448	13.5	196	3.3	0.7	-0.2	1.8	3,340	380	368	595	388	1,175	100%	100%	50%	0%	39.5	-9
	1400	3.59	140	15.66	437	573	15.6	12,308	13.5	192	3.3	0.7	-0.2	1.8	3,380	386	372	607	392	1,200	100%	100%	50%	0%	39.5	-9
	1430	3.74	125	15.53	429	503	15.6	12,592	13.5	193	3.3	0.6	-0.3	1.7	3,360	370	386	563	377	1,115	100%	100%	50%	0%	39.5	-9
	1500	3.92	110	15.72	445	532	15.6	12,848	13.5	202	3.3	0.6	-0.2	1.7	3,360	376	391	584	383	1,149	100%	100%	50%	0%	39.5	-9
	1530	3.54	119	15.86	451	659	15.6	12,958	13.5	195	3.3	0.6	-0.2	1.8	3,360	381	382	595	388	1,168	100%	100%	50%	0%	39.5	-9
	1600	3.28	218	15.64	454	590	15.6	12,464	13.5	164	3.3	0.6	-0.2	1.7	3,377	387	385	607	393	1,198	100%	100%	50%	0%	39.5	-9
	1630	2.97	87	15.67	458	468	15.6	13,265	13.5	198	3.3	0.6	-0.2	1.7	3,383	371	379	551	382	1,134	100%	100%	50%	0%	39.5	-9
	1700	3.97	106	15.63	461	593	15.6	13,060	13.6	199	3.3	0.6	-0.2	1.7	3,282	375	380	554	385	1,160	100%	100%	50%	0%	39.5	-9
	1730	3.21	78	15.76	450	506	15.6	12,137	13.5	197	3.3	0.6	-0.2	1.7	3,323	381	387	595	390	1,191	100%	100%	50%	0%	39.5	-9
	1800	3.38	138	16.28	433	506	15.6	12,535	13.5	195	3.3	0.6	-0.2	1.7	3,300	387	375	609	395	1,249	100%	100%	50%	0%	39.5	-9
	1830	3.21	87	16.38	441	628	15.6	11,618	13.5	195	3.3	0.6	-0.2	1.7	3,358	370	377	535	381	1,153	100%	100%	50%	0%	39.5	-9
	1900	3.46	69	16.19	448	573	15.6	12,204	13.5	194	3.3	0.6	-0.2	1.7	3,359	377	381	591	387	1,229	100%	100%	50%	0%	39.5	-9
	1930	3.43	58	15.35	474	670	15.6	12,522	13.5	201	3.3	0.6	-0.3	1.6	3,411	381	397	604	391	1,258	100%	100%	50%	0%	39.5	-9
	2000	3.43	67	15.83	476	544	15.6	12,210	13.5	198	3.5	0.7	-0.3	1.7		370	381	548	380	1,194	100%	100%	50%	0%	39.5	-9
	2030	3.91	102	15.91	474	567	15.6	12,638	13.5	200	3.4	0.7	-0.3	1.7		374	379	584	383	1,207	100%	100%	50%	0%	39.5	-9
	2100	3.97	195	16.26	461	590	15.6	13,044	13.5	201	3.4	0.7	-0.3	1.7		382	383	599	391	1,217	100%	100%	50%	0%	39.5	-9
	2130	3.26	107	15.50	456	523	15.6	11,423	13.5	196	3.5	0.7	-0.3	1.7		371	385	532	381	1,198	100%	100%	50%	0%	39.5	-9
	2200	3.61	451	16.10	447	583	15.6	11,953	13.5	198	3.5	0.7	-0.3	1.7		376	377	585	386	1,222	100%	100%	50%	0%	39.5	-9
	2230	3.01	98	15.94	450	591	15.6	12,338	13.5	197	3.5	0.6	-0.3	1.7		383	380	600	392	1,229	100%	100%	50%	0%	39.5	-9
	2300	3.51	83	15.89	452	493	15.6	10,958	13.5	194	3.5	0.6	-0.3	1.7		371	365	523	383	1,185	100%	100%	50%	0%	39.5	-9
	2330	3.63	116	16.07	468	576	15.6	12,943	13.5	201	3.5	0.6	-0.3	1.7		375	376	565	386	1,191	100%	100%	50%	0%	39.5	-9
12/19/95	0000	3.37	82	16.40	449	594	15.6	12,909	13.5	203	3.5	0.6	-0.2	1.7		382	379	599	392	1,252	100%	100%	50%	0%	39.5	-9
	0030	3.10	99	15.90	465	587	15.6	12,667	13.5	202	3.6	0.7	-0.3	1.8	3,266	387	378	609	397	1,265	100%	100%	50%	0%	39.5	-9
	0100	4.00	68	15.80	462	496	15.6	13,742	13.5	209	3.5	0.8	-0.1	1.9	3,374	361	376	551	378	1,214	100%	100%	50%	0%	39.5	-9
	0130	3.72	90	15.90	447	550	15.6	12,104	13.5	202	3.5	0.8	-0.2	1.8	3,364	375	381	588	386	1,234	100%	100%	50%	0%	39.5	-9
	0200	3.72	98	16.10	463	576	15.6	12,732	13.5	203	3.5	0.8	-0.1	1.7	3,316	388	382	602	394	1,250	100%	100%	50%	0%	39.5	-9
	0230	3.59	90	16.00	444	523	15.6	12,397	13.5	198	3.5	0.8	-0.2	1.7	3,279	364	366	561	376	1,177	100%	100%	50%	0%	39.5	-9
	0300	3.31	85	15.80	438	564	15.6	12,740	13.5	202	3.5	0.8	-0.2	1.7	3,305	374	375	584	384	1,191	100%	100%	50%	0%	39.5	-9
	0330	3.46	95	15.80	432	572	15.6	12770	13.5	204	3.5	0.8	-0.2	1.7	3,278	381	370	601	391	1,210	100%	100%	50%	0%	39.5	-9
	0400	3.58	107	16.20	441	595	15.6	12,450	13.5	201	3.4	0.8	-0.1	1.8	3,374	386	371	612	395	1,204	100%	100%	50%	0%	39.5	-9
	0430	3.78	113	15.80	426	542	15.6	12,070	13.5	200	3.4	0.8	-0.2	1.7	3,315	364	376	567	376	1,130	100%	100%	50%	0%	39.5	-9
	0500	3.56	78	15.50	445	565	15.6	12,844	13.5	200	3.4	0.8	-0.2	1.7	3,311	374	381	586	383	1,165	100%	100%	50%	0%	39.5	-9
	0530	3.24	95	15.80	445	583	15.6	12,912	13.5	198	3.4	0.8	-0.1	1.8	3,334	381	375	600	390	1,194	100%	100%	50%	0%	39.5	-9
	0600	3.13	130	16.50	430	601	15.6	13,036	13.0	200	3.4	0.8	-0.1	1.8	3,376	385	376	613	394	1,244	100%	100%	50%	0%	39.5	-9
	0630	3.42	308	16.10	448	580	15.6	12,143	13.0	193	3.4	0.7	-0.1	1.7	3,331	363	377	582	373	1,115	100%	100%	50%	0%	39.5	-9
	0700	3.75	75	15.10	474	551	15.6	12,850	13.0	199	3.4	0.7	-0.2	1.7	3,380	371	367	585	380	1,189	100%	100%	50%	0%	39.5	-9
	0730	3.82	77	15.90	471	568	15.6	13,022	13.0	197	3.3	0.7	-0.2	1.6	3,384	376	374	596	385	1,259	100%	100%	50%	0%	39.5	-9
	0800	3.75	79	15.88	464	565	15.6	12,511	13.0	191	3.5	0.7	-0.2	1.7	3,320	383	362	607	390	1,304	100%	100%	50%	0%	39.5	-9
1/9/96	0030	3.61	216	15.50	304	544	14.6	12,413	14.0	197	3.0	0.4	-0.2	1.7	3,094	355	374	534	346	969	100%	100%	50%	0%	39.5	-9
	0100	3.57	529	16.30	322	590	14.6	12,442	14.0	205	3.1	0.6	0.1	1.8	3,013	361	387	545	352	995	100%	100%	50%	0%	39.5	-9
	0130	3.28	163	15.50	318	578	14.6	10,746	14.0	195	3.0	0.5	-0.1	1.7	3,113	367	389	555	357	1,009	100%	100%	50%	0%	39.5	-9
	0200	3.57	205	15.80	306	577	14.6	10,892	14.0	195	3.0	0.5	-0.1	1.7	3,205	372	374	563	362	1,035	100%	100%	50%	0%	39.5	-9
	0230	3.09	208	15.60	306	577	14.6	12,276	14.0	201	2.8	0.7	-0.1	1.8	3,052	377	379	570	365	1,051	100%	100%	50%	0%	39.5	-9
	0300	3.64	262	16.00	320	588	14.6	12,642	14.0	200	2.8	0.7	-0.2	1.8	3,090	382	370	582	371	1,070	100%	100%	50%	0%	39.5	-9
	0330	3.32	188	15.90	332	589	14.6	11,638	14.0	195	2.9	0.6	-0.2	1.7	3,238	386	376	586	375	1,087	100%	100%	50%	0%	39.5	-9
	0400	3.05	201	15.90	337	599	14.6	11,869	14.0	198	3.1	0.7	-0.2	1.8	3,161	390	385	596	378	1,094	100%	100%	50%	0%	39.5	-9
	0430	3.27	149	15.80	359	572	14.6	11,899	14.0	194	3.1	0.7	-0.3	1.8	3,151	394	387	603	381	1,108	100%	100%	50%	0%	39.5	-9
	0500	3.02	194	16.40	366	603	14.6	13,149	14.0	200	3.1	0.7	-0.2	1.8	3,193	396	380	615	385	1,132	100%	100%	50%	0%	39.5	-9
	0530	3.19	445	16.00	293	583	14.6	13,232	14.0	198	3.2	0.6	0.1	1.7	3,376	397	374	615	387	1,155	100%	100%	50%	0%	39.5	-9
	0600	3.54	110	15.10	335	507	14.6	12,688	14.5	193	3.1	0.8	0.1	1.8	3,286	378	391	519	374	942	100%	100%	50%	0%	39.5	-9
	0630	3.76	128	15.30	338	631	14.6	13,272	14.5	198	3.1	0.8	-0.1	1.8	3,310	381	388	531	356	961	100%	100%	50%	0%	39.5	-9
	0700	3.76	162	15.40	330	554	14.6	13,417	14.0	201	3.1	0.8	-0.2	1.8	3,275	382	366	543	357	993	100%	100%	50%	0%	39.5	-9
	0730	4.00	99	15.40	342	550	14.6	12,972	14.0	200	3.1	0.8	-0.2	1.8	3,090	364	397	549	360	1,005	100%	100%	50%	0%	39.5	-9
	0800	3.62	113	15.20	346	558	14.6	13,440	14.0	202	3.3	0.9	0.1	2.0	3,301	367	384	557	363	1,036	100%	100%	50%	0%	39.5	-9
	0830	3.56	114	15.51	302	550	14.6	13,222	14.0	195	3.6	0.9	-0.2	1.9	3,320	370	383	566	368	1,044	100%	100%	50%	0%	39.5	-9
	0900	3.70	100	15.62	372	558	14.6	13,094	14.0	187	3.6	0.8	-0.2	1.8	3,380	373	399	571	368	1,063	100%	100%	50%	0%	39.5	-9
	0930	3.80	110	15.64	387	560	14.6	14,499	14.0	174	3.8	0.8	-0.2	1.9	3,350	371	389	575	370	1,078	100%	100%	50%	0%	39.5	-9
	1000	3.50	106	15.04	383	556	14.6	13,599	14.0	164	3.7	0.8	-0.2	1.8	3,420	374	397	583	372	1,086	100%	100%	50%	0%	39.5	-9
	1030	3.72	94	15.27	390	563	14.6	12,606	14.0	190	3.8	0.8	-0.2	1.8	3,300	380	391	590	376	1,107	100%	100%	50%	0%	39.5	-9
	1100	3.88	108	15.73	398	566	14.6	12,891	14.0	197	3.7	0.8	-0.3	1.8	3,350	385	380	598	380	1,118	100%	100%	50%	0%	39.5	-9
	1130	3.76	115	15.74	428	584	14.6	12,609	14.0	193	3.8	0.8	-0.2	1.8	3,320	387	393	602	382	1,129	100%	100%	50%	0%	39.5	-9
	1200	3.82	92	15.70	391	506	14.6	13,367	14.0	198	3.8	0.8	-0.2	1.7	3,320	363	386	535	362	979	100%	100%	50%	0%	39.5	-9
	1230	3.80	75	15.87	401	534	14.6	12,810	14.0	194	3.7	0.8	-0.2	1.8	3,330	359	400	541	360	997	100%	100%	50%	0%	39.5	-9
	1300	3.78	105	15.48	416	546	14.6	13,083	14.0	202	3.7	0.8	-0.2	1.8	3,340	362	382	551	363	1,025	100%	100%	50%	0%	39.5	-9
	1330	3.68	125	15.76	424	557	14.6	13,262	14.0	203	3.8	0.8	-0.2	1.9	3,400	364	393	556	365	1,048	100%	100%	50%	0%	39.5	-9
	1400	3.34	105	15.26	414	560	14.6	12,711	14.0	199	3.8	0.8	-0.2	1.9	3,370	368	379	565	369	1,058	100%	100%	50%	0%	39.5	-9
	1430	3.15	157	16.02	424	598	14.6	12,578	14.0	197	3.8	0.8	-0.2	2.0	3,410	372	379	571	372	1,078	100%	100%	50%	0%	39.5	-9
	1500	3.49	106	15.80	447	570	14.6	13,494	14.0	198	3.8	0.8	-0.2	1.9	3,430	373	381	580	374	1,084	100%	100%	50%	0%	39.5	-9
	1530	3.66	102	15.26	459	562	14.6	13,073	14.0	186	3.8	0.8	-0.2	1.9	3,420	376	374	583	377	1,098	100%	100%	50%	0%	39.5	-9
	1600	2.98	128	16.49	443	577	14.6	13,325	14.0	191	3.7	1.0	-0.2	1.9	3,423	380	386	591	380	1,125	100%	100%	50%	0%	39.5	-9
	1630	3.02	110	15.90	457	578	14.6	13,221	14.0	192	3.8	1.1	-0.3	2.0	3,350	382	387	597	82	1,131	100%	100%	50%	0%	39.5	-9
	1700	2.95	126	17.01	424	603	14.6	13,709	14.0	195	3.9	1.1	-0.2	2.1	3,430		377	603	385	1,160	100%	100%	50%	0%	39.5	-9
	1730	Coal feed rate was increased from 18.6 to 19.8 lb/m to maintain a firing rate of 15.6 MMBtu/h based on a new calorific value																								
	1800	3.23	148	15.87	448	493	15.6	13,878	14.0	191	4.5	1.4	-0.2	2.0	3,710	370	393	550	375	1,059	100%	100%	50%	0%	39.5	-9
	1830	3.62	83	15.72	501	538	15.6	14,457	14.0	202	4.6	1.4	-0.2	2.2	3,680	368	378	563	375	1,097	100%	100%	50%	0%	39.5	-9
	1900	2.55	170	16.80	499	588	15.6	14,435	14.0	196	4.6	1.5	-0.3	2.4	3,700	370	373	572	377	1,126	100%	100%	50%	0%	39.5	-9
	1930	3.26	167	16.27	494	587	15.6	14,116	14.0	192	4.6	1.6	-0.3	2.4	3,730	374	384	578	380	1,131	100%	100%	50%	0%	39.5	-9
	2000	2.95	119	15.66	488	577	15.6	13,942	14.0	191	4.6	1.5	-0.2	2.5	3,720	376	385	586	384	1,131	100%	100%	50%	0%	39.5	-9
	2030	3.72	100	15.33	509	585	15.6	14,554	14.0	204	4.6	1.3	-0.3	2.5	3,770	381	380	597	389	1,142	100%	100%	50%	0%	39.5	-9
	2100	3.97	94	15.94	483	584	15.6	14,343	14.0	202	4.6	1.2	-0.2	2.5	3,760	385	379	605	391	1,150	100%	100%	50%	0%	39.5	-9
	2130	3.28	276	16.44	398	577	15.6	14,460	14.0	193	4.5	1.3	-0.2	2.4	3,710	387	374	606	392	1,074	100%	100%	50%	0%	39.5	-9
	2200	3.49	60	14.98	455	495	15.6	14,116	14.0	189	4.5	1.3	-0.2	2.4	3,530	369	391	585	375	1,097	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	2230	2.11	67	13.88	518	530	15.6	14,185	14.0	200	Photohelic sensor line cleaned out				3,840	371	365	572	378	1,123	100%	100%	50%	0%	39.5	-9
	2300	2.99	73	15.31	475	567	15.6	14,891	14.0	200	4.5	1.1	-0.2		3,710	374	365	585	381	1,156	100%	100%	50%	0%	39.5	-9
	2330	2.66	139	16.44	484	604	15.6	15,139	14.0	197	4.5	1.1	-0.3		3,750	379	363	595	385	1,165	100%	100%	50%	0%	39.5	-9
1/10/98	0000	2.12	354	17.00	454	650	15.6	15,273	14.0	199	4.5	1.1	-0.2	2.7	3,704	383	363	603	389	1,181	100%	100%	50%	0%	39.5	-9
	0030	3.20	96	16.30	461	594	15.6	15,282	14.0	201	4.5	1.2	-0.2	2.8	3,817	387	387	619	396	1,199	100%	100%	50%	0%	39.5	-9
	0100	2.76	226	16.30	522	455	15.6	14,562	14.0	203					3,909	362	375	553	375	1,067	100%	100%	50%	0%	39.5	-9
		Boiler off line due to low feedwater level																								
	0500	4.37	207	15.30	443	527	15.6	15,074	13.5	197	4.9	1.8	0.2	2.7	3,948	362	383	561	373	1,042	100%	100%	50%	0%	39.5	-9
	0530	4.16	135	15.33	419	515	15.6	14,990	13.5	169	4.9	1.9	-0.1	2.8	3,888	366	387	564	376	1,047	100%	100%	50%	0%	39.5	-9
	0600	4.00	159	14.90	395	516	15.6	14,557	14.0	192	4.9	1.8	-0.1	2.7	3,931	371	388	569	377	1,051	100%	100%	50%	0%	39.5	-9
	0630	3.78	263	15.40	377	546	15.6	14,817	14.0	189	4.0	1.4	-0.1	2.1	3,719	371	391	568	377	1,069	100%	100%	50%	0%	39.5	-9
	0700	4.48	147	15.10	390	521	15.6	15,148	13.5	179	4.4	1.4	-0.1	2.5	3,679	374	390	575	380	1,063	100%	100%	50%	0%	39.5	-9
	0730	3.59	126	16.30	401	560	15.6	15,067	13.5	164	4.3	1.4	-0.2	2.4	3,734	376	385	583	381	1,065	100%	100%	50%	0%	39.5	-9
	0800	3.33	138	16.00	449	579	15.6	15,563	14.0	186	4.3	1.3	-0.1	2.5		382	381	594	387	1,110	100%	100%	50%	0%	39.5	-9
	0830	Changed coal feed rate to 19 lb/m																								
	0900	3.93	117	15.55	445	523	14.9	15,061	13.5	179	4.5	1.0	-0.2	1.5	3,670	385	386	601	390	1,128	100%	100%	50%	0%	39.5	-9
	0930	3.71	111	15.52	449	569	14.9	14,742	13.5	183	4.5	0.9	-0.3	1.6	3,630	388	398	608	392	1,127	100%	100%	50%	0%	39.5	-9
	1000	3.65	74	16.02	418	498	14.9	14,913	13.5	183	3.9	0.9	-0.2	1.9	3,480	359	383	533	365	1,101	100%	100%	50%	0%	39.5	-9
	1030	3.57	79	15.97	454	485	14.9	14,862	13.5	182	3.9	0.9	-0.2	2.1	3,510	358	398	547	364	1,032	100%	100%	50%	0%	39.5	-9
	1100	3.92	72	15.73	442	465	14.9	14,814	13.5	182	3.9	0.9	-0.1	2.0	3,520	360	380	557	367	1,061	100%	100%	50%	0%	39.5	-9
		Ran out of coal, shipment was received ~1500 hours																								
	1900	3.58	1231	15.77	389	527	14.9	16,167	13.5	159	3.7	1.0	-0.2	2.0	3,400	368	390	577	373	1,115	100%	100%	50%	0%	39.5	-9
	1930	3.96	131	16.49	356	535	14.9	16,016	13.5	156	3.7	1.0	-0.1	2.1	3,370	369	396	579	373	1,117	100%	100%	50%	0%	39.5	-9
	2000	4.22	137	15.56	377	538	14.9	16,667	13.5	147	3.8	0.9	-0.2	2.1	3,345	370	398	582	373	1,124	100%	100%	50%	0%	39.5	-9
	2030	3.95	132	15.44	382	578	15.6	17,237	13.5	149	4.1	1.0	-0.2	2.1	3,600	373	379	595	377	1,159	100%	100%	50%	0%	39.5	-9
	2100	3.76	129	15.92	413	578	15.6	17,900	13.5	146	4.2	1.0	-0.3	2.1	3,500	374	371	604	380	1,169	100%	100%	50%	0%	39.5	-9
	2130	3.46	131	15.78	386	596	15.6	17,670	13.5	145	4.3	1.1	-0.3	2.1	3,500	360	369	609	384	1,173	100%	100%	50%	0%	39.5	-9
	2200	3.50	134	15.66	430	601	15.6	17,569	13.5	146	4.2	1.1	-0.3	2.2	3,550	374	383	617	386	1,187	100%	100%	50%	0%	39.5	-9
	2230	3.53	134	15.93	429	609	15.6	17,664	13.5	144	4.1	1.1	-0.3	2.1	3,510	358	380	621	390	1,196	100%	100%	50%	0%	39.5	-9
	2300	3.91	139	15.03	436	598	15.6	17,423	13.5	145	4.0	1.2	-0.2	2.0	3,530	398	379	627	393	1,222	100%	100%	50%	0%	39.5	-9
	2330	3.93	95	15.08	433	514	15.6	18,170	13.5	145	4.2	1.1	-0.2	2.0	3,580	356	383	550	364	1,108	100%	100%	50%	0%	39.5	-9
1/11/98	0000	3.86	84	14.85	389	515	15.6	18,245	13.5	139	4.1	1.1	-0.1	2.0	3,670	349	380	560	365	1,113	100%	100%	50%	0%	39.5	-9
	0030	3.95	82	14.80	420	538	15.6	18,111	13.5	139	4.1	1.2	-0.3	2.0	3,625	352	378	566	369	1,133	100%	100%	50%	0%	39.5	-9
	0100	3.20	124	15.55	395	575	15.6	18,264	13.5	146	4.0	1.1	-0.2	2.0	3,460	359	376	564	371	1,139	100%	100%	50%	0%	39.5	-9
	0130	4.28	132	15.64	404	583	15.6	16,909	13.5	137	3.8	1.0	-0.4	2.2	3,395	361	391	573	371	1,149	100%	100%	50%	0%	39.5	-9
	0200	3.23	105	15.26	409	586	15.6	19,426	13.5	134	3.9	1.1	-0.2	2.2	3,410	365	385	582	375	1,159	100%	100%	50%	0%	39.5	-9
	0230	3.63	100	16.00	417	591	15.6	18,633	13.5	137	3.9	1.0	-0.2	2.1	3,404	366	376	590	377	1,179	100%	100%	50%	0%	39.5	-9
	0300	3.26	103	15.50	442	585	15.6	19,432	14.0	133	3.8	0.9	-0.1	2.1	3,525	368	373	597	380	1,188	100%	100%	50%	0%	39.5	-9
	0330	3.29	112	15.96	458	587	15.6	20,514	13.5	127	4.2	0.9	-0.5	1.9	3,460	368	384	604	383	1,207	100%	100%	50%	0%	39.5	-9
	0400	3.42	113	15.48	462	571	15.6	21,212	13.5	117	4.0	0.9	-0.3	2.0	3,510	367	381	609	385	1,212	100%	100%	50%	0%	39.5	-9
	0430	3.93	114	15.50	482	568	15.6	20,473	14.0	120	4.0	0.9	-0.2	1.9	3,468	371	377	616	389	1,229	100%	100%	50%	0%	39.5	-9
	0500	3.20	133	15.70	464	582	15.6	16,538	14.0	129	3.9	1.0	-0.2	1.8	3,442	376	381	621	392	1,237	100%	100%	50%	0%	39.5	-9
	0530	2.55	106	15.80	478	491	15.6	17,163	14.0	149	3.9	1.0	-0.3	1.9	3,370	363	378	549	376	1,110	100%	100%	50%	0%	39.5	-9
	0600	3.29	99	15.20	445	513	15.6	17,415	14.0	149	3.9	0.9	-0.1	2.0	3,507	356	365	564	371	1,146	100%	100%	50%	0%	39.5	-9
	0630	3.24	96	15.20	428	534	15.6	12,569	14.0	148	3.9	1.0	-0.2	2.1	3,447	357	364	576	374	1,160	100%	100%	50%	0%	39.5	-9
	0700	3.14	118	16.00	491	572	15.6	17,928	14.0	146	3.9	1.0	-0.2	2.0	3,553	363	380	584	378	1,170	100%	100%	50%	0%	39.5	-9
	0730	3.29	97	15.40	464	577	15.6	17,789	14.0	147	4.0	1.1	-0.1	2.0	3,456	368	387	591	382	1,190	100%	100%	50%	0%	39.5	-9
	0800	4.09	96	15.38	454	571	15.6	17,517	13.5	145	4.0	1.1	-0.1	2.0	3,540	369	378	598	384	1,212	100%	100%	50%	0%	39.5	-9
	0830	3.05	107	15.32	474	609	15.6	17,800	13.0	146	4.0	1.1	-0.1	2.0	3,460	373	393	604	388	1,223	100%	100%	50%	0%	39.5	-9
	0900	3.97	65	15.55	475	502	15.6	17,337	13.5	147	4.1	1.1	-0.1	2.1	3,480	356	388	556	370	1,126	100%	100%	50%	0%	39.5	-9
	0930	3.98	78	15.65	489	524	15.6	17,478	13.5	147	4.1	1.1	-0.1	2.1	3,520	355	371	570	371	1,144	100%	100%	50%	0%	39.5	-9
	1000	3.67	84	15.01	508	536	15.6	17,797	13.5	147	4.2	1.1	-0.1	2.0	3,620	360	382	579	376	1,160	100%	100%	50%	0%	39.5	-9
	1030	3.80	112	15.36	490	519	15.6	17,368	13.0	147	4.1	1.1	-0.2	2.0	3,570	363	377	587	376	1,173	100%	100%	50%	0%	39.5	-9
	1100	3.96	146	15.73	457	492	15.6	17,173	13.5	147	4.1	1.1	-0.2	2.1	3,520	367	375	594	383	1,189	100%	100%	50%	0%	39.5	-9
	1130	3.69	75	15.32	445	370	15.6	17,551	13.5	149	4.1	1.1	-0.2	2.1	3,510	373	382	605	387	1,197	100%	100%	50%	0%	39.5	-9
	1200	Sample line froze					15.6	17,694	13.5	147	4.1	1.0	-0.2	2.1	3,540	376	385	609	391	1,214	100%	100%	50%	0%	39.5	-9
	1230	3.65	68	15.10	508	592	15.6	17,725	13.5	146	4.2	1.1	-0.1	2.1	3,550	363	379	559	378	1,140	100%	100%	50%	0%	39.5	-9
	1300	3.53	70	14.45	499	571	15.6	16,753	13.5	148	3.9	1.1	-0.1	2.1	3,420	360	376	566	373	1,126	100%	100%	50%	0%	39.5	-9
	1330	3.67	62	14.12	520	572	15.6	18,323	13.5	134	4.0	1.0	-0.2	2.0	3,430	359	377	572	373	1,147	100%	100%	50%	0%	39.5	-9
	1400	3.20	103	15.07	484	596	15.6	17,470	13.5	144	3.6	1.0	-0.2	1.8	3,350	360	366	577	373	1,159	100%	100%	50%	0%	39.5	-9
	1430	3.79	68	14.36	490	570	15.6	16,941	13.0	146	3.9	1.0	-0.2	1.8	3,420	366	383	586	380	1,162	100%	100%	50%	0%	39.5	-9
	1500	3.41	80	15.74	493	598	15.6	17,507	13.0	143	4.0	1.0	-0.2	1.8	3,460	370	382	595	384	1,208	100%	100%	50%	0%	39.5	-9
	1530	3.43	66	15.44	481	581	15.6	17,887	13.0	142	4.0	1.0	-0.2	1.8	3,410	357	381	560	371	1,137	100%	100%	50%	0%	39.5	-9
	1600	3.33	282	15.21	494	595	15.6	17,945	13.0	140	4.0	1.0	-0.2	1.8	3,520	360	384	576	377	1,162	100%	100%	50%	0%	39.5	-9
	1630	3.24	53	14.95	504	576	15.6	17,850	13.0	142	4.0	1.0	-0.2	1.9	3,550	363	388	580	378	1,163	100%	100%	50%	0%	39.5	-9
	1700	3.70	59	15.80	486	606	15.6	18,427	13.0	136	4.0	1.0	-0.2	2.0	3,510	364	389	586	381	1,190	100%	100%	50%	0%	39.5	-9
	1730	3.86	56	15.07	484	584	15.6	17,554	13.0	140	4.0	1.1	-0.2	2.0	3,490	367	377	594	383	1,196	100%	100%	50%	0%	39.5	-9
	1800	3.56	53	14.97	509	575	15.6	16,857	13.0	146	4.0	1.0	-0.2	2.0	3,530	372	377	600	388	1,209	100%	100%	50%	0%	39.5	-9
	1830	4.41	54	14.62	521	565	15.6	16,667	13.0	146	4.0	0.9	-0.2	1.9	3,500	377	386	606	392	1,219	100%	100%	50%	0%	39.5	-9
	1900	4.44	51	14.70	499	559	15.6	17,058	13.0	149	4.1	0.9	-0.2	2.0	3,510	359	375	559	371	1,132	100%	100%	50%	0%	39.5	-9
	1930	4.52	47	14.38	511	564	15.6	17,163	13.0	147	4.1	1.0	-0.2	2.0	3,510	359	377	571	373	1,160	100%	100%	50%	0%	39.5	-9
	2000	4.53	43	14.85	512	558	15.6	17,788	13.0	147	4.1	1.0	-0.2	2.0	3,220	363	361	579	377	1,165	100%	100%	50%	0%	39.5	-9
	2030	4.25	46	15.07	504	558	15.6	16,895	13.0	146	4.1	1.0	-0.2	2.0	3,500	368	380	583	381	1,178	100%	100%	50%	0%	39.5	-9
	2100	4.14	51	15.82	526	565	15.6	18,866	13.0	147	4.1	0.9	-0.3	2.0	3,480	371	385	589	384	1,207	100%	100%	50%	0%	39.5	-9
	2130	4.17	47	15.23	529	562	15.6	17,055	13.0	149	4.1	1.0	-0.2	2.0	3,470	374	363	595	388	1,213	100%	100%	50%	0%	39.5	-9
	2200	4.29	56	15.12	526	666	15.6	17,148	13.0	150	4.1	1.0	-0.2	2.0	3,460	329	384	603	392	1,234	100%	100%	50%	0%	39.5	-9
	2230	4.44	54	15.42	504	549	15.6	14,029	13.0	200	4.1	1.0	-0.2	2.0	3,430	357	376	564	372	1,153	100%	100%	50%	0%	39.5	-9
	2300	4.55	54	15.13	508	552	15.6	11,794	13.0	211	4.0	1.0	-0.2	2.0	3,450	372	379	589	384	1,188	100%	100%	50%	0%	39.5	-9
	2330	3.35	62	15.30	512	572	15.6	12,110	13.5	209	4.1	0.9	-0.3	1.9	3,480	376	385	594	388	1,200	100%	100%	50%	0%	39.5	-9
1/12/98	0000	3.59	51	15.80	509	583	15.6	11,710	13.5	209	4.1	1.0	-0.2	2.0	3,500	381	382	603	392	1,222	100%	100%	50%	0%	39.5	-9
	0030	3.84	69	15.20	506	568	15.6	11,650	13.5	209	4.0	0.9	-0.1	1.9	3,469	384	380	609	395	1,233	100%	100%	50%	0%	39.5	-9
	0100	3.26	89	15.60	452	553	15.6	12,317	14.0	209	4.0	0.9	-0.2	1.8	3,310	367	385	565	372	1,145	100%	100%	50%	0%	39.5	-9
	0130	3.84	78	15.80	478	566	15.6	12,041	14.0	209	3.8	0.8	-0.1	1.7	3,376	372	382	581	380	1,180	100%	100%	50%	0%	39.5	-9
	0200	3.61	74	15.70	477	566	15.6	11,873	14.0	211	3.8	0.7	-0.2	1.7	3,451	375	390	589	383	1,196	100%	100%	50%	0%	39.5	-9
	0230	3.48	72	15.40	502	574	15.6	11,743	13.5	207	3.9	0.8	-0.1	1.8	3,338	380	395	597	387	1,211	100%	100%	50%	0%	39.5	-9
	0300	3.80	42	14.80	485	576	15.6	12,331	13.5	208	3.9	0.8	-0.2	1.8	3,481	385	375	605	391	1,219	100%	100%	50%	0%	39.5	-9
	0330	3.92	69	15.50	489	570	15.6	12,082	13.5	206	3.8	0.8	-0.2	1.8	3,323	387	385	611	393	1,236	100%	100%	50%	0%	39.5	-9
	0400	4.09	112	16.00	475	581	15.6	12,413	13.5	206	3.8	0.8	-0.1	1.7	3,459	390	377	618	397	1,243	100%	100%	50%	0%	39.5	-9
	0430	4.08	58	15.60	466	524	15.6	12,500	14.0	209	4.0	0.9	-0.1	1.9	3,451	366	376	565	372	1,171	100%	100%	50%	0%	39.5	-9
	0500	3.87	69	15.40	481	539	15.6	11,875	14.0	206	4.0	0.9	-0.2	1.8	3,462	371	375	575	376	1,189	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (scfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	0530	3.95	79	15.60	458	586	15.6	12,728	13.5	199	4.0	0.8	-0.3	1.9	3,442	378	379	588	382	1,212	100%	100%	50%	0%	39.5	-9
	0600	3.28	70	15.60	491	579	15.6	13,063	13.5	197	3.8	0.8	-0.1	1.8	3,425	379	383	593	385	1,222	100%	100%	50%	0%	39.5	-9
	0630	4.07	87	15.70	476	575	15.6	12,999	13.5	199	3.8	0.7	-0.2	1.7	3,402	382	376	599	388	1,218	100%	100%	50%	0%	39.5	-9
	0700	3.92	64	15.50	473	573	15.6	13,117	14.0	198	3.8	0.8	-0.2	1.9	3,405	385	388	606	391	1,222	100%	100%	50%	0%	39.5	-9
	0730	2.30	112	12.20	444	594	15.6	13,582	13.5	189	3.8	0.8	-0.1	1.8	3,500	387	400	612	394	1,264	100%	100%	50%	0%	39.5	-9
	0800	3.98	76	16.03	462	528	15.6	12,622	13.5	186	3.8	0.9	-0.1	1.9	3,380	370	382	562	375	1,174	100%	100%	50%	0%	39.5	-9
	0830	3.57	84	15.83	444	566	15.6	12,850	13.5	196	3.6	0.9	-0.2	1.8	3,390	366	395	570	372	1,191	100%	100%	50%	0%	39.5	-9
	0900	3.51	108	15.26	447	566	15.6	13,108	13.5	190	3.8	0.9	-0.2	1.8	3,420	370	372	584	377	1,199	100%	100%	50%	0%	39.5	-9
	0930	3.73	71	15.12	463	572	15.6	11,859	13.5	188	3.8	0.9	-0.2	1.8	3,420	375	384	591	381	1,222	100%	100%	50%	0%	39.5	-9
	1000	3.24	124	15.40	469	581	15.6	13,355	13.5	205	3.8	0.9	-0.2	1.8	3,410	378	398	603	386	1,237	100%	100%	50%	0%	39.5	-9
	1030	3.32	90	15.64	462	560	15.6	13,642	13.5	192	3.8	0.8	-0.2	1.8	3,350	365	381	560	372	1,162	100%	100%	50%	0%	39.5	-9
	1100	3.38	203	15.96	456	592	15.6	13,225	13.5	187	3.8	0.9	-0.2	1.8	3,340	366	373	572	373	1,187	100%	100%	50%	0%	39.5	-9
	1130	3.69	99	15.73	449	585	15.6	11,607	13.5	186	3.8	0.9	-0.2	1.8	3,340	370	374	581	376	1,194	100%	100%	50%	0%	39.5	-9
	1200	3.84	115	15.89	454	598	15.6	13,140	13.5	207	3.8	0.8	-0.2	1.8	3,300	374	380	595	381	1,212	100%	100%	50%	0%	39.5	-9
	1230	3.49	106	15.93	462	584	15.6	12,126	13.5	195	3.8	0.9	-0.2	1.8	3,300	380	390	602	386	1,225	100%	100%	50%	0%	39.5	-9
	1300	3.51	117	15.55	451	582	15.6	12,287	13.5	194	3.8	0.8	-0.2	1.8	3,420	384	380	615	391	1,227	100%	100%	50%	0%	39.5	-9
	1330	3.87	77	14.78	439	530	15.6	13,077	13.5	211	3.8	0.8	-0.2	1.8	3,450	365	386	560	373	1,150	100%	100%	50%	0%	39.5	-9
	1400	3.47	114	16.13	427	583	15.6	12,389	13.5	202	3.8	0.9	-0.2	1.8	3,310	367	371	567	373	1,166	100%	100%	50%	0%	39.5	-9
	1430	3.40	85	15.63	438	574	15.6	11,211	13.5	198	3.4	0.7	-0.2	1.8	3,310	372	373	582	377	1,199	100%	100%	50%	0%	39.5	-9
	1500	3.23	102	15.83	440	595	15.6	13,549	13.5	205	3.4	0.8	-0.2	1.8	3,290	377	384	594	380	1,218	100%	100%	50%	0%	39.5	-9
	1530	3.94	112	16.05	466	569	15.6	13,187	13.5	204	3.8	0.8	-0.2	1.8	3,410	366	375	564	372	1,165	100%	100%	50%	0%	39.5	-9
	1600	3.66	72	15.23	452	561	15.6	12,841	13.5	209	3.9	1.0	-0.2	1.8	3,430	369	390	579	376	1,191	100%	100%	50%	0%	39.5	-9
	1630	3.68	74	15.46	453	570	15.6	13,164	13.5	201	4.0	0.8	-0.3	1.8	3,430	372	370	585	380	1,208	100%	100%	50%	0%	39.5	-9
	1830	4.04	91	15.51	345	572	15.6	13,575	13.5	194	4.0	0.8	-0.2	2.0	3,360	367	380	578	375	1,130	100%	100%	50%	0%	39.5	-9
	1900	3.86	589	16.24	302	586	15.6	13,236	13.5	198	4.0	0.8	-0.2	2.0	3,360	368	373	582	376	1,142	100%	100%	50%	0%	39.5	-9
	1930	4.32	80	14.40	305	589	15.6	13,286	13.5	196	3.9	0.7	-0.2	1.8	3,420	374	384	592	381	1,165	100%	100%	50%	0%	39.5	-9
	2000	4.49	101	15.32	301	586	15.6	12,759	13.5	198	4.0	0.8	-0.2	1.9	3,390	379	386	596	382	1,158	100%	100%	50%	0%	39.5	-9
	2030	3.82	78	15.08	390	549	15.6	12,528	13.5	197	3.9	0.8	-0.2	1.8	3,380	383	373	604	385	1,174	100%	100%	50%	0%	39.5	-9
	2100	3.71	81	15.83	388	559	15.6	13,005	13.5	200	4.0	1.0	-0.2	1.2	3,490	387	388	611	389	1,172	100%	100%	50%	0%	39.5	-9
	2130	3.97	77	15.43	376	582	15.6	12,898	13.5	202	3.8	1.0	-0.2	1.3	3,410	390	378	616	391	1,187	100%	100%	50%	0%	39.5	-9
	2200	3.85	150	15.78	360	502	15.6	14,019	13.5	205	3.8	1.0	-0.3	1.7	3,320	362	389	537	368	1,094	100%	100%	50%	0%	39.5	-9
	2230	3.91	81	15.76	361	522	15.6	13,198	13.5	204	3.9	0.9	-0.3	1.8	3,310	363	386	556	368	1,104	100%	100%	50%	0%	39.5	-9
	2300	3.83	71	15.33	356	546	15.6	12,888	13.5	197	4.0	1.0	-0.2	1.8	3,330	363	390	566	369	1,133	100%	100%	50%	0%	39.5	-9
	2330	4.01	120	15.65	400	554	15.6	12,682	14.0	190	3.9	1.0	-0.3	1.8	3,377	369	375	573	374	1,151	100%	100%	50%	0%	39.5	-9
1/13/95	0000	3.64	135	15.30	372	548	15.6	12,220	14.0	198	3.9	1.0	-0.2	1.7	3,395	375	384	584	378	1,163	100%	100%	50%	0%	39.5	-9
	0030	3.45	89	15.40	398	574	15.6	12,813	14.0	202	3.7	0.8	-0.3	1.8	3,368	378	382	591	382	1,184	100%	100%	50%	0%	39.5	-9
	0100	3.21	98	15.50	399	565	15.6	13,132	13.5	199	3.8	0.7	-0.2	1.9	3,388	382	387	599	386	1,201	100%	100%	50%	0%	39.5	-9
	0130	3.69	99	15.71	418	569	15.6	13,134	14.0	200	3.6	0.7	-0.3	1.8	3,330	386	373	605	388	1,217	100%	100%	50%	0%	39.5	-9
	0200	3.92	86	15.89	422	537	15.6	12,046	14.0	198	3.7	0.7	-0.4	1.7	3,430	391	387	616	393	1,240	100%	100%	50%	0%	39.5	-9
	0230	3.38	93	15.84	430	561	15.6	13,153	13.5	198	3.5	0.8	-0.5	1.9	3,420	392	379	620	395	1,251	100%	100%	50%	0%	39.5	-9
	0300	4.07	190	15.17	398	530	15.6	13,036	13.5	208	3.7	0.8	-0.4	1.8	3,380	363	376	556	370	1,115	100%	100%	50%	0%	39.5	-9
	0330	4.46	71	15.60	386	516	15.6	12,551	13.5	193	3.7	0.7	-0.1	2.0	3,455	365	368	563	372	1,133	100%	100%	50%	0%	39.5	-9
	0400	3.05	102	15.50	421	532	15.6	13,202	13.5	186	3.7	0.9	-0.2	1.8	3,312	367	373	574	374	1,158	100%	100%	50%	0%	39.5	-9
	0430	3.77	77	15.34	402	549	15.6	12,293	13.5	191	3.6	0.8	-0.3	1.7	3,400	372	383	582	378	1,180	100%	100%	50%	0%	39.5	-9
	0500	3.76	68	14.85	390	557	15.6	12,133	13.5	193	3.6	0.9	-0.3	1.8	3,400	377	394	592	384	1,209	100%	100%	50%	0%	39.5	-9
	0530	4.02	73	15.70	402	580	15.6	12,762	13.5	194	3.7	0.9	-0.2	1.8	3,455	380	390	598	386	1,222	100%	100%	50%	0%	39.5	-9
	0600	3.98	95	15.90	423	589	15.6	13,251	13.5	203	3.8	0.9	0.0	1.9	3,443	384	386	609	389	1,233	100%	100%	50%	0%	39.5	-9
	0630	4.05	98	16.52	423	588	15.6	12,456	13.5	192	3.7	0.8	-0.3	1.8	3,390	388	387	613	392	1,266	100%	100%	50%	0%	39.5	-9
	0700	3.07	97	15.80	413	582	15.6	11,898	13.5	200	3.7	0.9	-0.3	1.7	3,370	392	387	619	395	1,285	100%	100%	50%	0%	39.5	-9
	0730	3.83	65	15.80	407	539	15.6	12,862	13.5	198	3.5	0.8	-0.1	1.7	3,293	366	374	557	369	1,148	100%	100%	50%	0%	39.5	-9
	0800	4.16	137	16.00	409	553	15.6	12,875	13.5	195	3.6	0.8	-0.3	1.7	3,241	369	383	570	372	1,166	100%	100%	50%	0%	39.5	-9
	0830	2.97	133	15.50	412	557	15.6	13,074	13.5	201	3.6	0.8	-0.3	1.8	3,322	374	390	584	377	1,191	100%	100%	50%	0%	39.5	-9
	0900	3.17	310	16.40	381	573	15.6	12,047	13.5	197	3.7	0.7	-0.3	1.8	3,392	379	389	592	381	1,240	100%	100%	50%	0%	39.5	-9
	0930	3.60	117	15.70	386	565	15.6	12,793	14.0	206	3.8	0.8	-0.2	1.8	3,316	384	389	604	386	1,270	100%	100%	50%	0%	39.5	-9
	1000	3.63	252	15.90	352	578	15.6	11,882	13.5	199	3.7	0.7	-0.4	1.9	3,309	390	383	616	391	1,265	100%	100%	50%	0%	39.5	-9
	1030	3.59	144	15.80	393	578	15.6	12,793	13.5	189	3.6	0.6	-0.2	1.8	3,265	396	380	627	396	1,300	100%	100%	50%	0%	39.5	-9
	1100	3.81	313	15.90	403		15.6	12,148	14.0	198	3.7	0.8	-0.1	1.8	3,263	369	380	564	370	1,154	100%	100%	50%	0%	39.5	-9
	1130	3.47	93	16.30	415		15.6	12,827	13.5	196	3.7	0.7	-0.2	1.8	3,264	372	377	573	375	1,172	100%	100%	50%	0%	39.5	-9
	1200	3.66	17	16.46			15.6	11,994	13.5	197	3.8	0.7	-0.2	1.8	3,290	379	379	589	381	1,215	100%	100%	50%	0%	39.5	-9
	1230	3.91	42	16.44			15.6	11,820	13.5	199	3.8	0.7	-0.3	1.6	3,270	384	377	598	384	1,243	100%	100%	50%	0%	39.5	-9
	1300	3.86	133	16.25			15.6	12,358	13.5	200	3.8	0.7	-0.2	1.7	3,250	390	377	611	389	1,267	100%	100%	50%	0%	39.5	-9
	1330	3.31	208	16.84			15.6	12,865	13.5	201	3.9	0.7	-0.2	1.8	3,290	388	385	619	392	1,303	100%	100%	50%	0%	39.5	-9
	1400	3.78	232	16.06			15.6	13,028	13.5	191	3.8	0.7	-0.3	1.7	3,280	371	387	564	371	1,186	100%	100%	50%	0%	39.5	-9
	1430	3.70	1890	16.92			15.6	11,300	13.5	199	3.8	0.7	-0.1	1.7	3,320	378	381	582	377	1,236	100%	100%	50%	0%	39.5	-9
	1500	3.79	386	16.78			15.6	13,201	13.5	181	3.9	0.7	-0.2	1.7	3,290	383	384	592	381	1,268	100%	100%	50%	0%	39.5	-9
	1530	3.55	264	16.48			15.6	12,155	13.5	199	3.7	0.7	-0.3	1.7	3,260	388	398	603	387	1,279	100%	100%	50%	0%	39.5	-9
	1600	3.48	106	15.95			15.6	13,018	13.5	193	3.9	0.7	-0.3	1.7	3,270	391	382	616	391	1,293	100%	100%	50%	0%	39.5	-9
	1630	3.65	398	16.53			15.6	12,245	13.5	201	3.7	0.8	-0.4	1.6	3,270	396	387	624	397	1,315	100%	100%	50%	0%	39.5	-9
	1700	3.69	96	16.56			15.6	11,991	13.5	193	3.8	0.7	-0.2	1.8	3,300	373	393	564	371	1,188	100%	100%	50%	0%	39.5	-9
	1730	3.40	134	16.40			15.6	11,759	13.5	198	3.6	0.6	-0.2	1.7	3,260	376	379	578	377	1,236	100%	100%	50%	0%	39.5	-9
	1800	3.93	118	15.52			15.6	12,172	13.5	194	3.7	0.7	-0.2	1.7	3,270	381	381	590	381	1,253	100%	100%	50%	0%	39.5	-9
	1830	3.42	163		451	572	15.6	11,756	13.5	201	3.6	0.7	-0.3	1.7	3,300	388	384	604	389	1,284	100%	100%	50%	0%	39.5	-9
	1900	3.89	50		453	555	15.6	12,181	13.5	204	3.8	0.7	-0.2	1.8	3,480	393	386	624	394	1,308	100%	100%	50%	0%	39.5	-9
	1935	4.06	65		430	478	15.6	13,629	13.6	214	3.8	0.7	-0.2	1.8	3,460	362	395	545	370	1,168	100%	100%	50%	0%	39.5	-9
	2000	3.93	106		447	651	15.6	13,253	13.6	193	3.8	0.6	-0.2	1.8	3,490	371	393	572	372	1,201	100%	100%	50%	0%	39.5	-9
	2030	3.87	85		398	554	15.6	12,787	13.5	198	3.8	0.7	-0.4	1.7	3,440	377	377	580	378	1,215	100%	100%	50%	0%	39.5	-9
	2100	3.61	115	15.45	564	597	15.6	13,001	13.5	194	3.8	0.6	-0.3	1.9	3,500	381	380	592	383	1,235	100%	100%	50%	0%	39.5	-9
	2130	3.77	125	14.64	571	571	15.6	11,983	13.5	194	3.8	0.9	-0.3	1.8	3,450	386	390	597	387	1,242	100%	100%	50%	0%	39.5	-9
	2200	3.87	147	15.45	565	603	15.6	12,633	13.5	205	3.9	0.6	-0.3	1.7	3,460	392	393	608	393	1,257	100%	100%	50%	0%	39.5	-9
	2230	2.87	167	15.00	564	607	15.6	11,945	13.5	201	3.8	0.7	-0.2	1.8	3,440	395	391	613	396	1,260	100%	100%	50%	0%	39.5	-9
	2300	3.84	130	15.00	546	516	15.6	11,617	13.5	196	3.9	0.7	-0.2	1.6	3,460	364	378	559	368	1,163	100%	100%	50%	0%	39.5	-9
	2330	3.64	111	15.45	554	551	15.6	11,924	13.5	203	4.0	0.6	-0.2	1.8	3,450	375	398	576	377	1,179	100%	100%	50%	0%	39.5	-9
1/14/95	0000	3.47	172	15.42	566	587	15.6	11,963	13.5		3.9	0.8	-0.3	2.0	3,450	383	399	591	384	1,212	100%	100%	50%	0%	39.5	-9
	0030	3.83	183	15.40	577	587	15.6	12,584	13.5	209	3.8	0.8	-0.1	2.0	3,456	386	386	597	388	1,221	100%	100%	50%	0%	39.5	-9
	0100	2.99	139	14.90	493	613	15.6	12,488	13.5	203	3.9	0.8	-0.3	1.9	3,494	390	397	602	390	1,227	100%	100%	50%	0%	39.5	-9
	0130	2.98	168	14.70	489	619	15.6	12,931	13.5	203	3.8	0.8	-0.2	2.0	3,360	395	381	611	395	1,240	100%	100%	50%	0%	39.5	-9
	0200	3.35	117	14.70	459	529	15.6	12,557	13.5	208	4.0	0.9	-0.1	2.1	3,330	375	395	570	376	1,174	100%	100%	50%	0%	39.5	-9
	0230	3.66	135	14.50	476	561	15.6	12,429	13.5	201	3.9	0.8	-0.2	2.0	3,375	380	390	583	381	1,194	100%	100%	50%	0%	39.5	-9
	0300	3.56	133	15.10	484	584	15.6	12,635	13.5	205	3.9	0.8	-0.3	2.0	3,407	384	387	592	386	1,205	100%	100%	50%	0%	39.5	-9
	0330	2.85	125	14.70	499	596	15.6	12,581	13.5	205	3.6	0.7	-0.3	2.1	3,456	389	392	602	390	1,221	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2	CO	CO2	NOx	SO2	Firing Rate	Steam Flow	UV signal	Steam Press.	Windbox P.	Static Pressure			Comb. Air	Comb. Air	Mill Air Flow	Boiler Outlet	BH. Inlet	Conv. Pass	Swirler Settings				Coal Gun	Gas Gun
		(%)	(ppm)	(%)	(ppm)	(ppm)	(MM Btu/h)	(lb/h)		(psig)	(in W.C.)	Primary	Secondary	Tertiary	(acfm)	(F)	(acfm)	(F)	(F)	(F)	Primary	Secondary	Tertiary	Radial Damp	Position	Position
	0400	2.99	199	14.70	498	608	15.6	12,036	13.5	196	3.8	0.8	-0.2	2.0	3,496	393	375	606	394	1,229	100%	100%	50%	0%	39.5	-9
	0430	3.54	118	14.70	481	537	15.6	12,398	14.0	201	3.9	0.7	-0.2	2.0	3,492	375	385	566	374	1,158	100%	100%	50%	0%	39.5	-9
	0500	3.82	117	14.60	498	552	15.6	12,647	14.0	203	3.8	0.7	-0.2	2.1	3,478	381	376	583	361	1,177	100%	100%	50%	0%	39.6	-9
	0530	3.41	116	14.90	509	594	15.6	13,429	13.5	205	3.9	0.8	-0.1	2.0	3,472	386	402	592	385	1,200	100%	100%	50%	0%	39.5	-9
	0600	3.67	169	14.90	509	601	15.6	12,079	13.0	202	3.8	0.8	-0.2	1.9	3,524	390	385	599	390	1,198	100%	100%	50%	0%	39.5	-9
	0630	3.62	306	15.10	519	612	15.6	12,178	13.5	198	3.8	0.7	-0.3	1.9	3,448	395	390	605	393	1,214	100%	100%	50%	0%	39.5	-9
	0700	3.28	126	14.80	524	607	15.6	12,578	13.5	201	3.8	0.8	-0.2	1.9	3,445	398	397	614	397	1,218	100%	100%	50%	0%	39.5	-9
	0730	4.30	94	14.50	500	526	15.6	12,456	14.0	204	4.0	0.8	-0.2	1.9	3,532	376	391	571	376	1,134	100%	100%	50%	0%	39.5	-9
	0800	4.09	104	14.90	479	551	15.6	11,536	13.5	202	3.9	0.7	-0.2	1.9	3,469	381	390	582	381	1,158	100%	100%	50%	0%	39.5	-9
	0830	4.17	105	15.00	504	562	15.6	12,349	13.5	204	3.9	0.8	-0.2	1.9	3,357	385	392	591	386	1,177	100%	100%	50%	0%	39.5	-9
	0900	3.71	119	14.60	486	557	15.6	11,865	13.5	198	3.9	0.8	-0.2	2.0	3,521	390	386	598	390	1,177	100%	100%	50%	0%	39.5	-9
	0930	3.62	124	14.70	485	589	15.6	12,203	13.5	203	3.9	0.8	-0.1	2.0	3,437	394	383	606	393	1,169	100%	100%	50%	0%	39.5	-9
	1000	3.21	133	15.00	493	601	15.6	12,220	13.5	200	3.8	0.8	-0.2	2.0	3,525	397	396	612	396	1,204	100%	100%	50%	0%	39.5	-9
	1030	4.10	103	14.40	484	507	15.6	11,917	13.5	195	3.8	0.9	-0.3	2.1	3,450	373	397	562	372	1,118	100%	100%	50%	0%	39.5	-9
	1100	3.37	108	15.00	495	547	15.6	12,865	13.5	201	3.8	0.8	-0.2	2.0	3,420	381	385	580	379	1,148	100%	100%	50%	0%	39.5	-9
	1130	3.60	113	14.40	489	547	15.6	12,497	13.5	200	3.7	0.8	-0.2	2.1	3,431	386	392	588	383	1,156	100%	100%	50%	0%	39.5	-9
	1200	3.54	153	15.10	485	590	15.6	12,459	13.5	202	3.7	0.8	-0.3	2.0	3,254	391	389	594	387	1,179	100%	100%	50%	0%	39.5	-9
	1230	3.13	149	15.30	487	613	15.6	12,563	13.5	201	3.6	0.7	-0.2	1.8	3,298	395	390	603	392	1,188	100%	100%	50%	0%	39.5	-9
	1300	2.81	220	15.40	470	617	15.6	13,069	13.5	200	3.5	0.6	-0.3	1.7	3,384	399	386	612	395	1,215	100%	100%	50%	0%	39.5	-9
	1330	3.54	121	14.70	445	498	15.6	12,900	14.0	199	3.5	0.7	-0.2	1.8	3,326	373	386	556	372	1,116	100%	100%	50%	0%	39.5	-9
	1400	3.65	827	15.90	435	566	15.6	12,384	14.0	197	3.5	0.7	-0.3	1.7	3,276	381	388	576	377	1,155	100%	100%	50%	0%	39.5	-9
	1430	3.12	153	14.70	448	580	15.6	12,815	14.0	199	3.5	0.6	-0.2	1.7	3,352	387	395	593	382	1,187	100%	100%	50%	0%	39.5	-9
	1500	3.63	279	15.50	450	603	15.6	12,949	14.0	200	3.5	0.7	-0.2	1.7	3,386	394	393	605	386	1,193	100%	100%	50%	0%	39.5	-9
	1530	3.09	144	14.90	457	608	15.6	12,377	14.0	198	3.6	0.7	-0.1	1.7	3,297	402	383	617	391	1,216	100%	100%	50%	0%	39.5	-9
	1600	2.57	246	15.60	448	638	15.6	12,871	14.0	197	3.6	0.7	-0.2	1.7	3,378	407	385	624	396	1,243	100%	100%	50%	0%	39.5	-9
	1630	2.60	359	15.32	420	524	15.6	14,388	13.5	217	3.7	0.7	-0.2	1.7	3,300	368	383	545	369	1,110	100%	100%	50%	0%	39.5	-9
	1700	3.28	200	14.74	451	515	15.6	12,488	13.5	204	3.7	0.8	-0.3	1.7	3,310	380	388	574	375	1,133	100%	100%	50%	0%	39.5	-9
	1730	3.26	137	15.46	454	454	15.6	12,414	13.5	200	3.8	0.8	-0.3	1.7	3,330	388	384	588	382	1,184	100%	100%	50%	0%	39.5	-9
	1800	3.75	189	15.29	457	457	15.6	11,969	13.5	220	3.8	0.7	-0.3	1.7	3,370	395	394	605	389	1,190	100%	100%	50%	0%	39.5	-9
	1830	3.09	132	15.13	453	453	15.6	12,738	13.5	200	3.8	0.7	-0.3	1.7	3,350	401	385	616	395		100%	100%	50%	0%	39.5	-9
	1900	3.59	171	15.60	430	430	15.6	14,453	13.5	214	3.9	0.6	-0.3	1.8	3,390	368	377	546	371		100%	100%	50%	0%	39.5	-9
	1930	3.46	132	15.20	432	432	15.6	12,647	13.5	201	3.8	0.8	-0.2	1.9	3,360	382	378	581	376	1,168	100%	100%	50%	0%	39.5	-9
	2000	3.28	159	15.43	409	576	15.6	11,948	13.5	198	3.7	0.7	-0.3	1.8	3,340	391	389	597	384	1,184	100%	100%	50%	0%	39.5	-9
	2030	3.38	167	16.10	390	604	15.6	12,877	13.5	197	3.7	0.6	-0.2	1.9	3,360	393	379	608	387	1,208	100%	100%	50%	0%	39.5	-9
	2100	3.57	190	15.00	424	613	15.6	12,223	13.5	194	3.7	0.6	-0.2	1.8	3,360	397	381	617	392	1,220	100%	100%	50%	0%	39.5	-9
	2130	3.43	135	15.30	428	597	15.6	13,080	13.5	199	3.7	0.6	-0.2	1.9	3,390	403	388	623	396	1,253	100%	100%	50%	0%	39.5	-9
	2200	3.63	199	15.76	414	518	15.6	13,837	13.5	217	3.8	0.7	-0.3	1.9	3,390	365	383	549	370	1,142	100%	100%	50%	0%	39.5	-9
	2230	3.92	87	14.94	426	526	15.6	12,567	13.5	198	3.8	0.6	-0.3	1.8	3,420	376	391	577	376	1,163	100%	100%	50%	0%	39.5	-9
	2300	3.72	147	15.73	429	577	15.6	12,195	13.5	197	3.8	0.7	-0.3	1.8	3,370	384	381	587	380	1,166	100%	100%	50%	0%	39.5	-9
	2330	3.63	292	15.69	410	584	15.6	12,302	13.5	198	3.8	0.8	-0.3	1.9	3,400	389	383	597	386	1,215	100%	100%	50%	0%	39.5	-9
1/15/96	0000	3.46	207	15.38	433	588	15.6	12,473	13.5	199	3.8	0.6	-0.3	1.6	3,400	395	386	610	342	1,233	100%	100%	50%	0%	39.5	-9
	0030	4.07	109	15.20	451	573	15.6	12,601	14.0	201	3.7	0.8	-0.1	2.1	3,474	398	384	613	394	1,251	100%	100%	50%	0%	39.5	-9
	0100	3.15	123	16.50	454	564	15.6	12,702	14.0	196	3.7	0.7	-0.2	2.0	3,351	402	394	623	398	1,270	100%	100%	50%	0%	39.5	-9
	0130	3.46	83	15.20	455	514	15.6	12,427	14.0	195	3.8	0.8	-0.2	2.1	3,439	372	388	562	372	1,167	100%	100%	50%	0%	39.5	-9
	0200	3.71	84	15.40	461	545	15.6	12,566	14.0	197	3.7	0.7	-0.1	2.1	3,378	381	388	580	379	1,203	100%	100%	50%	0%	39.5	-9
	0230	4.26	106	16.00	459	553	15.6	12,535	13.5	200	3.7	0.7	-0.2	2.0	3,430	386	382	591	384	1,215	100%	100%	50%	0%	39.5	-9
	0300	3.76	110	15.10	469	570	15.6	12,487	13.5	196	3.7	0.7	-0.2	2.1	3,432	390	387	597	388	1,235	100%	100%	50%	0%	39.5	-9
	0330	3.59	114	15.90	464	597	15.6	13,021	13.5	202	3.7	0.7	-0.1	2.1	3,469	394	390	608	391	1,259	100%	100%	50%	0%	39.5	-9
	0400	3.68	115	15.10	470	589	15.6	12,937	13.5	201	3.7	0.7	-0.2	2.0	3,447	399	378	616	396	1,264	100%	100%	50%	0%	39.5	-9
	0430	4.14	75	15.30	465	483	15.6	14,428	14.0	215	3.8	0.8	-0.1	2.2	3,445	367	383	559	372	1,178	100%	100%	50%	0%	39.5	-9
	0500	4.17	68	15.20	474	543	15.6	12,339	14.0	197	3.7	0.7	-0.1	2.1	3,216	378	391	576	376	1,202	100%	100%	50%	0%	39.5	-9
	0530	4.06	101	15.80	472	554	15.6	12,438	13.5	198	3.8	0.7	-0.2	2.0	3,461	385	386	588	381	1,227	100%	100%	50%	0%	39.5	-9
	0600	3.87	96	15.20	473	553	15.6	12,818	13.5	199	3.8	0.7	-0.2	1.9	3,476	389	376	596	386	1,249	100%	100%	50%	0%	39.5	-9
	0630	3.80	118	15.20	466	577	15.6	12,587	13.5	194	3.8	0.7	-0.3	2.0	3,501	392	387	601	388	1,260	100%	100%	50%	0%	39.5	-9
	0700	4.00	106	15.30	469	564	15.6	13,969	13.5	187	3.8	0.6	-0.3	1.9	3,401	394	385	608	391	1,272	100%	100%	50%	0%	39.5	-9
	0730	3.93	106	15.80	476	567	15.6	13,602	13.5	185	3.7	0.8	-0.1	2.1	3,501	394	387	613	393	1,286	100%	100%	50%	0%	39.5	-9
	0800	3.75	116	15.49	478	583	15.6	14,144	13.5	188	3.8	0.7	-0.2	2.0	3,450	397	384	619	396	1,288	100%	100%	50%	0%	39.5	-9
	0830	3.85	78	14.66	473	508	15.6	14,093	13.5	178	3.9	0.6	-0.2	2.0	3,450	374	392	562	375	1,169	100%	100%	50%	0%	39.5	-9
	0900	3.92	75	15.27	485	520	15.6	13,410	13.5	188	3.9	0.7	-0.2	2.0	3,390	374	399	580	377	1,209	100%	100%	50%	0%	39.5	-9
	0930	3.40	87	15.55	436	577	15.6	12,784	13.5	193	3.4	0.6	-0.2	1.8	3,280	379	398	586	379	1,213	100%	100%	50%	0%	39.5	-9
	1000	3.39	86	16.20	466	598	15.6	13,216	13.5	193	3.4	0.7	-0.3	1.8	3,300	384	387	592	383	1,241	100%	100%	50%	0%	39.5	-9
	1030	3.63	105	15.23	498	582	15.6	13,430	13.5	189	3.4	0.7	-0.3	1.9	3,350	387	396	600	386	1,288	100%	100%	50%	0%	39.5	-9
	1100	3.46	119	15.73	494	597	15.6	13,442	13.5	193	3.4	0.7	-0.3	1.8	3,340	388	395	603	389	1,308	100%	100%	50%	0%	39.5	-9
	1130	3.42	123	15.45	501	603	15.6	13,285	13.5	193	3.4	0.7	-0.2	1.8	3,250	392	394	609	393	1,316	100%	100%	50%	0%	39.5	-9
	1200	3.71	158	15.59	494	543	15.6	12,928	14.0	196	3.6	0.7	-0.2	1.8	3,260	376	386	566	377	1,240	100%	100%	50%	0%	39.5	-9
	1230	3.91	101	15.41	487	547	15.6	13,314	13.5	189	3.5	0.7	-0.2	1.8	3,280	377	401	577	378	1,248	100%	100%	50%	0%	39.5	-9
	1300	3.66	100	15.68	493	560	15.6	13,333	13.5	192	3.5	0.7	-0.2	1.8	3,320	382	399	589	383	1,268	100%	100%	50%	0%	39.5	-9
	1330	3.93	114	16.05	495	589	15.6	12,490	13.5	190	3.5	0.7	-0.2	1.9	3,310	387	384	595	388	1,301	100%	100%	50%	0%	39.5	-9
	1400	3.93	128	15.83	510	598	15.6	12,725	13.5	185	3.6	0.6	-0.2	1.8	3,340	393	390	605	394	1,312	100%	100%	50%	0%	39.5	-9
	1430	3.71	94	15.99	486	533	15.6	13,053	13.5	202	3.6	0.7	-0.2	1.8	3,230	375	394	583	376	1,241	100%	100%	50%	0%	39.5	-9
	1500	3.41	117	15.46	497	553	15.6	12,846	13.5	190	3.5	0.7	-0.2	1.9	3,240	377	390	577	377	1,260	100%	100%	50%	0%	39.5	-9
	1530	3.88	119	15.52	495	575	15.6	12,772	13.5	193	3.5	0.7	-0.2	1.8	3,260	382	397	588	382	1,287	100%	100%	50%	0%	39.5	-9
	1600	3.61	165	15.36	502	604	15.6	13,216	14.0	192	3.4	0.7	-0.2	1.7	3,333	387	386	596	389	1,267	100%	100%	50%	0%	39.5	-9
	1630	4.23	141	15.55	491	581	15.6	13,137	14.0	186	3.5	0.7	-0.2	1.8	3,275	393	396	603	394	1,292	100%	100%	50%	0%	39.5	-9
	1700	3.73	103	15.40	486	422	15.6	10,437	13.5	200	3.6	0.7	-0.2	1.8	3,220	362	391	551	369	1,225	100%	100%	50%	0%	39.5	-9
	1730	3.67	113	15.42	497	531	15.6	12,987	13.5	199	3.6	0.7	-0.2	1.8	3,270	373	384	578	376	1,264	100%	100%	50%	0%	39.5	-9
	1800	3.32	156	15.36	497	582	15.6	12,754	13.5	193	3.6	0.7	-0.2	1.7	3,230	381	390	589	384	1,284	100%	100%	50%	0%	39.5	-9
	1830	3.87	127	15.41	491	597	15.6	12,599	13.5	190	3.6	0.6	-0.2	1.8	3,260	386	383	598	389	1,274	100%	100%	50%	0%	39.5	-9
	1900	3.71	125	14.98	492	557	15.6	13,861	13.5	182	3.6	0.6	-0.2	1.8	3,270	391	394	607	394	1,282	100%	100%	50%	0%	39.5	-9
	1930	4.22	95	15.10	502	606	15.6	12,023	13.5	190	3.6	0.6	-0.2	1.8	3,320	361	392	545	371	1,180	100%	100%	50%	0%	39.5	-9
	2000	4.43	151	15.74	496	561	15.6	12,946	13.5	189	3.6	0.7	-0.2	1.8	3,260	371	395	579	375	1,203	100%	100%	50%	0%	39.5	-9
	2030	4.17	137	15.29	494	590	15.6	12,648	13.5	197	3.6	0.7	-0.2	1.8	3,280	380	388	591	384	1,238	100%	100%	50%	0%	39.5	-9
	2100	3.15	135	15.28	504	619	15.6	12,569	13.5	194	3.6	0.7	-0.2	1.8	3,290	366	384	600	391	1,245	100%	100%	50%	0%	39.5	-9
	2130	4.02	83	14.90	495	503	15.6	14,232	13.5	216	3.6	0.7	-0.2	1.8	3,270	359	397	558	371	1,166	100%	100%	50%	0%	39.5	-9
	2200	4.01	117	15.08	501	522	15.6	13,025	13.5	195	3.6	0.6	-0.2	1.8	3,290	372	388	578	376	1,191	100%	100%	50%	0%	39.5	-9
	2230	4.09	154	15.16	504	598	15.6	12,897	13.5	192	3.6	0.6	-0.2	1.6	3,290	380	396	590	384	1,217	100%	100%	50%	0%	39.5	-9
	2300	3.85	131	15.68	511	611	15.6	13,332	13.5	193	3.6	0.7	-0.3	1.7	3,240	385	384	600	389	1,230	100%	100%	50%	0%	39.5	-9
	2330	3.44	226	16.38	491	608	15.6	12,674	13.5	189	3.6	0.7	-0.3	1.8	3,290	388	398	604	392	1,255	100%	100%	50%	0%	39.5	-9
1/16/96	0000	3.76	124	15.00	506	522	15.6	13,492	14.0	192	3.5	0.6	-0.2	1.7	3,312	367	392	573	371	1,191	100%	100%	50%	0%	39.5	-9
	0030	3.54	128	15.50	504	544	15.6	13,141	14.0	186	3.5	0.7	-0.2	1.8	3,356	371	383	581	376	1,203	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	0100	2.90	130	15.60	495	495	15.6	12,738	14.0	191	3.7	0.8	-0.1	1.7	3,199	381	386	594	385	1,264	100%	100%	50%	0%	39.5	-9
	0130	3.28	168	15.10	502	502	15.6	12,512	13.5	194	3.6	0.7	-0.2	1.7	3,212	387	391	603	390	1,261	100%	100%	50%	0%	39.5	-9
	0200	3.94	171	15.67	499	499	15.8	12,326	13.5	187	3.5	0.7	-0.2	1.6	3,300	395	390	613	395	1,261	100%	100%	50%	0%	39.5	-9
	0230	3.56	190	15.70	498	498	15.6	12,813	13.5	187	3.5	0.7	-0.3	1.7	3,292	399	390	616	399	1,289	100%	100%	50%	0%	39.5	-9
	0300	3.82	128	15.30	496	496	15.6	14,861	14.0	215	3.5	0.8	-0.1	1.8	3,324	357	405	559	370	1,209	100%	100%	50%	0%	39.5	-9
	0330	3.20	125	15.50	498	498	15.6	13,019	14.0	190	3.5	0.8	-0.2	1.9	3,269	371	400	579	375	1,237	100%	100%	50%	0%	39.5	-9
	0400	3.98	125	15.90	497	497	15.6	12,871	13.5	192	3.5	0.7	-0.3	1.8	3,228	379	382	590	382	1,253	100%	100%	50%	0%	39.5	-9
	0430	3.58	141	15.00	506	506	15.6	13,242	14.0	191	3.6	0.8	-0.2	1.8	3,287	383	400	598	387	1,244	100%	100%	50%	0%	39.5	-9
	0500	3.28	135	15.00	505	621	15.6	12,917	14.0	194	3.5	0.7	-0.1	1.7	3,297	387	392	605	391	1,251	100%	100%	50%	0%	39.5	-9
	0530	2.85	169	16.00	497	636	15.6	12,975	14.0	191	3.5	0.8	-0.2	1.8	3,404	391	386	614	395	1,314	100%	100%	50%	0%	39.5	-9
	0600	4.18	97	15.40	492	471	15.8	14,069	14.0	213	3.5	0.8	-0.3	1.8	3,376	361	398	561	371	1,234	100%	100%	50%	0%	39.5	-9
	0630	3.88	129	15.50	489	539	15.6	12,668	14.0	192	3.5	0.6	-0.1	1.7	3,227	372	386	580	377	1,234	100%	100%	50%	0%	39.5	-9
	0700	3.05	144	15.10	500	580	15.6	12,947	14.0	195	3.5	0.7	-0.2	1.8	3,340	378	397	588	382	1,235	100%	100%	50%	0%	39.5	-9
	0730	3.33	134	16.00	497	598	15.6	12,932	13.5	193	3.4	0.7	-0.1	1.7	3,338	383	380	598	388	1,267	100%	100%	50%	0%	39.5	-9
	0800	3.54	152	15.98	497	618	15.6	12,903	13.6	196	3.5	0.8	-0.3	1.6	3,260	391	394	605	391	1,291	100%	100%	50%	0%	39.5	-9
	0830	3.41	162	16.33	501	623	15.6	12,589	13.5	189	3.6	0.5	-0.3	1.7	3,270	394	381	613	394	1,319	100%	100%	50%	0%	39.5	-9
	0900	3.28	154	15.13	493	528	15.6	12,995	13.5	195	3.5	0.5	-0.3	1.8	3,370	371	400	565	376	1,237	100%	100%	50%	0%	39.5	-9
	0930	3.33	145	15.95	491	563	15.6	12,209	13.5	192	3.5	0.6	-0.3	1.7	3,230	372	389	579	375	1,274	100%	100%	50%	0%	39.5	-9
	1000	3.40	125	15.53	498	574	15.6	12,642	13.5	196	3.5	0.5	-0.3	1.7	3,260	379	394	589	382	1,308	100%	100%	50%	0%	39.5	-9
	1030	3.91	152	15.63	485	567	15.6	12,192	13.5	195	3.5	0.6	-0.3	1.7	3,320	384	393	596	386	1,273	100%	100%	50%	0%	39.5	-9
	1100	3.29	142	16.09	479	610	15.6	12,770	13.5	196	3.5	0.6	-0.3	1.7	3,340	388	396	606	390	1,313	100%	100%	50%	0%	39.5	-9
	1130	3.46	149	15.22	493	605	15.6	12,012	13.5	197	3.5	0.5	-0.3	1.7	3,290	392	391	612	394	1,341	100%	100%	50%	0%	39.5	-9
	1200	4.12	116	14.83	488	497	15.6	12,609	13.5	201	3.8	0.7	0.0	1.9	3,420	374	387	569	378	1,229	100%	100%	50%	0%	39.5	-9
	1230	4.09	131	15.04	476	540	15.6	12,644	13.5	197	3.6	0.7	0.0	1.9	3,340	376	387	581	379	1,262	100%	100%	50%	0%	39.5	-9
	1300	3.47	198	15.45	474	577	15.6	12,944	13.5	201	3.5	0.7	0.0	1.8	3,310	378	403	591	383	1,221	100%	100%	50%	0%	39.5	-9
	1330	3.90	181	15.12	479	573	15.6	11,960	13.5	198	3.6	0.7	0.0	1.9	3,320	384	393	597	387	1,249	100%	100%	50%	0%	39.5	-9
	1400	3.76	191	15.78	484	596	15.6	11,969	13.5	197	3.6	0.7	0.0	1.7	3,290	389	393	605	391	1,254	100%	100%	50%	0%	39.5	-9
	1430	3.61	156	15.27	482	605	15.6	12,163	13.5	198	3.5	0.7	0.0	1.7	3,310	394	397	610	395	1,267	100%	100%	50%	0%	39.5	-9
	1500	3.90	207	15.94	485	527	15.6	12,897	13.5	211	3.6	0.7	0.0	1.8	3390	375	397	567	378	1,236	100%	100%	50%	0%	39.5	-9
	1530	3.53	165	16.05	466	561	15.6	12,142	13.5	206	3.6	0.7	-0.2	1.8	3330	377	399	582	380	1,260	100%	100%	50%	0%	39.5	-9
	1600	3.36	144	15.21	473	579	15.6	11,864	13.5	203	3.7	0.7	-0.2	1.8	3425	383	401	591	385	1,262	100%	100%	50%	0%	39.5	-9
	1630	3.37	138	15.00	490	588	15.8	12,560	13.5	198	3.7	0.7	-0.2	1.8	3440	385	391	597	387	1,294	100%	100%	50%	0%	39.5	-9
	1700	3.43	145	15.63	504	597	15.6	12,317	13.5	206	3.7	0.7	-0.2	1.8	3335	389	391	605	392	1,287	100%	100%	50%	0%	39.5	-9
	1730	3.38	137	15.13	496	577	15.6	12,830	13.5	200	3.7	0.7	-0.2	1.8	3360	392	384	612	394	1,318	100%	100%	50%	0%	39.5	-9
1/22/98	1600	2.82	322	15.40	243	636	15.6	11,296	13.5	188	2.8	0.6	-0.3	1.4	2,930	320	282	489	326	908	100%	100%	50%	0%	39.5	-9
	1630	4.01	357	14.77	222	613	15.6	12,569	14.0	197	3.3	0.5	-0.3	1.3	3,114	337	372	524	343	972	100%	100%	50%	0%	39.5	-9
	1700	3.47	600	15.39	218	623	15.6	12,133	14.0	193	3.3	0.5	-0.3	1.3	3,071	344	390	541	348	1,016	100%	100%	50%	0%	39.5	-9
	1730	3.66	927	15.85	222	623	15.6	12,323	14.0	206	3.3	0.5	-0.3	1.4	3,011	352	381	557	357	1,045	100%	100%	50%	0%	39.5	-9
	1800	3.61	526	15.53	213	611	15.6	11,971	14.0	200	3.3	0.5	-0.3	1.4	2,954	362	393	570	364	1,072	100%	100%	50%	0%	39.5	-9
	1830	3.60	679	15.49	220	626	15.6	12,128	14.0	204	3.3	0.5	-0.3	1.4	3,005	369	387	585	369	1,106	100%	100%	50%	0%	39.5	-9
	1900	2.68	789	15.63	226	649	15.6	11,505	14.0	200	3.3	0.5	-0.3	1.3	3,056	376	379	596	375	1,121	100%	100%	50%	0%	39.5	-9
	1930	4.28	343	14.17	267	629	15.6	11,077	14.0	196	4.2	0.6	-0.3	2.2	3,711	385	382	646	392	1,181	100%	100%	50%	0%	39.5	-9
	2000	4.05	142	14.86	268	558	15.6	12,888	14.0	207	3.4	0.7	-0.3	1.6	3,530	364	374	518	367	950	100%	100%	50%	0%	39.5	-9
	2030	3.77	133	14.70	273	607	15.6	11,493	14.0	198	3.6	0.7	-0.3	1.6	3,519	353	391	526	355	969	100%	100%	50%	0%	39.5	-9
		No data recorded for two hours; temperature excursion (to 650°F); burning in the convective pass?																								
	2230	3.95	143	15.26	290	624	15.6	12,374	13.0	201	3.7	1.1	-0.3	2.0	3,470	360	377	543	363	1,007	100%	100%	50%	0%	39.5	-9
	2300	3.44	134	14.41	284	471	15.6	12,680	13.5	202	3.7	0.7	-0.3	1.8	3,508	361	376	544	361	1,007	100%	100%	50%	0%	39.5	-9
	2330	4.14	193	14.88	299	563	15.6	13,155	13.5	203	3.7	0.8	-0.3	1.9	3,473	361	375	549	362	1,024	100%	100%	50%	0%	39.5	-9
1/23/98	0000	4.07	145	15.12	298	563	15.6	12,133	13.5	198	3.6	0.9	-0.2	2.1	3,470	366	373	558	365	1,043	100%	100%	50%	0%	39.5	-9
	0030	3.99	198	15.14	298	577	15.6	12,618	13.5	202	3.6	0.9	-0.2	2.1	3,390	368	379	562	367	1,048	100%	100%	50%	0%	39.5	-9
	0100	3.67	166	15.13	289	578	15.6	12,061	13.0	198	3.6	0.9	-0.2	2.1	3,450	370	383	569	370	1,069	100%	100%	50%	0%	39.5	-9
	0130	3.35	231	15.32	279	592	15.6	12,990	13.5	202	3.7	1.0	-0.3	2.1	3,410	373	368	574	371	1,083	100%	100%	50%	0%	39.5	-9
	0200	3.47	163	15.29	288	583	15.6	13,144	13.5	204	3.6	0.9	-0.3	2.1	3,420	379	380	583	375	1,099	100%	100%	50%	0%	39.5	-9
	0230	3.46	187	15.13	308	585	15.6	13,028	13.5	203	3.6	0.9	-0.3	2.1	3,390	381	382	589	378	1,107	100%	100%	50%	0%	39.5	-9
	0300	3.68	163	15.32	317	602	15.6	12,421	13.6	194	3.6	0.9	-0.3	2.1	3,350	385	379	593	381	1,114	100%	100%	50%	0%	39.5	-9
	0330	3.64	127	15.48	350	585	15.6	13,362	13.5	200	3.6	0.9	-0.3	2.1	3,420	387	386	599	384	1,126	100%	100%	50%	0%	39.5	-9
	0400	3.52	173	15.72	338	590	15.6	13,317	13.5	199	3.6	0.8	-0.3	2.1	3,450	389	375	601	386	1,139	100%	100%	50%	0%	39.5	-9
	0430	3.76	98	14.92	339	528	15.6	13,498	13.5	203	4.0	1.0	-0.3	2.0	3,580	361	387	531	364	986	100%	100%	50%	0%	39.5	-9
	0500	3.43	145	16.16	310	579	15.6	12,973	13.0	197	3.8	0.9	-0.2	2.0	3,390	356	376	535	357	1,004	100%	100%	50%	0%	39.5	-9
	0530	3.37	118	15.12	326	559	15.6	13,575	13.0	198	3.8	0.9	-0.3	2.0	3,460	359	377	546	360	1,027	100%	100%	50%	0%	39.5	-9
	0600	3.57	175	15.21	303	576	15.6	12,575	13.0	195	3.8	0.9	-0.3	2.0	3,470	363	376	552	363	1,044	100%	100%	50%	0%	39.5	-9
	0630	3.30	131	15.73	354	571	15.6	13,245	13.0	200	3.8	0.9	-0.3	2.0	3,480	366	381	567	370	1,079	100%	100%	50%	0%	39.5	-9
	0700	3.73	143	15.73	398	582	15.6	13,794	13.0	195	3.8	0.9	-0.3	2.0	3,470	373	369	546	372	1,027	100%	100%	50%	0%	39.5	-9
2/2/98	0900	2.16	19	11.10	67	NA	15.2	14,200	10.5	202	7.1	NA	NA	NA	4,200	319	NA	544	340	1,008	50%	50%	50%	NA	Back	0
(Gas firing)	0930	2.07	19	11.30	62	NA	15.2	14,700	11.0	205	4.7	NA	NA	NA	4,291	344	NA	557	356	1,045	50%	50%	100%	NA	Back	0
	1000	2.28	172	11.20	76	NA	15.2	14,000	12.5	205	5.0	NA	NA	NA	4,328	346	NA	558	363	1,083	50%	50%	25%	NA	Back	0
	1030	1.73	146	11.50	81	NA	14.8	13,400	12.5	204	6.4	NA	NA	NA	4,061	349	NA	548	359	1,020	50%	50%	50%	NA	Back	0
	1100	2.48	22	11.00	72	NA	14.8	14,200	12.5	206	6.8	NA	NA	NA	4,251	346	NA	553	360	996	50%	50%	50%	NA	Back	0
	1130	2.34	21	11.10	81	NA	14.8	14,500	10.5	207	7.0	NA	NA	NA	4,149	348	NA	553	360	1,002	50%	50%	50%	NA	Back	0
2/12/98	0530	3.91	130	14.94	301	506	15.2	12,100	13.0	203	3.4	0.7	-0.9	1.6	3,560	381	406	551	395	971	100%	100%	50%	0%	39.5	-9
	0600	3.17	122	13.52	342	524	15.2	12,700	13.0	201	3.3	0.6	-1.0	1.7	3,550	385	386	561	368	993	100%	100%	50%	0%	39.5	-9
	0630	4.11	113	13.76	378	532	15.2	11,800	13.0	199	3.3	0.7	-1.0	1.8	3,600	367	375	566	370	1,008	100%	100%	50%	0%	39.5	-9
	0700	4.15	119	13.97	355	536	15.2	12,500	13.5	201	3.4	0.7	-0.9	2.0	3,590	370	381	575	374	1,015	100%	100%	50%	0%	39.5	-9
	0730	4.11	130	14.29	387	549	15.2	13,200	12.5	203	3.4	0.6	-1.0	1.8	3,570	373	403	583	377	1,039	100%	100%	50%	0%	39.5	-9
	0800	4.28	124	13.78	382	533	15.2	12,200	12.5	196	3.3	0.6	-0.8	2.0	3,630	375	399	590	379	1,041	100%	100%	50%	0%	39.5	-9
	0830	3.90	141	15.29	373	575	15.2	11,938	13.0	192	2.7	0.4	-0.7	1.4	3,360	375	388	588	375	1,055	100%	100%	50%	0%	39.5	-9
	0900	3.70	155	15.93	409	593	15.2	13,115	13.0	200	2.7	0.4	-0.6	1.4	3,300	379	397	598	377	1,065	100%	100%	50%	0%	39.5	-9
	0930	3.30	132	15.78	407	607	15.2	13,416	13.0	201	2.7	0.3	-0.7	1.3	3,380	381	391	605	380	1,063	100%	100%	50%	0%	39.5	-9
	1000	3.90	208	15.80	393	658	15.2	14,698	13.0	191	2.7	0.4	-1.0	1.4	3,280	357	374	531	359	935	100%	100%	50%	0%	39.5	-9
	1030	3.46	116	15.45	426	576	15.2	13,239	13.0	193	2.6	0.4	-0.7	1.4	3,290	354	383	545	357	968	100%	100%	50%	0%	39.5	-9
	1100	3.54	134	15.31	397	577	15.2	13,535	13.0	199	2.7	0.4	-0.7	1.4	3,310	358	381	554	359	988	100%	100%	50%	0%	39.5	-9
	1130	3.43	171	15.46	431	611	15.2	14,168	13.0	194	2.6	0.4	-0.7	1.4	3,320	362	390	565	363	1,008	100%	100%	50%	0%	39.5	-9
	1200	3.68	124	15.48	431	593	15.2	13,892	13.0	203	2.7	0.4	-0.6	1.4	3,300	366	382	574	368	1,024	100%	100%	50%	0%	39.5	-9
	1230	3.58	160	15.65	422	611	15.2	12,958	13.0	194	2.7	0.3	-0.6	1.4	3,290	371	387	583	372	1,046	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	1300	3.75	144	15.76	449	593	15.2	13,228	13.0	194	2.6	0.3	-0.7	1.4	3,310	376	381	590	375	1,067	100%	100%	50%	0%	39.5	-9
	1330	3.45	135	15.45	411	608	15.2	11,582	13.0	184	2.7	0.3	-0.7	1.4	3,280	380	379	598	379	1,082	100%	100%	50%	0%	39.5	-9
	1400	3.38	215	14.78	427	610	15.2	14,362	13.0	197	2.6	0.3	-0.7	1.4	3,240	384	383	608	382	1,112	100%	100%	50%	0%	39.5	-9
	1430	3.54	229	15.32	412	600	15.2	13,248	13.0	190	2.7	0.3	-0.7	1.4	3,310	388	386	614	386	1,153	100%	100%	50%	0%	39.5	-9
	1500	3.37	189	14.78	418	549	15.2	14,148	13.0	203	2.7	0.3	-0.7	1.4	3,320	360	373	543	362	1,003	100%	100%	50%	0%	39.5	-9
	1530	3.60	198	15.21	454	566	15.2	11,678	13.0	192	2.8	0.3	-0.7	1.4	3,340	356	382	556	361	1,035	100%	100%	50%	0%	39.5	-9
	1600	3.73	491	14.50	433	579	15.2	13,000	13.0	188	2.7	0.5	-0.5	1.6	3,409	359	381	565	365	1,048	100%	100%	50%	0%	39.5	-9
	1630	3.99	246	15.40	423	574	15.2	13,154	13.5	195	2.7	0.3	-0.5	1.6	3,338	364	390	572	367	1,057	100%	100%	50%	0%	39.5	-9
	1700	3.49	181	14.70	424	579	15.2	12,920	13.0	191	2.8	0.4	-0.4	1.4	3,411	370	389	580	372	1,079	100%	100%	50%	0%	39.5	-9
	1730	3.16	190	14.60	441	590	15.2	11,609	13.0	186	2.8	0.5	-0.4	1.6	3,361	373	382	589	376	1,095	100%	100%	50%	0%	39.5	-9
	1800	3.51	110	15.80	443	619	15.2	12,455	13.0	188	2.6	0.3	-0.2	1.7	3,307	377	381	599	380	1,109	100%	100%	50%	0%	39.5	-9
	1830	3.34	164	15.90	447	616	15.2	12,542	13.0	191	2.8	0.5	-0.4	1.3	3,439	381	365	609	383	1,139	100%	100%	50%	0%	39.5	-9
	1900	3.01	155	16.20	468	623	15.2	12,294	13.0	191	2.7	0.6	-0.4	1.7	3,453	384	379	615	387	1,159	100%	100%	50%	0%	39.5	-9
	1930	3.67	110	15.60	439	567	15.2	13,376	14.0	195	3.0	0.6	-0.3	1.7	3,324	357	394	552	362	1,021	100%	100%	50%	0%	39.5	-9
	2000	3.37	127	15.60	449	578	15.2	11,982	13.5	185	2.6	0.5	-0.2	1.4	3,422	357	380	560	363	1,051	100%	100%	50%	0%	39.5	-9
	2030	3.62	133	15.90	460	569	15.2	13,592	13.0	185	2.7	0.5	-0.3	1.6	3,261	361	383	574	367	1,075	100%	100%	50%	0%	39.5	-9
	2100	3.64	111	15.70	447	562	15.2	13,665	13.0	188	2.8	0.6	-0.3	1.6	3,438	364	386	579	370	1,087	100%	100%	50%	0%	39.5	-9
	2130	3.49	101	15.90	448	567	15.2	12,612	13.0	187	2.6	0.6	-0.3	1.5	3,502	368	380	588	374	1,104	100%	100%	50%	0%	39.5	-9
	2200	3.68	74	15.40	477	567	15.2	13,492	13.0	195	2.7	0.6	-0.3	1.5	3,438	370	383	595	377	1,117	100%	100%	50%	0%	39.5	-9
	2230	3.73	82	15.90	474	569	15.2	13,294	13.0	189	2.8	0.4	-0.3	1.6	3,463	375	390	602	381	1,133	100%	100%	50%	0%	39.5	-9
	2300	4.09	149	15.70	438	549	15.2	12,644	13.5	188	2.7	0.6	-0.4	1.6	3,416	379	375	611	384	1,145	100%	100%	50%	0%	39.5	-9
	2330	3.99	80	15.80		559	15.2	13,143	13.5	197	2.8	0.3	-0.5	1.3	3,356	382	382	617	387	1,150	100%	100%	50%	0%	39.5	-9
2/13/96	0000	3.65	134	15.80		565	15.2	12,500	13.0	188	2.9	0.5	-0.7	1.6	3,350	387	381	623	392	1,176	100%	100%	50%	0%	39.5	-9
	0030	3.77	102	16.23		589	15.2	13,400	13.0	195	3.0	0.5	-0.7	1.7	3,400	390	375	631	394	1,192	100%	100%	50%	0%	39.5	-9
	0100	3.80	100	15.39		498	15.2	13,400	13.0	188	3.0	0.5	-0.7	1.6	3,440	355	381	544	361	1,037	100%	100%	50%	0%	39.5	-9
	0130	3.80	84	15.52		550	15.2	13,600	13.0	198	3.0	0.5	-0.8	1.7	3,400	357	374	562	363	1,060	100%	100%	50%	0%	39.5	-9
	0200	3.24	193	16.25		561	15.2	13,200	13.0	194	3.1	0.5	-0.8	1.7	3,370	363	385	572	368	1,076	100%	100%	50%	0%	39.5	-9
	0230	3.25	79	15.25	470	571	15.2	12,900	13.0	194	3.0	0.5	-0.7	1.7	3,370	369	375	582	373	1,092	100%	100%	50%	0%	39.5	-9
	0300	3.41	97	15.60	466	593	15.2	13,300	13.0	197	3.1	0.5	-0.8	1.7	3,390	373	386	592	376	1,132	100%	100%	50%	0%	39.5	-9
	0330	2.98	100	15.60	484	594	15.2	13,100	13.0	197	3.1	0.6	-0.8	1.7	3,480	377	385	603	382	1,133	100%	100%	50%	0%	39.5	-9
	0400	3.86	109	16.10	490	589	15.2	13,100	13.0	185	3.1	0.6	-0.8	1.7	3,410	380	383	610	386	1,158	100%	100%	50%	0%	39.5	-9
	0430	2.91	101	15.00	443	583	15.2	13,600	13.0	198	3.3	0.6	-0.8	1.7	3,510	384	365	616	390	1,168	100%	100%	50%	0%	39.5	-9
	0500	3.31	107	15.20	480	591	15.2	13,300	13.0	195	3.3	0.8	-0.7	1.6	3,510	387	391	621	393	1,179	100%	100%	50%	0%	39.5	-9
	0530	3.24	117	15.79	484	589	15.2	12,800	13.0	189	3.3	0.7	-0.6	1.7	3,490	390	386	627	396	1,198	100%	100%	50%	0%	39.5	-9
	0600	3.37	84	15.20	479	520	15.2	13,600	13.0	181	3.3	0.7	-0.8	1.9	3,500	354	381	550	360	1,041	100%	100%	50%	0%	39.5	-9
	0630	4.16	104	15.20	479	556	15.2	13,100	13.0	181	3.3	0.7	-0.7	1.8	3,480	357	373	563	365	1,070	100%	100%	50%	0%	39.5	-9
	0700	4.15	95	15.44	502	567	15.2	13,446	13.0	188	3.3	0.8	-0.8	2.0	3,580	362	382	574	370	1,085	100%	100%	50%	0%	39.5	-9
	0730	4.22	82	14.70	493	549	15.2	13,900	13.0	191	3.3	0.8	-0.8	1.9	3,590	365	381	583	374	1,107	100%	100%	50%	0%	39.5	-9
	0800	4.23	138	15.73	517	574	15.2	13,997	12.5	193	3.3	0.8	-0.8	2.0	3,570	369	386	590	377	1,114	100%	100%	50%	0%	39.6	-9
	0830	3.74	84	15.49	429	549	13.6	13,320	12.5	179	2.1	0.5	-0.6	1.4	3,040	369	387	577	368	1,091	100%	100%	50%	0%	39.5	-9
	0900	3.46	165	15.23	382	548	12.0	10,967	12.5	172	1.9	0.3	-0.6	0.9	2,560	365	386	580	356	1,072	100%	100%	50%	0%	39.5	-9
	0930	3.40	133	15.08	376	546	12.0	11,467	12.5	182	1.8	0.3	-0.6	0.9	2,620	368	384	572	358	1,095	100%	100%	50%	0%	39.5	-9
	1000						12.0	11,306	12.5	184	1.8	0.3	-0.6	0.9	2,550	374	378	583	362	1,120	100%	100%	50%	0%	39.5	-9
	1030	3.79	177	15.47			12.0	10,849	12.5	177	1.9	0.3	-0.6	0.9	2,620	378	389	594	367	1,143	100%	100%	50%	0%	39.5	-9
	1100	3.48	208	15.64	380	584	12.0	11,074	12.5	184	1.8	0.3	-0.6	0.9	2,600	383	377	605	371	1,162	100%	100%	50%	0%	39.5	-9
	1130	3.88	192	15.79	386	591	12.0	11,463	12.5	181	1.8	0.3	-0.6	0.9	2,810	389	378	614	377	1,178	100%	100%	50%	0%	39.5	-9
	1200	3.61	125	15.67	400	591	12.0	10,675	12.5	176	2.2	0.3	-0.6	1.2	2,590	361	380	525	351	985	100%	100%	50%	0%	39.5	-9
	1230	3.72	114	15.58	391	584	12.0	11,394	12.5	185	2.2	0.5	-0.6	1.2	2,560	353	377	536	348	1,019	100%	100%	50%	0%	39.5	-9
	1300	3.71	102	15.33	390	577	12.0	10,761	12.5	174	2.3	0.5	-0.6	1.2	2,580	356	380	543	351	1,038	100%	100%	50%	0%	39.5	-9
	1330	3.43	92	16.47	394	573	12.0	11,031	12.5	186	2.2	0.6	-0.6	1.2	2,590	360	373	555	354	1,064	100%	100%	50%	0%	39.5	-9
	1400	3.54	93	15.42	384	568	12.0	10,451	13.0	180	2.3	0.6	-0.6	1.2	2,560	365	380	561	359	1,075	100%	100%	50%	0%	39.5	-9
	1430	3.48	101	15.34	393	591	12.0	10,894	13.0	184	2.2	0.6	-0.6	1.2	2,630	371	377	570	363	1,105	100%	100%	50%	0%	39.5	-9
	1500	3.64	124	15.45	398	588	12.0	10,771	13.0	185	2.2	0.6	-0.6	1.1	2,590	377	378	579	367	1,111	100%	100%	50%	0%	39.5	-9
	1530	3.97	138	15.88	398	597	12.0	10,610	13.0	190	2.2	0.6	-0.4	1.2	2,610	381	371	586	370	1,126	100%	100%	50%	0%	39.5	-9
	1600	3.38	110	15.04	417	598	12.0	10,198	13.0	189	2.5	0.6	-0.4	1.2	2,690	384	368	599	376	1,160	100%	100%	50%	0%	39.5	-9
	1630	3.83	104	15.00	389	586	12.0	10,303	13.0	183	2.5	0.6	-0.3	1.2	2,744	388	375	605	380	1,164	100%	100%	50%	0%	39.5	-9
	1700	3.84	98	15.00	537	548	15.6	14,249	13.0	189	4.5	1.3	-0.6	2.4	3,760	388	383	556	379	1,097	100%	100%	50%	0%	39.5	-9
	1730	3.09	85	15.00	540	575	15.6	13,729	13.0	183	4.4	1.2	-0.6	2.3	3,719	387	402	574	374	1,108	100%	100%	50%	0%	39.5	-9
	1800	3.86	85	15.80	551	578	15.6	14,008	13.0	185	4.3	1.3	-0.4	2.3	3,729	389	383	583	377	1,135	100%	100%	50%	0%	39.5	-9
	1830	3.85	82	15.20	544	573	15.6	13,976	13.0	190	4.4	1.3	-0.4	2.3	3,730	373	395	591	379	1,155	100%	100%	50%	0%	39.5	-9
	1900	3.61	100	15.60	541	601	15.6	14,966	13.0	179	4.1	1.2	-0.5	2.2	3,636	376	383	594	382	1,166	100%	100%	50%	0%	39.5	-9
	1930	3.84	105	15.60	559	605	15.6	13,977	13.0	179	4.2	1.1	-0.5	2.2	3,581	378	372	602	383	1,182	100%	100%	50%	0%	39.5	-9
	2000	3.08	94	15.10	549	592	15.6	13,782	13.0	180	4.0	1.2	-0.6	2.4	3,656	382	381	608	386	1,186	100%	100%	50%	0%	39.5	-9
	2030	3.61	94	15.40	550	590	15.6	14,264	13.0	179	4.1	1.0	-0.5	2.3	3,614	383	382	615	389	1,207	100%	100%	50%	0%	39.5	-9
	2100	4.02	102	15.20	551	574	15.6	14,394	13.0	181	4.1	1.0	-0.4	2.2	3,659	366	379	570	369	1,099	100%	100%	50%	0%	39.5	-9
	2130	3.54	90	15.50	535	578	15.6	13,288	13.0	193	4.1	1.1	-0.5	2.2	3,605	370	378	582	371	1,120	100%	100%	50%	0%	39.5	-9
	2200	3.89	109	15.30	559	596	15.6	13,666	13.0	191	4.1	1.2	-0.1	2.1	3,689	375	377	592	375	1,134	100%	100%	50%	0%	39.5	-9
	2230	3.68	104	15.10	563	571	15.6	13,381	13.0	187	4.0	1.0	-0.5	2.1	3,590	379	376	597	381	1,147	100%	100%	50%	0%	39.5	-9
	2300	3.78	123	15.90	543	601	15.6	12,990	12.5	198	4.0	1.1	-0.2	2.3	3,657	383	383	606	384	1,166	100%	100%	50%	0%	39.5	-9
	2330	4.22	104	15.60	574	582	15.6	13,190	12.5	189	4.0	1.2	-0.4	2.1	3,634	385	378	611	386	1,169	100%	100%	50%	0%	39.5	-9
12/14/96	0000	4.33	96	14.53	524	556	15.6	12,800	13.0	196	4.2	1.2	-0.6	2.1	3,630	368	379	570	369	1,078	100%	100%	50%	0%	39.5	-9
	0030	3.60	156	15.54	531	585	15.6	12,600	13.0	206	4.2	1.3	-0.7	2.3	3,600	371	369	583	373	1,109	100%	100%	50%	0%	39.5	-9
	0100	4.06	105	14.69	529	580	15.6	13,100	13.0	201	4.2	1.4	-0.8	2.2	3,590	376	370	591	378	1,130	100%	100%	50%	0%	39.5	-9
	0130	3.55	95	15.00	572	580	15.6	12,700	13.0	207	4.2	1.4	-0.8	2.2	3,580	381	368	602	382	1,148	100%	100%	50%	0%	39.5	-9
	0200	3.78	110	15.60	531	595	15.6	12,500	13.0	204	4.2	1.4	-0.8	2.2	3,580	388	369	604	387	1,169	100%	100%	50%	0%	39.5	-9
	0230	3.95	270	15.60	529	603	15.6	13,500	13.0	203	4.1	1.3	-0.9	2.3	3,620	390	376	617	391	1,195	100%	100%	50%	0%	39.5	-9
	0300	4.42	75	14.80	550	444	15.6	13,900	13.0	212	4.2	1.4	-0.8	2.3	3,630	354	373	555	365	1,067	100%	100%	50%	0%	39.5	-9
	0330	3.83	87	15.00	558	559	15.6	12,800	13.0	201	4.2	1.4	-0.9	2.2	3,540	370	386	574	372	1,084	100%	100%	50%	0%	39.5	-9
	0400	3.68	114	15.40	534	581	15.6	12,800	13.0	205	4.1	1.3	-0.7	2.2	3,570	375	373	585	377	1,112	100%	100%	50%	0%	39.5	-9
	0430	3.70	139	15.30	519	590	15.6	12,800	13.0	205	4.1	1.2	-0.7	2.2	3,580	379	374	592	382	1,133	100%	100%	50%	0%	39.5	-9
	0500	3.68	108	14.80	529	589	15.6	12,600	13.0	206	4.2	1.2	-0.9	2.2	3,580	384	365	601	387	1,144	100%	100%	50%	0%	39.5	-9
	0530	3.51	130	15.50	539	601	15.6	12,400	13.0	208	4.2	1.2	-0.9	2.2	3,570	388	365	608	390	1,167	100%	100%	50%	0%	39.5	-9
	0600	3.87	115	15.40	516	609	15.6	12,300	13.0	207	4.2	1.2	-0.9	2.2	3,570	393	380	618	394	1,189	100%	100%	50%	0%	39.5	-9
	0630	3.84	79	15.10	511	471	15.6	12,100	13.0	206	4.3	1.3	-0.9	2.2	3,560	357	378	531	366	1,061	100%	100%	50%	0%	39.5	-9
	0700	3.46	197	15.78	524	586	15.6	13,115	13.0	205	3.9	1.0	-0.9	2.2	3,510	368	385	571	371	1,089	100%	100%	50%	0%	39.5	-9
	0730	4.16	97	14.80	550	570	15.6	13,500	13.0	190	4.0	1.0	-0.9	2.2	3,570	372	368	579	374	1,097	100%	100%	50%	0%	39.5	-9
	0800	3.98	126	15.37	561	592	15.6	12,743	13.0	201	3.9	1.0	-0.9	2.2	3,520	378	382	589	379	1,111	100%	100%	50%	0%	39.5	-9
	0830	3.91	110	16.18	542	591	15.6	13,047	13.0	197	3.9	1.0	-0.7	2.3	3,510	381	386	594	382	1,129	100%	100%	50%	0%	39.5	-9
	0900	3.43	225	15.77	383	580	12.0	10,337	12.5	194	2.0	0.3	-0.4	0.9	2,450	378	375	549	361	1,049	100%	100%	50%	0%	39.5	-9
	0930	3.42	96	14.88	407	585	12.0	10,433	12.5	183	2.2	0.3	-0.3	1.0	2,570	373	353	560	358	1,069	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2	CO	CO2	NOx	SO2	Firing Rate	Steam Flow	UV signal	Steam Press	Windbox P.	Static Pressure			Comb. Air	Comb.Air	Mill Air Flow	Boiler Outlet	BH. Inlet	Conv. Pass	Swirler Settings			Radial Damp	Coal Gun	Gas Gun
		(%)	(ppm)	(%)	(ppm)	(ppm)	(MM Btu/h)	(lb/h)		(psig)	(in W.C.)	Primary	Secondary	Tertiary	(scfm)	(F)	(scfm)	(F)	(F)	(F)	Primary	Secondary	Tertiary		Position	Position
	1000	3.97	124	14.77	459	565	12.0	10,822	12.5	184	2.4	0.5	-0.4	1.1	2,680	375	350	570	382	1,080	100%	100%	50%	0%	39.5	-9
	1030	4.10	133	14.74	461	570	12.0	10,764	12.5	195	2.4	0.4	-0.6	1.1	2,690	379	343	578	366	1,101	100%	100%	50%	0%	39.5	-9
	1100	4.33	242	15.71	466	593	12.0	10,089	12.5	208	2.6	0.4	-0.6	1.1	2,820	386	342	589	371	1,103	100%	100%	50%	0%	39.5	-9
	1130	4.24	130	14.44	466	577	12.0	10,012	12.5	200	2.8	0.4	-0.6	1.3	2,810	392	348	598	378	1,120	100%	100%	50%	0%	39.5	-9
	1200	3.85	126	14.47	443	585	12.0	9,586	12.5	201	2.8	0.5	-0.7	1.4	2,810	397	349	601	383	1,181	100%	100%	50%	0%	39.5	-9
	1230	4.28	80	14.19	434	499	12.0	10,823	12.5	198	2.6	0.4	-0.6	1.4	2,780	372	352	629	381	993	100%	100%	50%	0%	39.5	-9
	1300	4.58	127	14.69	458	509	12.0	9,604	12.5	198	2.5	0.5	-0.6	1.4	2,730	362	353	536	353	984	100%	100%	50%	0%	39.5	-9
	1330	4.47	95	13.77	453	499	12.0	10,526	12.5	202	2.5	0.4	-0.6	1.4	2,720	363	341	545	356	998	100%	100%	50%	0%	39.5	-9
	1400	4.45	105	14.37	444	527	12.0	9,439	12.5	200	2.5	0.4	-0.6	1.4	2,630	367	346	551	356	1,017	100%	100%	50%	0%	39.5	-9
	1430	3.99	115	14.66	425	552	12.0	10,567	12.5	196	2.5	0.4	-0.7	1.3	2,690	370	345	556	361	1,067	100%	100%	50%	0%	39.5	-9
	1500	4.47	124	14.47	454	554	12.0	9,587	12.5	193	2.5	0.4	-0.7	1.3	2,700	374	346	565	385	1,084	100%	100%	50%	0%	39.5	-9
	1530	4.11	119	14.27	459	580	12.0	10,300	13.0	204	2.5	0.5	-0.7	1.3	2,760	379	342	574	369	1,088	100%	100%	50%	0%	39.5	-9
	1600	4.45	159	14.50	483	580	12.0	9,674	13.0	184	2.6	0.4	-0.5	1.3	2,735	362	356	579	374	1,107	100%	100%	50%	0%	39.5	-9
	1630	4.44	157	14.20	492	593	12.0	9,662	13.0	186	2.6	0.5	-0.4	1.3	2,833	387	363	586	377	1,122	100%	100%	50%	0%	39.5	-9
	1700	3.40	93	14.80	518	510	15.6	12,751	13.5	203	4.4	1.2	-0.5	2.2	3,451	375	382	552	382	1,098	100%	100%	50%	0%	39.5	-9
	1730	3.43	207	14.60	527	571	15.6	13,112	13.5	198	4.4	1.2	-0.4	2.2	3,460	373	380	571	375	1,067	100%	100%	50%	0%	39.5	-9
	1800	3.74	122	14.80	555	589	15.6	13,442	13.5	205	4.5	1.3	-0.5	2.3	3,612	377	380	566	380	1,095	100%	100%	50%	0%	39.5	-9
	1830	3.34	122	15.00	572	614	15.6	13,731	13.5	198	4.5	1.3	-0.4	2.3	3,581	383	388	595	387	1,118	100%	100%	50%	0%	39.5	-9
	1900	3.86	131	14.90	582	618	15.6	13,728	13.5	196	4.5	1.2	-0.5	2.2	3,536	387	381	601	391	1,132	100%	100%	50%	0%	39.5	-9
	1930	3.72	131	15.30	563	623	15.6	13,428	13.5	200	4.6	1.2	-0.4	2.3	3,612	392	385	610	395	1,146	100%	100%	50%	0%	39.5	-9
	2000	3.78	163	15.30	541	553	15.6	13,439	13.5	204	4.4	1.1	-0.6	2.3	3,593	372	378	569	374	1,059	100%	100%	50%	0%	39.5	-9
	2030	3.69	265	15.30	545	592	15.6	12,785	13.0	202	4.3	1.1	-0.4	2.2	3,586	378	374	581	379	1,088	100%	100%	50%	0%	39.5	-9
	2100	3.88	113	15.50	554	585	15.6	12,915	12.5	205	4.3	1.2	-0.5	2.3	3,595	383	382	591	385	1,144	100%	100%	50%	0%	39.5	-9
	2130	3.81	227	15.70	544	616	15.6	13,013	12.5	204	4.3	1.2	-0.4	2.2	3,518	388	374	600	391	1,135	100%	100%	50%	0%	39.5	-9
	2200	3.95	162	15.40	549	595	15.6	12,847	12.5	205	4.4	1.0	-0.4	2.2	3,538	392	379	610	394	1,137	100%	100%	50%	0%	39.5	-9
	2230	3.97	204	15.20	650	530	15.6	13,190	13.0	195	4.4	1.1	-0.4	2.2	3,526	371	386	561	373	1,053	100%	100%	50%	0%	39.5	-9
	2300	3.83	164	15.20	584	569	15.6	12,737	13.0	199	4.5	1.2	-0.6	2.2	3,573	375	384	577	379	1,076	100%	100%	50%	0%	39.5	-9
	2330	3.97	148	15.20	552	579	15.6	13,445	13.0	202	4.4	1.2	-0.7	2.2	3,621	380	385	587	384	1,098	100%	100%	50%	0%	39.5	-9
2/15/98	0000	4.02	184	14.80	539	586	15.6	13,100	13.0	201	4.4	1.3	-0.6	2.2	3,540	388	384	596	390	1,117	100%	100%	50%	0%	39.5	-9
	0030	3.53	153	15.70	549	613	15.6	13,200	13.0	204	4.4	1.4	-0.7	2.2	3,590	391	387	603	393	1,143	100%	100%	50%	0%	39.5	-9
	0100	3.69	99	15.00	544	462	15.6	12,300	13.0	206	4.4	1.2	-0.7	2.2	3,590	359	381	530	369	1,027	100%	100%	50%	0%	39.5	-9
	0130	3.87	136	16.00	546	572	15.6	13,300	13.0	204	4.3	1.4	-0.7	2.3	3,500	371	366	570	372	1,059	100%	100%	50%	0%	39.5	-9
	0200	3.69	131	15.30	555	569	15.6	13,000	12.5	203	4.3	1.3	-0.7	2.2	3,530	376	373	581	378	1,083	100%	100%	50%	0%	39.5	-9
	0230	3.54	110	15.00	574	610	15.6	13,100	12.5	203	4.4	1.6	-0.7	2.3	3,570	382	380	591	384	1,108	100%	100%	50%	0%	39.5	-9
	0300	3.69	161	15.30	570	611	15.6	13,300	12.5	207	4.4	1.5	-0.7	2.3	3,550	386	371	590	389	1,129	100%	100%	50%	0%	39.5	-9
	0330	4.21	93	15.20	552	483	15.8	13,700	13.0	216	4.3	1.6	-0.7	2.4	3,510	356	376	539	364	1,038	100%	100%	50%	0%	39.5	-9
	0400	4.01	157	15.30	554	549	15.6	12,700	13.0	206	4.3	1.8	-0.7	2.4	3,550	371	370	571	371	1,063	100%	100%	50%	0%	39.5	-9
	0430	3.56	115	15.00	543	584	15.6	13,300	13.0	207	4.3	1.5	-0.7	2.4	3,570	378	384	581	376	1,088	100%	100%	50%	0%	39.5	-9
	0500	3.62	296	15.50	544	634	15.6	13,300	13.0	211	4.3	1.8	-0.7	2.5	3,570	384	383	593	384	1,112	100%	100%	50%	0%	39.5	-9
	0530	3.58	151	15.30	558	614	15.6	12,900	13.0	204	4.3	1.5	-0.7	2.5	3,620	390	374	600	389	1,133	100%	100%	50%	0%	39.5	-9
	0600	3.71	167	15.60	574	625	15.6	12,500	13.0	207	4.4	1.6	-0.7	2.5	3,530	394	378	608	393	1,154	100%	100%	50%	0%	39.5	-9
	0630	3.72	200	15.20	522	484	15.6	13,800	13.0	215	4.4	1.7	-0.7	2.5	3,540	361	377	540	367	1,035	100%	100%	50%	0%	39.5	-9
	0700	3.02	135	15.70	528	565	15.6	13,500	13.0	205	4.3	1.5	-0.7	2.4	3,510	373	381	572	371	1,066	100%	100%	50%	0%	39.5	-9
	0730	3.57	181	15.30	633	602	15.6	12,600	13.0	209	4.3	1.4	-0.7	2.5	3,560	379	379	584	378	1,085	100%	100%	50%	0%	39.5	-9
	0800	3.47	173	16.59	635	619	15.6	12,810	12.5	209	4.3	1.2	-0.7	2.4	3,680	387	387	595	385	1,106	100%	100%	50%	0%	39.5	-9
	0830	5.57	98	13.75	505	490	12.0	10,215	12.5	204	4.0	1.1	-0.6	2.1	3,370	389	385	589	383	1,047	100%	100%	50%	0%	39.5	-9
	0900	5.61	60	13.64	529	517	12.0	10,210	12.5	205	3.5	0.9	-0.6	1.8	3,190	386	380	583	378	1,061	100%	100%	50%	0%	39.5	-9
	0930	5.01	70	14.55	524	565	12.0	11,171	12.5	209	3.5	0.9	-0.6	1.8	3,220	388	371	596	383	1,097	100%	100%	50%	0%	39.5	-9
	1000	5.67	65	14.01	538	535	12.0	11,112	12.5	184	4.0	1.0	-0.5	1.9	3,390	390	366	596	386	1,096	100%	100%	50%	0%	39.5	-9
	1030	4.00	77	14.73	534	570	12.0	12,622	13.0	193	4.0	1.0	-0.6	1.9	3,470	390	368	603	386	1,121	100%	100%	50%	0%	39.5	-9
	1100	4.03	90	14.51	563	566	12.0	12,999	13.0	200	4.0	1.0	-0.6	1.8	3,350	395	367	609	390	1,158	100%	100%	50%	0%	39.5	-9
	1130	5.76	75	13.52	540	502	12.0	11,737	12.5	183	4.7	1.2	-0.6	2.4	3,670	371	361	527	375	1,016	100%	100%	50%	0%	39.5	-9
	1200	5.76	67	13.23	522	509	12.0	13,007	12.5	199	4.7	1.2	-0.6	2.4	3,640	369	384	572	374	1,022	100%	100%	50%	0%	39.5	-9
	1230	4.24	127	14.54	583	575	12.0	12,467	12.5	186	4.4	1.2	-0.6	2.4	3,590	371	349	573	375	1,058	100%	100%	50%	0%	39.5	-9
	1300	5.34	73	13.77	566	531	12.0	11,133	12.5	197	4.3	1.1	-0.6	2.2	3,540	375	373	576	377	1,054	100%	100%	50%	0%	39.5	-9
	1330	5.89	67	13.15	525	502	12.0	10,985	12.5	193	4.3	1.1	-0.6	2.2	3,500	378	393	581	381	1,039	100%	100%	50%	0%	39.5	-9
	1400	5.62	74	12.68	540	511	12.0	11,495	12.5	206	4.0	1.1	-0.5	2.1	3,380	380	391	589	381	1,041	100%	100%	50%	0%	39.5	-9
	1430	5.82	69	13.17	563	506	12.0	10,825	13.0	201	3.9	1.2	-0.6	2.0	3,260	381	362	584	381	1,054	100%	100%	50%	0%	39.5	-9
	1500	5.43	71	13.55	576	526	12.0	10,660	12.5	201	4.0	1.2	-0.6	2.0	3,310	381	372	587	276	1,072	100%	100%	50%	0%	39.5	-9
	1530	5.16	76	13.30	557	530	12.0	10,761	13.0	197	3.8	1.1	-0.5	2.0	3,260	383	372	592	281	1,081	100%	100%	50%	0%	39.5	-9
	1600	6.38	73	12.70	523	503	12.0	10,186	13.0	197	3.7	1.0	-0.3	2.0	3,163	385	387	592	382	1,064	100%	100%	50%	0%	39.5	-9
	1630	5.73	72	12.80	583	611	12.0	10,431	13.0	197	3.7	1.0	-0.4	2.0	3,313	385	381	600	383	1,091	100%	100%	50%	0%	39.5	-9
	1700	3.47	93	15.20	572	565	15.6	13,572	13.5	192	4.5	1.4	-0.6	2.3	3,635	369	383	563	374	1,046	100%	100%	50%	0%	39.5	-9
	1730	4.13	84	14.90	554	553	15.6	13,494	13.5	200	4.5	1.3	-0.3	2.3	3,649	373	376	578	377	1,045	100%	100%	50%	0%	39.5	-9
	1800	3.87	154	15.50	527	581	15.6	13,283	13.0	202	4.4	1.4	-0.5	2.3	3,569	378	387	586	382	1,065	100%	100%	50%	0%	39.5	-9
	1830	3.62	188	15.10	525	570	15.6	13,287	13.0	194	4.3	1.5	-0.4	2.3	3,488	384	387	596	387	1,090	100%	100%	50%	0%	39.5	-9
	1900	3.89	218	15.30	533	583	15.6	12,982	13.0	198	4.3	1.5	-0.3	2.3	3,487	390	378	606	393	1,108	100%	100%	50%	0%	39.5	-9
	1930	3.96	114	15.50	536	573	15.6	13,190	13.0	190	4.3	1.4	-0.4	2.3	3,480	397	383	614	400	1,127	100%	100%	50%	0%	39.5	-9
	2000	3.97	158	16.00	541	579	15.6	12,822	13.0	194	4.4	1.3	-0.5	2.3	3,529	372	391	574	375	1,019	100%	100%	50%	0%	39.5	-9
	2030	3.62	95	16.00	532	583	15.6	13,474	13.0	197	4.2	1.3	-0.5	2.2	3,486	376	377	584	379	1,048	100%	100%	50%	0%	39.5	-9
	2100	3.42	90	15.10	583	574	15.6	13,378	13.0	197	4.2	1.3	-0.4	2.3	3,515	383	389	595	365	1,066	100%	100%	50%	0%	39.5	-9
	2130	3.60	85	15.40	567	589	15.6	13,352	13.0	198	4.2	1.3	-0.5	2.2	3,464	388	373	504	390	1,085	100%	100%	50%	0%	39.5	-9
	2200	3.68	95	15.40	575	606	15.6	12,784	13.0	197	4.3	1.3	-0.6	2.3	3,526	392	378	612	396	1,114	100%	100%	50%	0%	39.5	-9
	2230	3.90	154	15.60	540	572	15.6	13,370	13.0	200	4.3	1.2	-0.7	2.4	3,481	370	378	566	373	1,006	100%	100%	50%	0%	39.5	-9
	2300	Lost coal feed due to screwdriver being dropped into the Redler conveyor																								
2/16/98	0430	3.76	173	15.13	442	559	15.6	12,700	13.0	197	4.3	1.7	-0.7	2.2	3,460	367	391	571	373	1,000	100%	100%	50%	0%	39.5	-9
	0500	4.41	114	15.18	443	565	15.6	12,300	12.5	211	4.3	1.7	-0.7	2.3	3,430	378	384	583	378	1,017	100%	100%	50%	0%	39.5	-9
	0530	3.51	91	15.40	430	587	15.6	12,300	12.5	204	4.3	1.5	-0.7	2.4	3,430	383	397	586	383	1,053	100%	100%	50%	0%	39.5	-9
	0600	4.01	107	14.80	445	563	15.6	12,700	12.5	205	4.3	1.6	-0.7	2.4	3,450	388	395	597	388	1,050	100%	100%	50%	0%	39.5	-9
	0630	3.85	75	14.65	443	523	15.6	16,500	13.0	212	4.4	1.7	-0.7	2.4	3,450	362	402	530	362	961	100%	100%	50%	0%	39.5	-9
	0700	3.24	89	15.40	453	571	15.6	13,000	13.0	209	4.4	1.4	-0.7	2.4	3,460	366	389	559	366	988	100%	100%	50%	0%	39.5	-9
	0730	3.96	96	15.50	461	579	15.6	12,500	12.5	200	4.3	1.3	-0.7	2.3	3,480	371	389	567	371	1,001	100%	100%	50%	0%	39.5	-9
	0800	3.93	351	15.12	451	574	15.6	13,315	12.5	204	4.1	1.2	-0.6	2.3	3,480	375	394	577	375	1,001	100%	100%	50%	0%	39.5	-9
	0830	4.35	203	15.10	448	582	15.6	12,603	12.5	204	4.1	1.2	-0.6	2.3	3,480	376	389	581	376	1,021	100%	100%	50%	0%	39.5	-9
	0900	5.60	91	13.56	410	509	12.0	10,222	12.5	200	3.0	0.7	-0.7	1.9	3,000	367	376	563	367	961	100%	100%	50%	0%	39.5	-9
	0930	5.53	91	13.41	408	514	12.0	9,836	12.5	199	2.9	0.7	-0.4	1.4	2,900	373	375	563	365	970	100%	100%	50%	0%	39.5	-9
	1000	4.58	102	13.20	415	532	12.0	10,092	13.0	198	2.8	0.7	-0.5	1.4	2,890	375	371	569	367	1,002	100%	100%	50%	0%	39.5	-9
	1030	4.70	102	13.13	419	526	12.0	11,022	13.0	188	2.8	0.7	-0.5	1.4	3,019	376	382	572	368	1,017	100%	100%	50%	0%	39.5	-9
	1100	4.66	96	13.45	411	535	12.0	10,115	13.0	191	2.9	0.7	-0.5	1.5	2,880	378	380	577	369	1,068	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
	1130	5.12	100	13.20	403	525	12.0	10,637	13.0	192	2.8	0.7	-0.5	1.4	2,860	381	364	582	373	1,072	100%	100%	50%	0%	39.5	-9
	1200	4.70	108	13.12	417	537	12.0	10,433	13.0	195	2.8	0.7	-0.5	1.4	2,910	384	378	587	376	1,086	100%	100%	50%	0%	39.5	-9
	1230	5.05	110	12.60	434	512	12.0	10,239	13.0	199	3.1	0.7	-0.4	1.4	2,990	388	386	593	379	1,102	100%	100%	50%	0%	39.5	-9
	1300	5.12	119	12.67	439	519	12.0	9,935	13.0	197	3.1	0.6	-0.5	1.4	2,930	390	386	598	382	1,120	100%	100%	50%	0%	39.5	-9
	1330	6.40	103	12.35	411	468	12.0	10,155	13.0	194	3.1	0.6	-0.5	1.4	2,890	362	381	530	358	957	100%	100%	50%	0%	39.5	-9
	1400	5.37	114	13.08	419	496	12.0	9,838	12.5	194	3.1	0.6	-0.5	1.4	2,920	357	381	536	354	988	100%	100%	50%	0%	39.5	-9
	1430	5.56	99	12.75	438	484	12.0	10,175	13.0	198	3.1	0.6	-0.4	1.4	2,930	358	382	546	357	1,000	100%	100%	50%	0%	39.5	-9
	1500	5.18	103	13.04	438	501	12.0	10,349	13.0	205	3.1	0.5	-0.4	1.4	2,930	362	382	552	360	1,022	100%	100%	50%	0%	39.5	-9
	1530	5.32	98	12.57	435	501	12.0	9,546	13.0	198	3.1	0.6	-0.4	1.4	2,940	364	381	559	363	1,032	100%	100%	50%	0%	39.5	-9
	1600	5.25	102	13.12	429	527	12.0	10,056	13.0	197	3.1	0.5	-0.4	1.4	2,871	367	383	565	366	1,061	100%	100%	50%	0%	39.5	-9
	1630	5.62	101	12.80	413	509	12.0	9,912	13.0	196	3.0	0.7	-0.4	1.4	3,001	369	373	567	368	1,079	100%	100%	50%	0%	39.5	-9
	1700	3.89	127	13.90	487	589	14.0	11,689	13.0	200	3.2	0.9	-0.3	2.0	3,187	378	379	588	381	1,150	100%	100%	50%	0%	39.5	-9
	1730	4.12	142	13.70	454	672	14.0	11,005	13.0	198	3.3	0.9	-0.3	1.9	3,244	381	385	590	383	1,155	100%	100%	50%	0%	39.5	-9
	1800	4.06	255	13.80	487	518	15.6	13,434	13.0	195	4.3	1.3	-0.6	2.3	3,562	362	390	555	370	1,066	100%	100%	50%	0%	39.5	-9
	1830	3.50	403	15.00	490	584	15.6	13,025	13.0	197	4.3	1.4	-0.6	2.4	3,652	369	388	574	375	1,110	100%	100%	50%	0%	39.5	-9
	1900	3.74	237	15.10	486	612	15.6	13,576	13.0	194	4.3	1.3	-0.5	2.3	3,609	360	384	591	387	1,097	100%	100%	50%	0%	39.5	-9
	1930	3.90	292	15.50	495	619	15.6	13,124	13.0	195	4.2	1.3	-0.5	2.4	3,526	388	401	602	394	1,116	100%	100%	50%	0%	39.5	-9
	2000	4.09	289	14.60	485	531	15.6	13,397	13.0	190	4.3	1.2	-0.5	2.3	3,589	384	390	560	370	1,029	100%	100%	50%	0%	39.5	-9
	2030	3.82	774	15.10	469	578	15.6	13,457	13.0	190	4.3	1.2	-0.6	2.3	3,531	369	393	575	376	1,054	100%	100%	50%	0%	39.5	-9
	2100	3.88	520	15.00	493	593	15.6	13,996	13.0	190	4.3	1.2	-0.4	2.3	3,521	377	372	589	384	1,077	100%	100%	50%	0%	39.5	-9
	2130	3.56	486	14.80	482	602	15.6	12,424	13.0	202	4.3	1.3	-0.6	2.3	3,461	386	369	600	392	1,105	100%	100%	50%	0%	39.5	-9
	2200	3.84	1256	15.40	479	564	15.6	13,109	13.0	196	4.3	1.3	-0.5	2.3	3,518	383	384	563	376	1,058	100%	100%	50%	0%	39.5	-9
	2230	3.64	491	15.60	465	589	15.6	13,437	13.0	204	4.3	1.2	-0.6	2.3	3,511	371	376	583	378	1,084	100%	100%	50%	0%	39.5	-9
	2300	3.52	720	15.50	478	612	15.6	13,279	13.0	202	4.3	1.3	-0.6	2.3	3,442	379	384	593	386	1,101	100%	100%	50%	0%	39.5	-9
	2330	3.66	558	15.30	473	611	15.6	13,434	13.0	193	4.3	1.2	-0.5	2.3	3,427	389	383	602	394	1,103	100%	100%	50%	0%	39.5	-9
2/17/96	0000	3.98	378	15.00	472	536	15.6	12,700	12.5	194	4.3	1.2	-0.7	2.2	3,430	366	378	570	372	1,062	100%	100%	50%	0%	39.5	-9
	0030	3.27	328	15.40	497	583	15.6	13,300	12.5	195	4.3	1.1	-0.7	2.1	3,500	377	384	586	382	1,092	100%	100%	50%	0%	39.5	-9
	0100	3.80	873	15.50	490	629	15.6	13,300	12.5	205	4.3	1.2	-0.7	2.1	3,470	386	378	597	391	1,119	100%	100%	50%	0%	39.5	-9
	0130	4.56	579	14.90	478	461	15.6	12,400	12.5	201	4.4	1.1	-0.7	2.3	3,530	352	382	536	361	1,039	100%	100%	50%	0%	39.5	-9
	0200	3.46	316	14.90	502	553	15.6	13,300	12.5	199	4.3	1.1	-0.7	2.2	3,470	366	373	571	371	1,079	100%	100%	50%	0%	39.5	-9
	0230	3.21	343	15.30	514	605	15.6	12,600	13.0	201	4.3	1.1	-0.7	2.3	3,410	378	379	587	382	1,118	100%	100%	50%	0%	39.5	-9
	0330	3.08	188	15.80	512	630	15.6	13,200	13.0	201	4.3	1.1	-0.7	2.3	3,460	385	371	597	388	1,155	100%	100%	50%	0%	39.5	-9
	0330	4.01	325	15.40	510	482	15.6	12,300	13.5	198	4.4	1.2	-0.7	2.2	3,510	351	381	530	364	1,073	100%	100%	50%	0%	39.5	-9
	0400	3.26	184	15.50	527	571	15.6	14,100	13.5	198	4.3	1.3	-0.7	2.2	3,480	362	375	566	366	1,098	100%	100%	50%	0%	39.5	-9
	0430	3.28	1926	15.90	508	612	15.6	12,600	13.0	204	4.3	1.2	-0.7	2.2	3,470	372	390	590	378	1,123	100%	100%	50%	0%	39.5	-9
	0500	3.28	272	15.20	504	597	15.6	13,600	13.0	205	4.3	1.2	-0.8	2.1	3,490	382	370	592	386	1,138	100%	100%	50%	0%	39.5	-9
	0530	3.83	797	15.10	488	492	15.6	13,800	13.5	213	4.3	1.3	-0.7	2.2	3,450	354	376	540	363	1,074	100%	100%	50%	0%	39.5	-9
	0600	3.78	1922	15.20	486	590	15.6	12,900	13.5	204	4.1	1.2	-0.7	2.1	3,490	367	374	570	371	1,105	100%	100%	50%	0%	39.5	-9
	0630	3.44	1145	15.50	480	629	15.6	13,200	13.5	205	4.2	1.3	-0.7	2.1	3,450	377	377	582	382	1,137	100%	100%	50%	0%	39.5	-9
	0700	3.48	1047	15.10	472	547	15.6	12,700	13.5	200	4.2	1.3	-0.7	2.2	3,470	386	374	590	390	1,178	100%	100%	50%	0%	39.5	-9
	0730	3.71	1583	15.50	483	473	15.6	12,300	13.0	202	4.3	1.3	-0.7	2.3	3,460	353	380	523	363	1,089	100%	100%	50%	0%	39.5	-9
	0800	4.15	85	14.90	415	483	12.0	10,100	13.0	196	2.7	0.5	-0.6	1.6	2,650	360	378	537	350	1,023	100%	100%	50%	0%	39.5	-9
	0830	3.92	94	15.30	400	510	12.0	10,500	13.0	202	2.6	0.5	-0.8	1.5	2,590	365	374	543	352	1,042	100%	100%	50%	0%	39.5	-9
	0900	3.63	115	14.80	481	528	12.0	10,100	12.5	195	3.0	0.7	-0.5	1.4	2,690	368	378	550	356	1,061	100%	100%	28%	0%	39.5	-9
	0930	3.98	223	15.10	481	551	12.0	10,500	12.6	203	3.1	0.5	-0.6	1.5	2,800	372	368	560	361	1,084	100%	100%	28%	0%	39.5	-9
	1000	4.96	124	14.50	492	544	12.0	10,800	12.5	207	3.3	0.7	-0.5	1.6	2,980	378	370	574	369	1,100	100%	100%	28%	0%	39.5	-9
	1030	5.08	153	14.50	504	560	12.0	10,000	12.5	198	3.6	0.7	-0.5	1.7	3,100	382	374	580	375	1,119	100%	100%	28%	0%	39.5	-9
	1100	3.90	1932	15.40	478	638	12.0	11,700	12.5	206	3.9	1.0	-0.5	1.8	3,160	385	341	590	380	1,156	100%	100%	28%	0%	39.5	-9
	1130	4.68	261	15.00	516	603	12.0	11,400	12.5	195	4.4	1.1	-0.5	2.1	3,390	392	385	605	393	1,165	100%	100%	28%	0%	39.5	-9
	1200	4.50	204	14.00	497	454	12.0	11,100	13.0	192	4.4	1.2	-0.3	2.2	3,341	363	380	552	367	1,043	100%	100%	28%	0%	39.5	-9
	1230	4.51	319	15.50	487	549	12.0	11,300	13.0	191	4.1	1.2	-0.2	2.0	3,145	367	376	560	369	1,058	100%	100%	28%	0%	39.5	-9
	1300	4.53	206	15.10	504	557	12.0	12,700	13.0	199	4.6	1.3	-0.3	2.4	3,287	374	373	580	377	1,088	100%	100%	28%	0%	39.5	-9
	1330	2.84	804	16.00	519	621	12.0	12,900	13.0	206	4.4	1.3	-0.2	2.1	3,472	385	370	593	388	1,126	100%	100%	28%	0%	39.5	-9
	1400	2.83	230	15.90	534	611	12.0	11,800	13.0	202	4.4	1.3	-0.2	2.2	3,414	384	367	601	395	1,136	100%	100%	28%	0%	39.5	-9
	1430	4.53	130	13.77	551	528	12.0	12,800	13.0	208	4.5	1.2	-0.4	2.4	3,411	365	391	560	366	1,068	100%	100%	28%	0%	39.5	-9
	1500	5.33	80	14.00	567	516	12.0	11,000	12.5	196	4.4	1.4	-0.2	2.3	3,428	369	395	565	369	1,081	100%	100%	28%	0%	39.5	-9
	1530	4.23	111	14.80	582	558	12.0	12,300	13.0	208	4.5	1.4	-0.1	2.2	3,517	372	390	577	374	1,115	100%	100%	28%	0%	39.5	-9
	1600	6.03	87	13.10	554	499	12.0	10,700	13.0	204	4.6	1.3	-0.2	2.3	3,371	374	395	575	375	1,092	100%	100%	28%	0%	39.5	-9
	1630	6.51	88	13.30	552	488	12.0	10,300	13.0	195	4.5	1.3	-0.2	2.3	3,523	377	391	575	377	1,099	100%	100%	28%	0%	39.5	-9
	1700	4.69	92	14.50	580	551	12.0	11,300	13.0	208	4.4	1.2	-0.4	2.2	3,372	376	374	582	377	1,142	100%	100%	28%	0%	39.5	-9
	1730	5.84	89	13.30	526	516	12.0	9,800	13.0	204	3.9	0.9	-0.1	1.6	3,117	378	393	573	374	1,114	100%	100%	28%	0%	39.5	-9
	1800	4.77	97	14.80	555	555	12.0	10,300	13.0	203	3.7	0.8	-0.2	1.4	2,969	379	388	574	373	1,128	100%	100%	28%	0%	39.5	-9
	1830	5.54	86	13.60	593	522	12.0	10,200	13.0	209	3.5	0.8	-0.3	1.5	3,015	380	387	575	374	1,120	100%	100%	28%	0%	39.5	-9
	1900	5.45	85	14.30	652	532	12.0	9,500	12.5	205	3.5	0.9	-0.2	1.6	2,952	382	387	578	376	1,129	100%	100%	28%	0%	39.5	-9
	1930	5.47	87	14.10	678	525	12.0	9,400	12.5	203	3.5	0.8	-0.1	1.5	3,029	384	383	581	378	1,120	100%	100%	28%	0%	39.5	-9
	2000	5.43	105	14.60	742	554	12.0	9,700	12.5	204	3.5	0.9	-0.3	1.7	3,039	386	390	585	380	1,143	100%	100%	28%	0%	39.5	-9
	2030	5.06	101	14.40	755	532	12.0	9,800	12.5	203	3.5	0.8	-0.2	1.7	3,015	387	385	587	381	1,119	100%	100%	28%	0%	39.5	-9
	2100	5.30	122	13.50	742	458	12.0	9,700	13.0	196	3.4	0.8	-0.1	1.7	3,064	387	388	531	381	1,012	100%	100%	28%	0%	39.5	-9
	2130	5.60	112	13.50	747	488	12.0	9,600	13.0	200	3.5	0.8	0.1	1.7	3,085	381	391	541	357	1,031	100%	100%	28%	0%	39.5	-9
	2200	5.57	116	13.70	508	508	12.0	10,100	12.0	208	3.6	0.8	-0.2	1.6	2,984	381	382	547	359	1,042	100%	100%	28%	0%	39.5	-9
	2230	5.70	147	13.60	476	516	12.0	9,600	12.5	200	3.6	0.7	-0.2	1.6	2,965	363	386	549	361	1,079	100%	100%	28%	0%	39.5	-9
	2240	Boiler shut down due to ash plugging the convective pass entrance; end of continuous/deposition test																								
2/18/95	2300	5.70	163	14.15	343	504	16.0	14,900	13.0	163	4.8	1.8	-0.6	2.4	3,896	334	351	531	351	956	100%	100%	28%	0%	39.5	-9
	2330	5.27	197	13.51	301	515	16.0	15,200	13.0	163	5.3	1.7	-0.6	2.3	3,854	342	378	535	358	959	100%	100%	28%	0%	39.5	-9
2/19/96	0000	4.54	178	14.30	329	564	16.0	15,600	12.0	163	5.4	1.7	-0.6	2.4	3,790	350	372	543	362	997	100%	100%	28%	0%	39.5	-9
	0030	4.13	185	15.00	326	575	16.0	15,000	12.5	166	4.2	1.1	-0.7	2.3	3,720	352	369	552	364	1,005	100%	100%	28%	0%	39.5	-9
	0100	3.75	184	15.00	325	579	16.0	16,100	12.0	156	4.3	1.1	-0.7	2.3	3,600	356	370	545	363	1,011	100%	100%	28%	0%	39.5	-9
	0130	4.28	180	14.10	336	569	16.0	15,900	12.0	156	4.4	1.0	-0.6	2.3	3,780	357	367	554	364	1,034	100%	100%	28%	0%	39.5	-9
	0200	3.74	254	15.00	273	578	15.2	14,300	12.0	160	3.4	0.9	-0.6	1.7	3,230	357	382	540	359	994	100%	100%	28%	0%	39.5	-9
	0230	4.27	429	15.20	301	577	15.2	15,100	12.5	152	3.3	1.0	-0.5	2.0	3,260	360	389	544	357	1,008	100%	100%	28%	0%	39.5	-9
	0300	3.98	207	15.30	298	585	15.2	15,300	13.0	156	3.5	0.8	-0.5	1.8	3,280	362	381	553	360	1,034	100%	100%	28%	0%	39.5	-9
	0330	3.80	240	15.60	300	586	15.2	15,600	13.0	154	3.3	1.0	-0.5	1.8	3,270	366	395	557	363	1,045	100%	100%	28%	0%	39.5	-9
	0400	3.98	214	15.20	282	582	15.2	15,100	12.5	156	3.4	0.6	-0.6	1.6	3,290	366	379	564	364	1,048	100%	100%	50%	0%	39.5	-9
	0430	3.24	167	15.40	333	563	15.2	16,000	12.5	155	3.4	0.5	-0.5	1.7	3,290	347	387	523	348	975	100%	100%	50%	0%	39.5	-9
	0500	3.98	160	15.40	318	562	15.2	14,300	13.0	161	3.1	0.6	-0.6	1.7	3,260	351	390	533	352	979	100%	100%	50%	0%	39.5	-9
	0530	3.52	161	15.60	309	564	15.2	15,900	13.0	154	3.3	0.7	-0.6	1.7	3,230	353	401	537	354	997	100%	100%	50%	0%	39.5	-9
	0600	3.75	176	15.10	330	580	15.2	15,700	12.5	154	3.2	0.9	-0.6	1.8	3,270	358	398	548	357	1,024	100%	100%	50%	0%	39.5	-9
	0630	3.17	174	15.70	333	588	15.2	16,000	13.0	155	3.2	0.8	-0.6	1.8	3,270	360	385	553	360	1,026	100%	100%	50%	0%	39.5	-9

Table B-1. Burner Characterization Summary

Date	Time	O2 (%)	CO (ppm)	CO2 (%)	NOx (ppm)	SO2 (ppm)	Firing Rate (MM Btu/h)	Steam Flow (lb/h)	UV signal	Steam Press (psig)	Windbox P. (in W.C.)
	0700	3.61	433	15.60	336	614	15.2	16,100	12.5	152	3.2
	0730	4.65	274	14.20	243	516	12.0	13,600	13.0	141	2.4
	0800	4.85	180	14.69	283	516	12.0	13,700	12.5	137	2.3
	0830	4.81	210	14.72	282	523	12.0	13,300	12.5	143	2.3
	0900	4.82	192	14.87	295	531	12.0	14,019	12.5	144	2.3
	0930	5.13	214	14.15	286	529	12.0	13,214	13.0	145	2.3
	1000	4.70	204	14.19	291	542	12.0	12,462	13.0	150	2.4
	1030	4.34	226	15.02	314	573	12.0	10,320	13.0	170	2.3
	1100	4.71	296	14.51	293	578	12.0	8,980	13.0	205	2.3
	1130	4.28	321	14.78	299	599	12.0	9,713	13.0	205	2.3
	1200	4.60	269	14.08	295	573	12.0	9,558	13.0	200	2.3
	1230	5.03	126	14.52	307	448	12.0	9,898	12.5	207	2.3
	1300	5.54	220	14.72	297	460	12.0	9,396	13.0	196	2.2
	1330	5.49	173	14.59	299	479	12.0	9,868	13.0	203	2.3
	1400	4.65	163	13.92	291	495	12.0	9,560	13.0	205	2.1
	1430	4.79	158	14.97	308	537	12.0	9,567	13.0	212	2.0
	1500	4.67	160	14.24	319	544	12.0	9,453	12.5	205	2.0
	1530	4.92	186	14.20	302	533	12.0	9,471	13.0	202	2.0
	1600	4.09	235	15.10	312	578	12.0	9,273	13.0	209	2.0
	1630	4.52	187	14.50	313	570	12.0	8,889	13.0	209	2.0

Time	Static Pressure Primary	Static Pressure Secondary	Static Pressure Tertiary	Comb. Air (acfm)	Comb. Air (F)	Mill Air Flow (acfm)	Boiler Outlet (F)	BH. Inlet (F)	Conv. Pass (F)	Swirler Settings Primary	Swirler Settings Secondary	Swirler Settings Tertiary	Radial Damp	Coal Gun Position	Gas Gun Position
0700	0.6	-0.6	1.6	3,250	366	395	560	364	1,056	100%	100%	50%	0%	39.5	-9
0730	0.7	-0.6	1.6	2,690	363	384	527	350	972	100%	100%	50%	0%	39.5	-9
0800	0.5	-0.5	1.2	2,710	358	394	538	346	996	100%	100%	50%	0%	39.5	-9
0830	0.5	-0.5	1.2	2,660	361	384	543	349	1,015	100%	100%	50%	0%	39.5	-9
0900	0.5	-0.5	1.2	2,690	366	394	552	353	1,023	100%	100%	50%	0%	39.5	-9
0930	0.5	-0.3	1.2	2,700	370	397	556	357	1,032	100%	100%	50%	0%	39.5	-9
1000	0.4	-0.3	1.2	2,740	374	389	567	360	1,045	100%	100%	50%	0%	39.5	-9
1030	0.4	-0.3	1.2	2,680	380	396	579	364	1,064	100%	100%	50%	0%	39.5	-9
1100	0.4	-0.2	1.2	2,720	390	382	592	372	1,086	100%	100%	50%	0%	39.5	-9
1130	0.4	-0.2	1.2	2,640	396	389	600	377	1,112	100%	100%	50%	0%	39.5	-9
1200	0.4	-0.3	1.2	2,690	400	395	606	381	1,117	100%	100%	50%	0%	39.5	-9
1230	0.4	-0.3	1.2	2,740	370	397	511	356	883	100%	100%	50%	0%	39.5	-9
1300	0.4	-0.3	1.2	2,690	358	399	517	347	909	100%	100%	50%	0%	39.5	-9
1330	0.4	-0.3	1.2	2,640	356	395	530	348	946	100%	100%	50%	0%	39.5	-9
1400	0.4	-0.3	1.2	2,640	361	394	545	352	960	100%	100%	50%	0%	39.5	-9
1430	0.4	-0.3	1.2	2,620	366	377	552	355	986	100%	100%	50%	0%	39.5	-9
1500	0.4	-0.3	1.2	2,740	371	380	561	360	1,002	100%	100%	50%	0%	39.5	-9
1530	0.4	-0.3	1.2	2,690	375	396	565	364	1,013	100%	100%	50%	0%	39.5	-9
1600	0.4	-0.2	1.1	2,691	380	382	576	369	1,036	100%	100%	50%	0%	39.5	-9
1630	0.4	-0.2	1.2	2,733	383	393	580	371	1,042	100%	100%	50%	0%	39.5	-9

Appendix C. Summary of Micronized Coal-Fired Testing

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	8/9/95	8/9/95	8/23/95	8/24/95	8/25/95	8/28/95	8/29/95	8/30/95	8/31/95	9/5/95	10/9/95
	Low-NOx	High Comb. Eff									
	Prim. Closed	Prim. Open	Prim. Open	Prim. Open	Prim. Closed	Prim. Open	Prim. Open	Prim. Open	Prim. Open	Prim. Open	Prim. 100%
	Sec. Closed	Sec. Closed	Sec. 70%	Sec. Open	Sec. Closed	Sec. Open	Sec. Open	Sec. Open	Sec. Open	Sec. 50%	Sec. 100%
	Tert. Open	Tert. Closed	Ter. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Gas Gun -8.5"	Gas Gun -8.5"	Gas Gun 3"	Gas Gun -9"	Gas Gun -9"	Gas Gun -9"	Gas Gun -9"	Gas Gun -9"	Gas Gun -9"	Gas Gun -9"	Radial 0%
	C. Gun 42.25"	C. Gun 42.25"	C. Gun 32"	C. Gun -10.5"	C. Gun -11"	C. Gun -10.5"	C. Gun -10.5"	C. Gun -10.5"	C. Gun -10.5"	C. Gun -10.5"	Gas Gun-9
WATER/STEAM SIDE											C. Gun -9.5
Steam flow rate; lb/h	13,466	14,367	13,467	14,417	14,378	14,039	13,938	14,139	13,601	13,122	13,218
Water temperature into boiler; °F	218	219	208	207	207	206	206	208	207	199	209
Drum pressure; psig	191	186	187	183	187	187	183	186	186	191	193
Calorimeter temperature; °F	313	312	302	301	301	300	301	302	302	301	300
Steam temperature; °F	386	384	373	371	372	372	371	373	372	374	372
Steam quality; %	100.1	100.1	99.5	99.5	99.5	99.4	99.5	99.5	99.5	99.4	99.4
Blowdown rate; lb/h	3,027	2,985	2,994	2,967	2,999	2,997	2,966	2,989	2,988	3,030	3,041
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140;15.7	1,140;15.7	1,140;15.7	1,140;15.7	1,140;15.8	1,140;15.8	1,140;15.8	1,140;15.8	1,140;15.8	1,098;15.3	1,140;15.7
Boiler outlet temperature; °F	588	607	549	539	594	562	561	566	571	571	569
Gas temperature leaving air heater; °F	403	414	378	378	400	386	389	390	391	389	388
Air temperature entering air heater; °F	177	183	175	171	166	168	177	173	175	171	162
Air temperature leaving air heater; °F	427	436	404	395	421	406	406	406	411	403	400
Air temperature into boiler; °F	404	415	382	377	399	383	387	385	389	377	375
Ash content of particulate; %	47.55	61.61	30.82	49.94	45.02	47.90	50.20	53.13	50.95	61.08	40.50
Coal combustion efficiency; %	94.1±1.2	97.2±0.5	89.2±1.3	95.3±0.6	94.5±0.6	94.3±1.1	95.4±0.2	95.9±0.8	95.5±0.4	97.5±0.8	93.3±0.7
Combustion air flow; lb/h	14,615	14,011	14,403	14716	14,442	14,693	14,694	14,935	14,639	14,031	14,623
Boiler draft; in H2O	0.04	0.03	0.05	-0.04	-0.01	-0.02	-0.03	-0.03	-0.04	-0.02	0.06
Boiler efficiency; %	83.42	85.72	80.34	84.7	83.46	83.84	84.77	85.01	84.46	86.21	82.39
Mill air flow rate; acfm,lb/h	341;1,480	326;1,393	356;1,555	360;1,572	359;1,574	388;1,701	356;1,549	390;1,688	392;1,722	369;1,629	379; 1,706
Mill outlet temperature; °F	231	243	211	206	206	197	201	220	188	230	222
EMISSIONS											
O2; %	3.5	2.7	3.4	3.8	3.3	3.5	3.6	3.8	3.5	3.5	3.5
CO; ppm;lb/MMBtu@3%O2	238;0.21	149;0.12	258;0.23	146;0.13	178;0.15	129;0.12	166;0.15	114;0.10	118;0.11	119;0.10	224; 0.20
CO2; %	15.8	16.5	15.6	15.0	15.3	15.4	15.4	15.3	15.6	15.9	14.9
SO2; ppm;lb/MMBtu@3%O2	512;1.04	552;1.03	583;1.16	485;1.01	529;1.05	474;0.97	511;1.04	538;1.13	478;0.99	540;1.08	541; 1.10
NOx; ppm;lb/MMBtu@3%O2	371;0.54	684;0.92	281;0.40	443;0.66	439;0.63	385;0.56	361;0.53	325;0.49	341;0.51	474;0.68	298; 0.44
MISCELLANEOUS DATA											
Maximum load											
(based on 14,700 lb steam/h); %	91.6	97.7	91.6	98.1	97.8	95.5	94.8	96.2	92.5	89.3	89.9

Footnote: Highlighted columns are subperiods within test periods.

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	10/11/95	10/11/95	10/12/95	10/12/95	10/13/95	10/13/95	10/16/95	10/16/95	10/16/95	10/16/95	10/16/95
			Test #1	Test #2	Test #3	Test #4	Test #5	Test #6	Test #7	Test #8	Test #9
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 50%	Prim. 50%	Prim. 50%	Prim. 50%	Prim. 0%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 40%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 0%	Radial 25%	Radial 0%	Radial 100%	Radial 25%	Radial 50%	Radial 0%	Radial 100%	Radial 25%	Radial 50%	Radial 0%
	Gas Gun-9	Gas Gun-9	Gas Gun-9	Gas Gun-9	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5
WATER/STEAM SIDE	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9.5	C. Gun -9	C. Gun 39.5	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9
Steam flow rate; lb/h	12,063	11,923	11,907	11,540	12,017	11,890	11,446	11,928	12,104	12,102	12,268
Water temperature into boiler; °F	210	209	208	208	208	209	209	209	209	209	210
Drum pressure; psig	197	194	193	192	195	193	195	193	193	193	193
Calorimeter temperature; °F	301	301	300	300	300	301	301	301	301	300	301
Steam temperature; °F	374	374	373	373	300	301	374	373	373	373	373
Steam quality; %	99.4	99.4	99.4	99.4	99.3	99.4	99.4	99.4	99.4	99.4	99.4
Blowdown rate; lb/h	3,079	3,050	3,046	3,036	3,055	3,041	3,061	3,047	3,044	3,047	3,041
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140;15.7	1,140;15.7	1,140;15.8	1,140;15.8	1,140;15.8	1,140;15.8	1,140;16.0	1,140;16.0	1,140;16.0	1,140;16.0	1,140;16.0
Boiler outlet temperature; °F	561	558	564	563	572	568	565	577	584	581	575
Gas temperature leaving air heater; °F	386	386	387	388	388	392	379	386	391	391	388
Air temperature entering air heater; °F	167	168	167	175	160	172	152	143	147	148	145
Air temperature leaving air heater; °F	399	396	398	403	398	403	394	397	403	399	395
Air temperature into boiler; °F	375	375	374	380	375	383	369	375	381	379	376
Ash content of particulate; %	50.17	55.53	56.43	41.08	53.50	50.12	55.60	47.12	56.97	57.94	65.09
Coal combustion efficiency; %	95.1±0.8	96.1±0.5	96.6±0.5	93.8±1.1	95.5±0.4	94.9±0.4	96.2±0.7	94.6±0.9	96.5±0.4	96.7±0.2	97.6±0.5
Combustion air flow; lb/h	14,818	14,896	15,045	14,819	14,735	14,927	14,882	14,766	14,552	14,998	14,862
Boiler draft; in H2O	-0.02	-0.03	0.00	-0.01	0.00	-0.02	-0.01	-0.01	-0.01	-0.01	0.00
Boiler efficiency; %	84.27	84.79	85.26	83.17	84.6	84.03	85.08	83.59	84.91	85.01	85.72
Mill air flow rate; acfm,lb/h	392; 1,759	391; 1,740	363; 1,623	352; 1,557	356; 1,593	378; 1,664	379; 1,703	376; 1,702	382; 1,708	382; 1,696	380; 1,697
Mill outlet temperature; °F	221	235	226	239	235	232	217	218	219	223	225
EMISSIONS											
O2; %	3.7	3.8	3.7	3.4	3.5	3.7	3.6	3.5	3.3	3.8	3.6
CO; ppm;lb/MMBtu@3%O2	137; 0.13	129; 0.12	112;0.10	301; 0.27	124; 0.11	148; 0.14	128; 0.11	200; 0.18	131; 0.11	140; 0.13	118; 0.11
CO2; %	16.0	15.8	16.1	15.7	16.0	15.7	15.6	15.2	15.1	14.6	14.9
SO2; ppm;lb/MMBtu@3%O2	537; 1.12	532; 1.12	546; 1.15	532; 1.09	542; 1.10	519; 1.08	520; 1.07	516; 1.00	532; 1.04	507; 1.06	499; 0.92
NOx; ppm;lb/MMBtu@3%O2	380; 0.57	387; 0.59	301; 0.45	309;0.45	482; 0.71	390; 0.59	441; 0.65	430; 0.62	559; 0.79	459; 0.69	543; 0.80
MISCELLANEOUS DATA											
Maximum load (based on 14,700 lb steam/h); %	82.1	81.1	81.0	78.5	81.7	80.9	77.9	81.1	82.3	82.3	83.5

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	10/17/95	10/17/95	10/17/95	10/17/95	10/17/95	10/18/95	10/18/95	10/18/95	10/18/95	10/18/95	10/19/95
	Test #10	Test #11A	Test #11B	Test #13	Test #14	Test # 15	Test # 16	Test # 17	Test #18	Test #19	Test #21
	Prim. 0%	Prim. 0%	Prim. 0%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 50%	Sec. 50%	Sec. 50%	Sec. 0%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 100%	Radial 75%	Radial 25%	Radial 0%	Radial 100%	Radial 25%	Radial 50%	Radial 0%	Radial 25%	Radial 50%	Radial 0%
	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5
WATER/STEAM SIDE	C. Gun -9.5	C. Gun -9.5	C. Gun -9.5	C. Gun -9.5	C. Gun -9.5	C. Gun 38.75	C. Gun 38.75	C. Gun 38.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
Steam flow rate; lb/h	12,042	12,003	12,066	12,056	11,849	12,061	11,735	12,045	12,132	12,183	12,355
Water temperature into boiler; °F	210	209	209	209	209	208	209	209	209	209	209
Drum pressure; psig	192	191	191	190	191	192	190	188	189	188	184
Calorimeter temperature; °F	301	300	299	299	299	Not Measured	300	300	300	299	299
Steam temperature; °F	373	372	372	372	372	NM	372	372	372	371	369
Steam quality; %	99.4	99.4	99.3	99.3	99.3	Not Determin.	99.4	99.4	99.4	99.3	99.4
Blowdown rate; lb/h	3,035	3,029	3,030	3,022	3,025	NM	3,017	3,004	3,012	3,000	2,970
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140;15.9	1,140;15.9	1,140;16.0	1,140;16.0	1,140;16.0	1,140;16.0	1,140;16.0	1,140;16.0	1,140;15.9	1,140;15.9	1,140;16.1
Boiler outlet temperature; °F	577	587	580	576	592	572	565	569	581	578	577
Gas temperature leaving air heater; °F	387	389	393	394	395	381	379	388	397	392	391
Air temperature entering air heater; °F	144	141	155	159	155	152	137	159	163	156	145
Air temperature leaving air heater; °F	396	399	401	401	406	NM	388	396	403	400	395
Air temperature into boiler; °F	377	379	382	383	385	385	369	377	383	381	376
Ash content of particulate; %	52.37	48.57	50.15	60.19	55.56	47.80	42.38	58.12	65.85	56.67	70.84
Coal combustion efficiency; %	96.1±0.5	95.7±0.4	96.2±0.3	97.5±0.2	96.9	95.8±0.2	94.8±0.3	97.3±0.4	97.9±0.2	96.8±0.2	98.2±0.3
Combustion air flow; lb/h	14,823	14,863	14,663	14,966	14,723	14,749	14,840	14,549	14,843	14,749	14,864
Boiler draft; in H2O	-0.01	-0.01	-0.01	0.00	-0.02	-0.15	-0.01	-0.01	-0.01	-0.01	-0.01
Boiler efficiency; %	84.7	84.47	84.62	85.31	84.99	85.50	83.85	85.76	86.04	85.45	86.3
Mill air flow rate; acfm,lb/h	378; 1,712	381; 1,715	389; 1,734	394; 1,763	384; 1,716	376;1,708	383; 1,750	371; 1,664	377; 1,671	377; 1,671	385; 1,731
Mill outlet temperature; °F	219	219	221	214	213	220	215	220	226	226	220
EMISSIONS											
O2; %	3.7	3.7	3.4	3.8	3.5	3.7	3.6	3.4	3.8	3.6	3.5
CO; ppm;lb/MMBtu@3%O2	275; 0.25	282; 0.26	178; 0.16	154; 0.14	238; 0.21	173;0.16	269; 0.24	149; 0.13	149; 0.14	149; 0.13	135; 0.12
CO2; %	15.5	15.5	14.9	14.5	14.8	14.5	15.5	15.5	15.3	15.5	15.5
SO2; ppm;lb/MMBtu@3%O2	498; 1.03	511; 1.06	502; 1.00	497; 1.03	538; 1.08	507;1.04	492; 1.00	513; 1.02	516; 1.07	490; 1.00	499; 1.01
NOx; ppm;lb/MMBtu@3%O2	389; 0.58	443; 0.66	454; 0.65	484; 0.72	458; 0.66	383;0.57	369; 0.54	479; 0.68	463; 0.69	390; 0.57	534; 0.78
MISCELLANEOUS DATA											
Maximum load											
(based on 14,700 lb steam/h); %	81.9	81.7	82.1	82.0	80.6	82.0	79.8	81.9	82.5	82.9	84.0

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	10/19/95	10/19/95	10/19/95	10/20/95	10/20/95	10/20/95	10/24/95	10/24/95	10/25/95	10/25/95	10/30/95
											Continuous/
							385 cfm mill	345 cfm mill	305 cfm mill	395 cfm mill	Deposition
	Test #22	Test #25	Test #29	Test #30	Test #33	Test #34	0900-1200	1230-1955	0830-1400	1430-1959	0600-0800
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 0%
	Tert. 50%	Tert. 100%	Tert. 75%	Tert. 75%	Tert. 25%	Tert. 25%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 25%
	Radial 25%	Radial 0%	Radial 0%	Radial 25%	Radial 0%	Radial 25%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9.5	Gas Gun -9
WATER/STEAM SIDE	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.75	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
Steam flow rate; lb/h	12,298	12,283	12,131	12,065	12,251	12,285	11,882	12,056	12,117	12,369	11,719
Water temperature into boiler; °F	209	209	210	211	211	211	209	209	207	209	210
Drum pressure; psig	185	183	184	185	184	183	166	167	166	168	159
Calorimeter temperature; °F	298	298	300	300	300	299	296	296	295	293	292
Steam temperature; °F	369	369	371	372	371	371	363	363	362	362	359
Steam quality; %	99.3	99.3	99.4	99.4	99.4	99.4	99.4	99.4	99.3	99.2	99.2
Blowdown rate; lb/h	2,980	2,963	2,970	2,981	2,968	2,962	2,825	2,832	2,822	2,839	2,765
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140;16.1	1,140;15.9	1,140;15.9	1,140;15.9	1,140;15.9	1,140;15.9	1,140;16.0	1,140;16.0	1,140;16.0	1,140;16.0	1,140;15.9
Boiler outlet temperature; °F	575	573	573	577	575	583	569	571	572	580	559
Gas temperature leaving air heater; °F	391	396	393	395	394	396	386	390	384	392	375
Air temperature entering air heater; °F	157	167	165	160	158	157	158	160	140	145	149
Air temperature leaving air heater; °F	396	399	400	401	399	400	394	392	382	391	384
Air temperature into boiler; °F	376	381	381	383	380	380	368	370	361	370	358
Ash content of particulate; %	61.36	65.59	67.28	62.07	72.75	72.75	54.51	63.14	64.00	73.30	41.90
Coal combustion efficiency; %	97.2±0.3	97.6±0.3	97.8±0.3	97.5±0.2	98.5±0.2	98.6±0.1	97.2±0.6	97.8±0.3	97.7±0.4	98.5±0.2	94.5±0.9
Combustion air flow; lb/h	14,879	14,647	14,774	14,808	14,726	14,621	14832	14,982	14,983	14,811	14,765
Boiler draft; in H2O	-0.02	-0.02	-0.02	-0.01	0.00	-0.01	0.00	-0.01	-0.01	-0.01	-0.02
Boiler efficiency; %	85.67	86.08	86.32	85.92	86.65	86.87	85.66	86.08	86.07	86.69	84.23
Mill air flow rate; acfm,lb/h	372; 1,655	375; 1,645	386; 1,687	379; 1,673	379; 1,675	383; 1,673	385; 1,731	344; 1,530	306; 1,366	395; 1,760	377; 1,684
Mill outlet temperature; °F	228	238	231	225	227	229	191	224	231	214	NM
EMISSIONS											
O2; %	3.5	3.5	3.6	3.7	3.6	3.4	3.5	3.7	3.7	3.5	3.7
CO; ppm;lb/MMBtu@3%O2	141; 0.13	143; 0.13	115; 0.10	148; 0.13	113; 0.10	122; 0.11	131; 0.12	122; 0.11	154; 0.14	93; 0.08	161; 0.14
CO2; %	15.6	15.5	15.4	15.4	15.5	15.6	15.6	15.4	15.3	15.8	15.5
SO2; ppm;lb/MMBtu@3%O2	508; 1.03	502; 1.01	487; 0.99	495; 1.02	473; 0.96	494; 0.99	496; 1.01	500; 1.04	483; 1.00	501; 1.02	513; 1.05
NOx; ppm;lb/MMBtu@3%O2	436; 0.64	456; 0.66	468; 0.69	442; 0.65	582; 0.85	543; 0.79	426; 0.62	522; 0.78	534; 0.80	538; 0.78	356; 0.53
MISCELLANEOUS DATA											
Maximum load											
(based on 14,700 lb steam/h); %	83.7	83.6	82.5	82.1	83.3	83.6	80.8	82.0	82.4	84.1	79.7

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	10/30/95 Continuous/ Deposition 1830-2330	10/31/95 Continuous/ Deposition 0003-0800	10/30 1830 to 10/31 0800 hr	10/31/95 Continuous/ Deposition 0830-1400	10/31/95 Continuous/ Deposition 1430-1930	10/31/95 Continuous/ Deposition 2000-2330	11/1/95 Continuous/ Deposition 0010-0800	10/31 0830 to 11/1 0800 hr	11/1/95 Continuous/ Deposition 2200-2330	11/2/95 Continuous/ Deposition 0001-0930	11/1 2200h to 11/2 0930 hr
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 0%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 25%	Tert. 25%	Tert. 25%	Tert. 25%	Tert. 25%	Tert. 25%	Tert. 25%	Tert. 25%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 50%	Radial 50%	Radial 50%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun -9	C. Gun -9	C. Gun -9
WATER/STEAM SIDE											
Steam flow rate; lb/h	12,059	12,232	12,165	12,166	12,217	12,294	12,275	12,238	11,815	11,892	11,882
Water temperature into boiler; °F	209	209	209	209	208	209	210	209	210	209	209
Drum pressure; psig	181	203	195	200	201	203	203	202	204	203	203
Calorimeter temperature; °F	298	302	300	302	301	301	302	302	302	301	301
Steam temperature; °F	368	377	374	377	376	377	378	377	378	377	377
Steam quality; %	99.4	99.4	99.4	99.4	99.3	99.3	99.4	99.4	99.4	99.3	99.3
Blowdown rate; lb/h	2,946	3,123	3,055	3,102	3,110	3,122	3,125	3,115	3,131	3,125	3,126
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140;15.7	1,140;15.7	1,140;15.7	1,140;15.8	1,140;15.8	1,140;16.0	1,140;15.9	1,140;15.9	1,140;15.9	1,140;15.6	1,140;15.6
Boiler outlet temperature; °F	566	575	572	572	572	571	572	572	556	570	568
Gas temperature leaving air heater; °F	383	388	386	390	392	390	392	391	382	388	387
Air temperature entering air heater; °F	150	144	146	143	151	152	148	148	155	157	157
Air temperature leaving air heater; °F	389	389	389	388	390	390	390	390	387	394	393
Air temperature into boiler; °F	366	368	367	369	371	370	371	370	366	373	372
Ash content of particulate; %	55.00	70.70	62.27	74.60	76.00	78.30	76.70	76.38	53.80	55.00	54.83
Coal combustion efficiency; %	96.0±0.6	98.2±0.3	97.0±1.4	98.5±0.1	98.7	98.8±0.0	98.5±0.1	98.6±0.1	96.6	96.7±0.6	96.7±0.5
Combustion air flow; lb/h	14,361	14,634	14,529	14,672	14,498	14,772	14,632	14,634	14,831	14,683	14,703
Boiler draft; in H2O	-0.02	-0.01	-0.01	0.02	-0.04	-0.05	0.01	-0.01	-0.04	-0.06	-0.06
Boiler efficiency; %	84.72	86.05	85.54	86.69	86.91	86.91	86.51	86.71	84.59	85.55	85.42
Mill air flow rate; acfm,lb/h	295; 1,329	306; 1,380	302; 1,360	372; 1,658	367; 1,634	364; 1,619	363; 1,633	366; 1,637	323; 1,431	326;1,445	326;1,443
Mill outlet temperature; °F	269	270	270	250	250	250	244	248	247	245	245
Burner metal temperature;°F	Not Measured (NM)	NM	NM	NM	NM	NM	NM	NM	NM	547	547
EMISSIONS											
O2; %	3.3	3.6	3.5	3.6	3.5	3.5	3.5	3.5	3.7	3.5	3.5
CO; ppm;lb/MMBtu@3%O2	161; 0.14	124; 0.11	138; 0.12	81; 0.07	91; 0.08	86; 0.08	107; 0.09	94; 0.08	129; 0.12	150;0.13	147;0.13
CO2; %	15.9	15.7	15.8	15.6	15.8	15.8	15.7	15.7	15.7	15.7	15.7
SO2; ppm;lb/MMBtu@3%O2	514; 1.02	491; 1.01	500; 1.01	379; 0.78	409; 0.82	472; 0.96	497; 1.00	444; 0.90	508; 1.05	506;1.02	506;1.03
NOx; ppm;lb/MMBtu@3%O2	483; 0.69	573; 0.85	538; 0.79	510; 0.75	529; 0.76	560; 0.82	573; 0.83	545; 0.79	410; 0.61	430;0.63	427;0.62
MISCELLANEOUS DATA											
Maximum load (based on 14,700 lb steam/h); %	82.0	83.2	82.8	82.8	83.1	83.6	83.5	83.2	80.4	80.9	80.8

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	11/2/95	11/2/95	11/3/95	11/2 1030h	11/3/95	11/3/95	11/4/95	11/4/95	11/5/95	11/5/95	11/5/95
	Continuous/	Continuous/	Continuous/	to 11/3	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/
	Deposition	Deposition	Deposition	1200 hr	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition
	1030-1300	1330-2300	0000-1200		1230-1800	1830-2330	0000-1000	1030-2330	0000-0430	0500-1300	1330-2330
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 50%	Radial 50%	Radial 50%	Radial 50%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun -9
WATER/STEAM SIDE											
Steam flow rate; lb/h	11,773	11,723	11,729	11,731	12,022	11,934	11,771	11,813	11,733	11,847	11,792
Water temperature into boiler; °F	207	205	209	207	208	210	211	209	209	210	209
Drum pressure; psig	202	201	200	201	201	200	202	201	202	202	200
Calorimeter temperature; °F	300	299	300	300	302	302	302	301	300	300	299
Steam temperature; °F	376	375	376	376	377	378	379	377	377	377	377
Steam quality; %	99.3	99.2	99.3	99.3	99.4	99.4	99.4	99.3	99.3	99.3	99.2
Blowdown rate; lb/h	3,112	3,103	3,099	3,102	3,110	3,102	3,113	3,107	3,114	3,111	3,098
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140;15.6	1,140;15.6	1,140;15.9	1,140; 15.7	1,140;15.9	1,140;15.9	1,140;15.6	1,140;15.6	1,140;15.6	1,140;15.6	1,140;15.6
Boiler outlet temperature; °F	564	565	572	568	573	577	579	576	578	578	577
Gas temperature leaving air heater; °F	387	386	386	386	386	385	384	382	383	383	385
Air temperature entering air heater; °F	162	162	158	160	148	139	136	135	133	133	140
Air temperature leaving air heater; °F	396	397	401	399	396	392	395	394	394	395	396
Air temperature into boiler; °F	377	378	382	380	377	374	376	375	375	376	378
Ash content of particulate; %	50.80	50.80	51.20	50.99	67.00	70.00	62.90	62.50	61.50	61.00	56.90
Coal combustion efficiency; %	96.4	96.4±0.4	96.1±0.8	96.3±0.6	98.2±0.3	98.4±0.3	97.7±0.3	97.2±0.2	97.3±0.2	97.2±0.2	96.6±0.2
Combustion air flow; lb/h	14,483	14,628	14,706	14,651	14,745	14,837	14,851	14,575	14,593	14,591	14,552
Boiler draft; in H2O	-0.01	-0.02	-0.02	-0.02	0.00	0.00	0.00	-0.02	-0.02	-0.02	-0.02
Boiler efficiency; %	85.22	85.37	85.11	85.23	86.68	86.84	86.13	85.78	85.67	85.56	85.10
Mill air flow rate; acfm,lb/h	405;1,798	392;1,738	390;1,730	392;1,740	393;1,737	363;1,601	370;1,668	367;1,673	362;1,666	370;1,707	374;1,722
Mill outlet temperature; °F	220	233	235	233	236	247	235	225	225	220	214
Burner metal temperature;°F	559	607	639	618	650	639	652	655	668	670	672
EMISSIONS											
O2; %	3.7	3.5	3.6	3.6	3.6	3.7	3.7	3.5	3.5	3.5	3.5
CO; ppm;lb/MMBtu@3%O2	160;0.14	172; 0.15	174;0.15	172;0.15	122;0.11	132;0.12	101;0.09	119;0.11	135;0.12	210;0.11	130;0.12
CO2; %	15.4	15.6	15.6	15.6	15.6	15.5	15.6	15.8	15.7	15.7	15.6
SO2; ppm;lb/MMBtu@3%O2	492;1.02	483;0.97	479;0.97	482;0.98	479;0.98	486;1.01	468; 0.97	4640.94	4410.89	4560.92	485;0.98
NOx; ppm;lb/MMBtu@3%O2	398;0.59	413;0.60	406;0.59	408;0.59	519;0.76	549;0.82	562;0.84	523;0.76	492;0.72	503;0.73	481;0.70
MISCELLANEOUS DATA											
Maximum load											
(based on 14,700 lb steam/h); %	80.1	79.7	79.8	79.8	81.8	81.2	80.1	80.4	79.8	80.6	80.2

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	11/6/95 Continuous/ Deposition 0004-0600	11/6/95 Continuous/ Deposition 0600-1235	11/3 1830h to 11/6 1235 hr	11/13/95 Continuous operation 1635-2230	11/14/95 Continuous operation 0304-1508	11/14/95 Continuous operation 1513-2319	11/13 1330 to 11/14 2230 hr	11/16/95 Continuous operation 0310-1203	11/16/95 Continuous operation 1209-2350	11/17/95 Continuous operation 2355-1416	11/16 0310 to 11/17 1416 hr
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun -9	C. Gun -9	C. Gun -9	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
WATER/STEAM SIDE											
Steam flow rate; lb/h	11,737	11,876	11,810	12,038	12,101	12,110	12,089	11,934	11,705	11,740	11,778
Water temperature into boiler; °F	209	206	209	208	207	208	208	208	209	209	209
Drum pressure; psig	200	200	201	206	206	205	206	206	205	204	205
Calorimeter temperature; °F	299	300	300	301	301	302	301	303	302	302	302
Steam temperature; °F	376	376	377	377	377	378	377	379	378	378	378
Steam quality; %	99.2	99.3	99.3	99.3	99.3	99.4	99.3	99.4	99.4	99.4	99.4
Blowdown rate; lb/h	3,098	3,100	3,106	3,141	3,141	3,140	3,141	3,144	3,261	3,128	3,177
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140;15.6	1,140;15.6	1,140;15.6	1,140;16.0	1,140;16.1	1,140;16.1	1,140;16.1	1,140;16.0	1,140;16.0	1,140;15.8	1140; 15.9
Boiler outlet temperature; °F	577	578	577	557	558	570	561	553	563	566	562
Gas temperature leaving air heater; °F	384	383	384	375	376	382	378	373	381	383	380
Air temperature entering air heater; °F	136	137	136	142	140	137	140	142	145	141	143
Air temperature leaving air heater; °F	394	394	394	387	387	391	388	383	396	395	392
Air temperature into boiler; °F	376	375	376	365	366	372	368	359	374	375	371
Ash content of particulate; %	54.40	54.60	60.42	54.06	58.18	60.34	57.89	53.66	53.91	58.34	55.65
Coal combustion efficiency; %	96.3±0.3	96.4±0.5	97.2±0.7	96.1±0.7	97.3±0.3	97.3±0.3	97.0±0.6	96.9±0.6	96.9±0.4	97.2±0.5	97.0±0.5
Combustion air flow; lb/h	14,692	14,684	14,662	15,002	15,122	15,080	15,081	15,141	15,050	14,842	14,989
Boiler draft; in H2O	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.03	-0.02	-0.03	-0.03	-0.03
Boiler efficiency; %	84.81	84.93	85.60	84.85	85.91	85.57	85.56	85.69	85.34	85.65	85.56
Mill air flow rate; acfm,lb/h	379;1,752	367;1,683	369;1,687	388;1,762	386; 1,727	379;1,738	384;1,737	386; 1,737	400; 1,824	388; 1,759	392; 1,776
Mill outlet temperature; °F	211	222	224	219	227	219	223	228	219	220	222
Burner metal temperature;°F	663	668	661	566	571	607	581	575	590	571	578
EMISSIONS											
O2; %	3.6	3.5	3.6	3.6	3.7	3.6	3.6	3.7	3.7	3.6	3.7
CO; ppm;lb/MMBtu@3%O2	134;0.12	150;0.13	136;0.11	114; 0.10	143; 0.13	112; 0.10	127; 0.11	106; 0.10	139; 0.13	128; 0.12	126; 0.11
CO2; %	15.6	15.5	15.6	15.5	15.5	15.8	15.6	15.6	15.6	15.6	15.6
SO2; ppm;lb/MMBtu@3%O2	510;1.03	480;0.97	473;0.96	493; 1.02	449; 0.93	170; 0.35	463; 0.96	478; 1.00	467 0.97	506 1.05	486; 1.01
NOx; ppm;lb/MMBtu@3%O2	489;0.71	500;0.73	514;0.75	389; 0.58	408; 0.61	328; 0.49	379; 0.56	375; 0.56	430; 0.64	454 0.67	426; 0.63
MISCELLANEOUS DATA											
Maximum load (based on 14,700 lb steam/h); %	79.8	80.8	80.3	81.9	82.3	82.4	82.2	81.2	79.6	79.9	80.1

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	11/22/95	11/28/95	11/29/95	11/30/95	12/13/95	12/14/95	12/14/95	12/15/95	12/15/95	12/16/95	12/16/95
					Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/
	400 acfm	400 acfm	320 acfm	320 acfm	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition
	1630-2230	1045-1500	1145-1535	1006-1645	1620-0016	0022-1245	1251-0036	0041-1603	1607-0013	0019-1210	1216-0009
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun 39.5	C. Gun 39.5	C. Gun 36.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
WATER/STEAM SIDE											
Steam flow rate; lb/h	12,716	12,397	12,434	12,431	12,657	12,721	12,690	12,891	12,272	12,693	12,733
Water temperature into boiler; °F	208	208	209	208	210	208	209	213	219	219	219
Drum pressure; psig	205	203	204	202	205	205	205	202	203	198	196
Calorimeter temperature; °F	NM	303	303	303	302	301	302	305	310	310	310
Steam temperature; °F	NM	378	379	378	379	378	378	381	387	386	385
Steam quality; %	ND	99.4	99.4	99.5	99.4	99.3	99.4	99.6	99.8	99.9	99.9
Blowdown rate; lb/h	3,136	3,120	3,128	3,118	3,141	3,136	3,135	3,113	3,119	3,086	3,066
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140; 15.9	1,140;16.0	1,140; 15.9	1,140; 16.1	1,140; 15.5	1,140; 15.5	1,140; 15.6	1,140; 15.6	1,140; 15.6	1,140; 15.4	1,140; 15.6
Boiler outlet temperature; °F	575	561	567	565	563	566	563	571	567	573	580
Gas temperature leaving air heater; °F	376	373	371	373	370	376	375	385	388	390	391
Air temperature entering air heater; °F	140	141	137	141	124	134	140	151	159	157	152
Air temperature leaving air heater; °F	387	388	390	395	381	388	390	398	403	405	407
Air temperature into boiler; °F	371	362	364	371	357	367	370	317	385	386	388
Ash content of particulate; %	50.95	42.78	40.50	45.22	59.35	66.35	63.56	66.32	59.82	64.88	69.30
Coal combustion efficiency; %	95.1±0.3	94.6±0.4	94.6±0.5	95.0±0.5	96.9±0.5	97.5±0.4	97.6±0.2	98.0±0.2	97.0±0.3	98.3±0.4	98.5±0.4
Combustion air flow; lb/h	15,248	15,365	15,032	15,393	14,863	14,514	14,239	14,482	14,629	14,625	14,616
Boiler draft; in H2O	-0.05	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.02	-0.03	-0.03
Boiler efficiency; %	84.37	83.11	83.90	84.00	85.90	86.18	86.50	86.52	85.80	86.53	86.63
Mill air flow rate; acfm,lb/h	388; 1,720	389;1,747	312;1,389	331;1,484	372;1,640	376;1,673	370;1,631	374;1,630	383;1,661	377;1,665	378;1,664
Mill outlet temperature; °F	228	213	228	237	238	225	228	234	220	213	213
Burner metal temperature;°F	547	515	478	544	534	571	576	589	628	630	642
EMISSIONS											
O2; %	4.1	4.0	3.7	4.0	4.1	3.6	3.2	3.5	3.7	3.5	3.7
CO; ppm;lb/MMBtu@3%O2	136; 0.13	228; 0.22	329; 0.30	523; 0.49	71; 0.07	82; 0.07	99; 0.09	108; 0.10	201; 0.18	199; 0.18	202; 0.18
CO2; %	15.2	15.2	15.4	15.2	15.3	15.7	16.0	16.0	15.5	15.6	15.6
SO2; ppm;lb/MMBtu@3%O2	486; 1.05	510; 1.10	501; 1.05	465; 1.00	513; 1.11	525; 1.08	529; 1.04	513; 1.04	542; 1.13	551; 1.12	539; 1.12
NOx; ppm;lb/MMBtu@3%O2	424; 0.66	381; 0.59	385; 0.58	350; 0.54	397; 0.62	471; 0.70	481;0.68	520; 0.76	444; 0.66	476; 0.69	497; 0.74
MISCELLANEOUS DATA											
Maximum load											
(based on 14,700 lb steam/h); %	86.5	84.3	84.6	84.6	86.1	86.5	86.3	87.7	83.5	86.3	86.6

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	12/17/95	12/17/95	12/18/95	12/18/95	12/19/95	12/13 1620	1/9/96	1/9/96	1/10/96	1/11/96	1/12/96
	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	to 12/19	Continuous/	Continuous/	Continuous/	Continuous/	Continuous
	Deposition	Deposition	Deposition	Deposition	Deposition	0820 hr	Deposition	Deposition	Deposition	Deposition	Deposition
	0015-1228	1233-0013	0019-1240	1244-0021	0027-0820		0714-1730	1800-0100	2030-1238	1244-0020	0025-1205
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
WATER/STEAM SIDE											
Steam flow rate; lb/h	12,674	12,430	12,676	12,586	12,144	12,626	13,368	14,555	17,249	16,386	12,461
Water temperature into boiler; °F	220	219	219	219	218	216	218	219	219	219	218
Drum pressure; psig	197	196	194	198	198	200	194	196	150	155	200
Calorimeter temperature; °F	310	310	309	310	310	307	309	311	300	300	310
Steam temperature; °F	385	385	384	385	385	383	384	385	364	366	386
Steam quality; %	99.9	99.9	99.9	99.9	99.9	99.7	99.9	100.0	99.7	99.7	99.9
Blowdown rate; lb/h	3,072	3,070	3,052	3,080	3,085	3,095	3,054	3,065	2,682	2,724	3,095
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140; 15.4	1,140; 15.3	1,140; 15.4	1,140; 15.4	1,140; 15.3	1,140; 15.5	1,116; 14.9	1,188; 16.8	1,188; 16.1	1,140; 15.4	1,140; 15.4
Boiler outlet temperature; °F	578	578	581	580	576	573	574	582	570	581	584
Gas temperature leaving air heater; °F	389	391	389	388	387	385	381	391	382	382	384
Air temperature entering air heater; °F	148	154	146	149	147	147	139	138	121	128	133
Air temperature leaving air heater; °F	405	409	406	406	403	401	401	402	397	395	404
Air temperature into boiler; °F	386	391	387	387	384	374	380	382	276	375	384
Ash content of particulate; %	65.67	56.73	51.44	64.45	66.85	63.07	56.32	51.82	61.72	71.61	65.87
Coal combustion efficiency; %	98.5±0.5	97.2±0.3	97.2±0.4	98.4±0.2	98.2±0.2	97.8±0.6	97.7±0.3	97.2±0.6	98.3±0.6	98.9±0.1	98.2±0.5
Combustion air flow; lb/h	14,417	14,382	14,394	14,278	14,145	14,459	13,866	14,746	15,265	14,703	14,582
Boiler draft; in H2O	-0.02	-0.03	-0.03	-0.01	-0.03	-0.03	-0.03	-0.02	-0.05	-0.05	-0.05
Boiler efficiency; %	86.59	85.53	85.84	86.60	86.72	86.30	86.16	85.68	86.42	87.05	86.66
Mill air flow rate; acfm,lb/h	382;1,696	382;1,706	379;1,671	376;1,679	374;1,642	377;1,668	385; 1,173	380; 1,681	380; 1,691	381; 1,664	381; 1,655
Mill outlet temperature; °F	212	210	215	205	211	219	238	240	237	245	243
Burner metal temperature;°F	642	652	655	631	631	616	607	586	598	610	633
EMISSIONS											
O2; %	3.7	3.7	3.7	3.5	3.5	3.6	3.4	3.1	3.7	3.9	3.8
CO; ppm;lb/MMBtu@3%O2	301; 0.27	336; 0.30	453; 0.41	176; 0.16	167; 0.15	203; 0.18	143; 0.13	231; 0.19	128; 0.12	90; 0.08	134; 0.12
CO2; %	15.6	15.5	15.6	15.9	15.8	15.7	15.6	15.9	15.4	15.2	15.5
SO2; ppm;lb/MMBtu@3%O2	536; 1.11	539; 1.09	495; 1.03	563; 1.15	557; 1.13	533; 1.09	559; 1.13	566; 1.06	553;1.16	571; 1.20	561; 1.18
NOx; ppm;lb/MMBtu@3%O2	469; 0.70	426;0.62	420; 0.63	451; 0.66	447; 0.65	463; 0.68	423; 0.62	488; 0.66	467; 0.70	499; 0.77	470; 0.71
MISCELLANEOUS DATA											
Maximum load (based on 14,700 lb steam/h); %	86.2	84.6	86.2	85.6	82.6	85.9	90.9	99.0	117.3	111.5	84.8

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	1/12/96	1/13/96	1/13/96	1/14/96	1/14/96	1/15/96	1/15/96	1/16/96	1/16/96	1/9 0714	2/12/96
	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	to 1/16	Continuous/
	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition	1733 hr*	Deposition
	1209-0001	0006-1233	1255-0006	0010-1203	1207-0010	0015-1205	1210-0014	0018-1206	1210-1733		0530-1149
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
WATER/STEAM SIDE											
Steam flow rate; lb/h	12,697	12,612	12,295	12,300	12,317	12,790	12,723	12,581	12,364	12,535	12,560
Water temperature into boiler; °F	219	218	219	219	217	218	220	220	219	219	218
Drum pressure; psig	196	197	198	201	199	194	191	193	202	197	197
Calorimeter temperature; °F	310	310	310	310	311	310	309	309	310	310	310
Steam temperature; °F	385	386	386	386	386	384	383	384	387	386	385
Steam quality; %	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	100	99.9
Blowdown rate; lb/h	3,065	3,074	3,079	3,104	3,087	3,050	3,024	3,044	3,111	3,074	3,077
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140; 15.3	1,140; 15.3	1,140; 15.4	1,140; 15.2	1,140; 15.4	1,140; 15.3	1,140; 15.2	1,140; 15.2	1,140; 15.4	1,141; 15.5	1,140; 15.3
Boiler outlet temperature; °F	580	587	582	586	583	589	578	587	592	583	570
Gas temperature leaving air heater; °F	381	385	387	391	393	392	387	390	394	387	371
Air temperature entering air heater; °F	136	141	146	149	161	150	141	139	147	140	135
Air temperature leaving air heater; °F	402	409	411	413	417	415	409	411	412	407	396
Air temperature into boiler; °F	382	389	391	394	398	396	390	391	393	378	373
Ash content of particulate; %	52.62	51.14	54.86	63.47	52.47	59.53	54.37	53.22	52.83	57.83	44.03
Coal combustion efficiency; %	96.7±0.8	97.5±0.2	98.1±0.3	98.5±0.1	97.5±0.4	98.4±0.2	97.9±0.1	97.9±0.1	97.8±0.0	97.9±0.7	96.8±0.5
Combustion air flow; lb/h	14,502	14,583	14,445	14,308	14,283	14,377	14,322	14,297	14,238	14,528	14,687
Boiler draft; in H2O	-0.05	-0.06	-0.06	-0.06	-0.07	-0.05	-0.06	-0.05	-0.04	-0.05	-0.09
Boiler efficiency; %	85.57	86.22	86.89	86.57	85.87	86.89	86.59	86.59	86.47	86.44	85.57
Mill air flow rate; acfm,lb/h	378; 1,645	383; 1,667	387; 1,669	391; 1,695	386; 1,677	387; 1,657	391; 1,683	393; 1,683	394; 1,684	385; 1,672	388; 1,691
Mill outlet temperature; °F	237	237	260	230	237	241	235	236	235	240	228
Burner metal temperature;°F	629	639	638	626	646	640	647	653	650	630	592
EMISSIONS											
O2; %	3.7	3.8	3.6	3.7	3.4	3.7	3.7	3.7	3.6	3.7	3.7
CO; ppm;lb/MMBtu@3%O2	165; 0.15	179; 0.17	197; 0.18	155; 0.14	230; 0.20	148; 0.13	182; 0.17	185; 0.17	172; 0.15	166; 0.15	165; 0.15
CO2; %	15.4	15.7	16.3	14.9	15.3	15.4	15.4	15.5	15.5	15.5	14.9
SO2; ppm;lb/MMBtu@3%O2	566; 1.18	499; 1.06	408; 0.84	562; 1.17	564; 1.14	557; 1.16	560; 1.17	568; 1.18	569; 1.17	545; 1.13	562; 1.20
NOx; ppm;lb/MMBtu@3%O2	396; 0.60	378; 0.58	491; 0.73	493; 0.74	438; 0.64	472; 0.71	495; 0.74	492; 0.73	483; 0.59	464; 0.69	388; 0.60
MISCELLANEOUS DATA											
Maximum load (based on 14,700 lb steam/h); %	86.4	85.8	83.6	83.7	83.8	87.0	86.6	85.6	84.1	91.2	85.4

* Periods 1/9/96 1800-0100 hrs, 1/10/96 2030-1238 hrs, and 1/11/96 1244-0020 hrs not used in averaging steam flow, drum pressure, calorimeter temperature, steam temperature, steam quality, and blowdown rate due to low steam pressure

Table C-1. Summary of Micronized Coal-Fired Testing

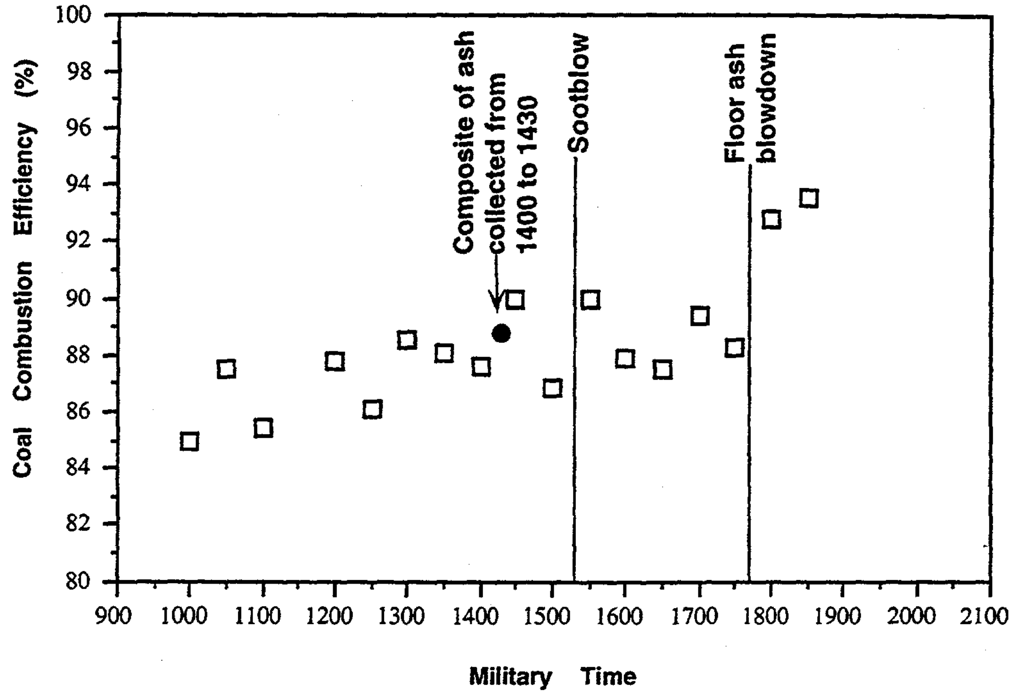
TEST/DESCRIPTION:	2/12/96 Continuous/ Deposition 1157-2346	2/12/96 Continuous/ Deposition 2352-0800	2/12 0530 to 2/13 0800 hr	2/13/96 Continuous/ Deposition 0830-1630	2/13/96 Continuous/ Deposition 1700-2348	2/13/96 Continuous/ Deposition 2353-0830	2/13 1700 to 2/14 0830 hr	2/14/96 Continuous/ Deposition 0900-1630	2/14/96 Continuous/ Deposition 1700-2340	2/14/96 Continuous/ Deposition 2344-0800	2/14 1700 to 2/15 0800 hr
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%
	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
WATER/STEAM SIDE			15.2 MMBtu/h	12.0 MMBtu/h			15.7 MMBtu/h	12.1 MMBtu/h			15.7 MMBtu/h
Steam flow rate; lb/h	13,071	13,062	12,945	11,041	13,874	12,610	13,165	10,105	12,954	12,492	12,698
Water temperature into boiler; °F	219	219	219	219	218	216	217	218	218	218	218
Drum pressure; psig	192	191	193	182	186	202	195	197	200	204	202
Calorimeter temperature; °F	309	309	309	305	308	311	310	309	311	311	311
Steam temperature; °F	383	383	383	379	381	387	384	385	386	387	387
Steam quality; %	99.9	99.9	99.9	99.7	99.9	99.9	99.9	99.8	99.9	99.9	99.9
Blowdown rate; lb/h	3,035	3,028	3,043	2,953	2,990	3,110	3,057	3,078	3,096	3,126	3,113
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	1,140; 15.2	1,140; 15.2	1,140; 15.2	900; 12.0	1,170; 15.8	1,170; 15.7	1,170; 15.7	900; 12.1	1,170; 15.7	1,170; 15.7	1,170; 15.7
Boiler outlet temperature; °F	584	583	580	571	590	579	584	565	583	568	575
Gas temperature leaving air heater; °F	378	381	377	367	387	384	385	370	388	384	386
Air temperature entering air heater; °F	130	130	131	145	134	140	137	159	146	148	147
Air temperature leaving air heater; °F	401	401	400	405	402	402	402	408	406	404	405
Air temperature into boiler; °F	379	380	378	385	382	383	383	388	387	384	385
Ash content of particulate; %	50.50	53.16	49.77	55.50	54.99	54.17	54.53	58.25	54.99	54.17	54.54
Coal combustion efficiency; %	97.2±0.4	97.3±0.3	97.1±0.4	97.6±0.4	98.1±0.1	98.1±0.1	98.1±0.1	98.5±0.2	98.2±0.1	97.1±0.3	97.6±0.6
Combustion air flow; lb/h	14,341	14,451	14,458	11,434	15,150	15,240	15,201	11,955	15,148	15,122	15,134
Boiler draft; in H2O	-0.09	-0.09	-0.09	-0.02	-0.04	-0.06	-0.05	-0.04	-0.04	-0.04	-0.04
Boiler efficiency; %	86.03	86.00	85.91	86.52	86.43	86.43	86.43	86.79	86.53	87.76	87.21
Mill air flow rate; acfm,lb/h	385; 1,699	381; 1,658	377; 1,671	377; 1,626	380; 1,633	375; 1,620	377; 1,626	347; 1,488	379; 1,623	377; 1,629	378; 1,626
Mill outlet temperature; °F	233	233	232	240	240	239	239	250	241	237	239
Burner metal temperature;°F	673	661	649	578	653	652	652	740	659	651	655
EMISSIONS											
O2; %	3.4	3.5	3.5	3.6	3.7	3.9	3.8	4.2	3.8	3.7	3.7
CO; ppm;lb/MMBtu@3%O2	183; 0.17	141; 0.13	166; 0.15	156; 0.14	124; 0.12	152; 0.14	140, 0.13	168; 0.17	200; 0.19	214; 0.20	208; 0.19
CO2; %	252.0	15.6	121.9	15.5	15.2	15.2	15.2	14.6	15.1	15.3	15.2
SO2; ppm;lb/MMBtu@3%O2	581; 1.20	556; 1.16	569; 1.19	576; 1.21	581; 1.23	563; 1.22	571; 1.23	556; 1.25	575; 1.24	558; 1.19	566; 1.21
NOx; ppm;lb/MMBtu@3%O2	429; 0.64	439; 0.66	422; 0.63	392; 0.59	552; 0.84	532; 0.83	541; 0.84	445; 0.72	552; 0.85	545; 0.83	548; 0.84
MISCELLANEOUS DATA											
Maximum load (based on 14,700 lb steam/h); %	88.9	88.9	88.1	75.1	94.4	85.8	89.6	68.7	88.1	85.0	86.4

Table C-1. Summary of Micronized Coal-Fired Testing

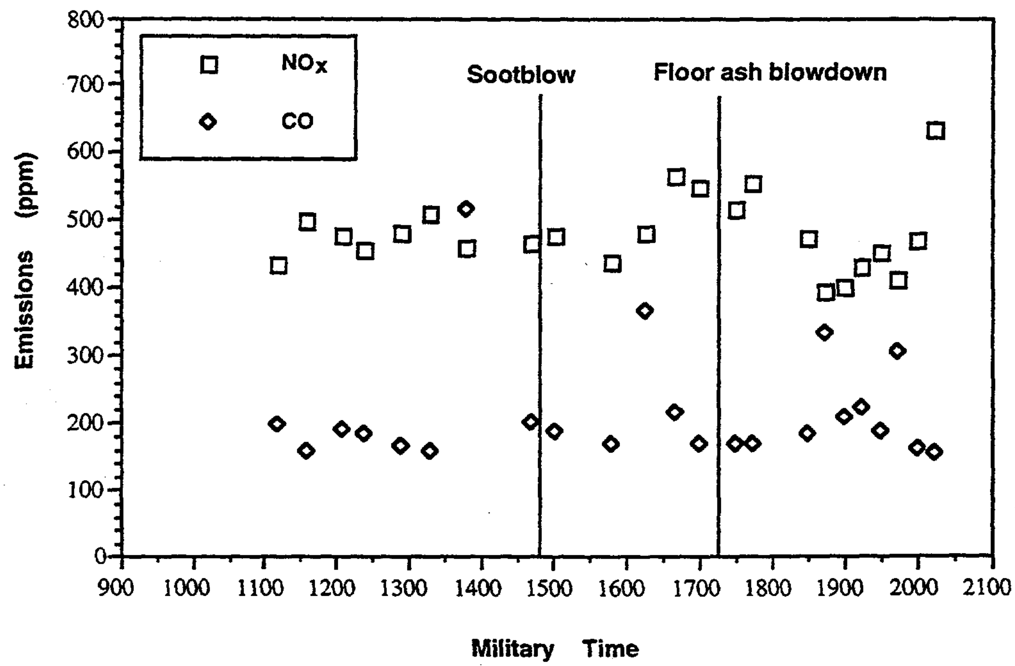
TEST/DESCRIPTION:	2/15/96	2/15/96	2/16/96	2/16/96	2/16/96	2/16/96	2/16 1800	2/17/96	2/17/96	2/17 0900	2/18/96
	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	Continuous/	to 2/17	Continuous/	Continuous/	to 2/17	Continuous
	Deposition	Deposition	Deposition	Deposition	Deposition	Deposition	0730 hr	Deposition	Deposition	2230 hr	Operation
	0830-1630	1700-2230	0430-0830	0900-1630	1800-2342	2347-0730		0900-1156	1200-2230		2300-0130
	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%	Sec. 100%
	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 50%	Tert. 28%	Tert. 28%	Tert. 28%	Tert. 28%
	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9	Gas Gun -9
	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5	C. Gun 39.5
WATER/STEAM SIDE	12.1 MMBtu/h	15.6 MMBtu/h	15.6 MMBtu/h	12.0 MMBtu/h	16.3 MMBtu/h	16.1 MMBtu/h	16.2 MMBtu/h	11.9 MMBtu/h	12.2 MMBtu/h	12.1 MMBtu/h	16.3 MMBtu/h
Steam flow rate; lb/h	11,303	13,013	12,436	10,124	13,194	12,674	12,895	10,826	10,734	10,754	15,410
Water temperature into boiler; °F	217	219	218	217	218	218	218	218	218	218	217
Drum pressure; psig	199	196	203	197	195	198	197	200	201	201	162
Calorimeter temperature; °F	310	310	311	309	309	310	310	310	310	310	302
Steam temperature; °F	385	385	387	385	384	385	385	386	387	387	371
Steam quality; %	99.9	99.9	99.9	99.8	99.9	99.9	99.9	99.9	99.9	99.9	99.7
Blowdown rate; lb/h	3,087	3,065	3,120	3,074	3,057	3,080	3,070	3,095	3,108	3,105	2,790
AIR,FUEL, FLUE GAS SIDE											
Coal flow rate; lb/h, MMBtu/h	900; 12.1	1,170; 15.6	1,170; 15.6	900; 12.0	1,218; 16.3	1,218; 16.1	1,218; 16.2	900; 11.9	900; 12.2	900; 12.1	1,218; 16.3
Boiler outlet temperature; °F	589	587	565	566	577	555	564	571	569	569	545
Gas temperature leaving air heater; °F	386	388	377	368	382	376	379	376	376	376	361
Air temperature entering air heater; °F	148	144	139	145	132	133	133	145	147	147	133
Air temperature leaving air heater; °F	412	410	396	402	402	396	399	409	403	404	374
Air temperature into boiler; °F	391	389	376	381	381	376	378	388	383	384	351
Ash content of particulate; %	61.14	54.32	50.81	63.80	38.16	34.42	36.01	44.85	55.70	53.35	27.38
Coal combustion efficiency; %	98.4±0.6	97.7±0.3	97.1±0.5	98.8±0.2	95.1±0.7	95.0±0.6	95.0±0.7	96.7±0.8	98.1±1.2	97.8±1.2	93.1±0.1
Combustion air flow; lb/h	12,818	15,100	15,229	12,650	15,625	15,306	15,442	11,767	12,757	12,543	16,807
Boiler draft; in H2O	-0.04	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.04	-0.03	-0.03	-0.08
Boiler efficiency; %	85.86	86.25	85.81	86.19	84.32	84.30	84.31	85.19	86.01	85.83	82.61
Mill air flow rate; acfm,lb/h	375; 1,611	383; 1,640	389; 1,702	380; 1,642	381; 1,634	378; 1,642	379; 1,639	369; 1,612	383; 1,661	380; 1,650	376; 1,642
Mill outlet temperature; °F	237	234	223	230	234	231	232	236	231	232	232
Burner metal temperature;°F	678	662	635	705	660	649	654	722	679	688	560
EMISSIONS											
O2; %	5.3	3.8	3.9	5.3	3.7	3.6	3.6	4.2	5.2	5.0	4.9
CO; ppm;lb/MMBtu@3%O2	124; 0.14	192; 0.18	187; 0.18	113; 0.13	622; 0.58	759; 0.69	701; 0.64	400; 0.40	232; 0.26	268; 0.29	190; 0.20
CO2; %	13.7	15.4	15.2	13.0	15.2	15.4	15.3	14.9	14.3	14.4	14.4
SO2; ppm;lb/MMBtu@3%O2	530; 1.37	574; 1.24	563; 1.23	514; 1.10	579; 1.23	549; 1.15	562; 1.18	561; 1.27	530; 1.35	537; 1.33	550; 1.35
NOx; ppm;lb/MMBtu@3%O2	543; 1.01	545; 0.85	445; 0.70	430; 0.79	481; 0.73	493; 0.74	488; 0.74	489; 0.79	592; 1.08	570; 1.02	325; 0.57
MISCELLANEOUS DATA											
Maximum load											
(based on 14,700 lb steam/h); %	76.9	88.5	84.6	68.9	89.8	86.2	87.7	73.6	73.0	73.2	104.8

Table C-1. Summary of Micronized Coal-Fired Testing

TEST/DESCRIPTION:	2/19/96	2/19/96
	Continuous	Continuous
	Operation	Operation
	0200-0700	0730-1630
	Prim. 100%	Prim. 100%
	Sec. 100%	Sec. 100%
	Tert. 28%	Tert. 28%
	Radial 0%	Radial 0%
	Gas Gun -9	Gas Gun -9
	C. Gun 39.5	C. Gun 39.5
WATER/STEAM SIDE	15.2 MMBtu/h	12.0 MMBtu/h
Steam flow rate; lb/h	15,481	10,748
Water temperature into boiler; °F	218	219
Drum pressure; psig	156	185
Calorimeter temperature; °F	301	305
Steam temperature; °F	368	379
Steam quality; %	99.7	99.7
Blowdown rate; lb/h	2,742	2,971
AIR,FUEL, FLUE GAS SIDE		
Coal flow rate; lb/h, MMBtu/h	1,140; 15.2	900; 12.0
Boiler outlet temperature; °F	545	557
Gas temperature leaving air heater; °F	358	362
Air temperature entering air heater; °F	137	157
Air temperature leaving air heater; °F	385	402
Air temperature into boiler; °F	363	379
Ash content of particulate; %	30.98	40.45
Coal combustion efficiency; %	94.1±0.6	96.1±0.7
Combustion air flow; lb/h	14,807	12,270
Boiler draft; in H2O	-0.04	-0.04
Boiler efficiency; %	83.75	84.86
Mill air flow rate; acfm,lb/h	391; 1,717	390; 1,694
Mill outlet temperature; °F	227	224
Burner metal temperature;°F	612	708
EMISSIONS		
O2; %	2.8	4.6
CO; ppm;lb/MMBtu@3%O2	216; 0.20	244; 0.26
CO2; %	15.3	14.5
SO2; ppm;lb/MMBtu@3%O2	573; 1.24	540; 1.29
NOx; ppm;lb/MMBtu@3%O2	309; 0.48	298; 0.51
MISCELLANEOUS DATA		
Maximum load		
(based on 14,700 lb steam/h); %	105.3	73.1



(a)



(b)

Figure D-1. COAL COMBUSTION EFFICIENCY BASED ON THE BAGHOUSE ASH SAMPLES (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING CONDUCTED ON 08/03/95

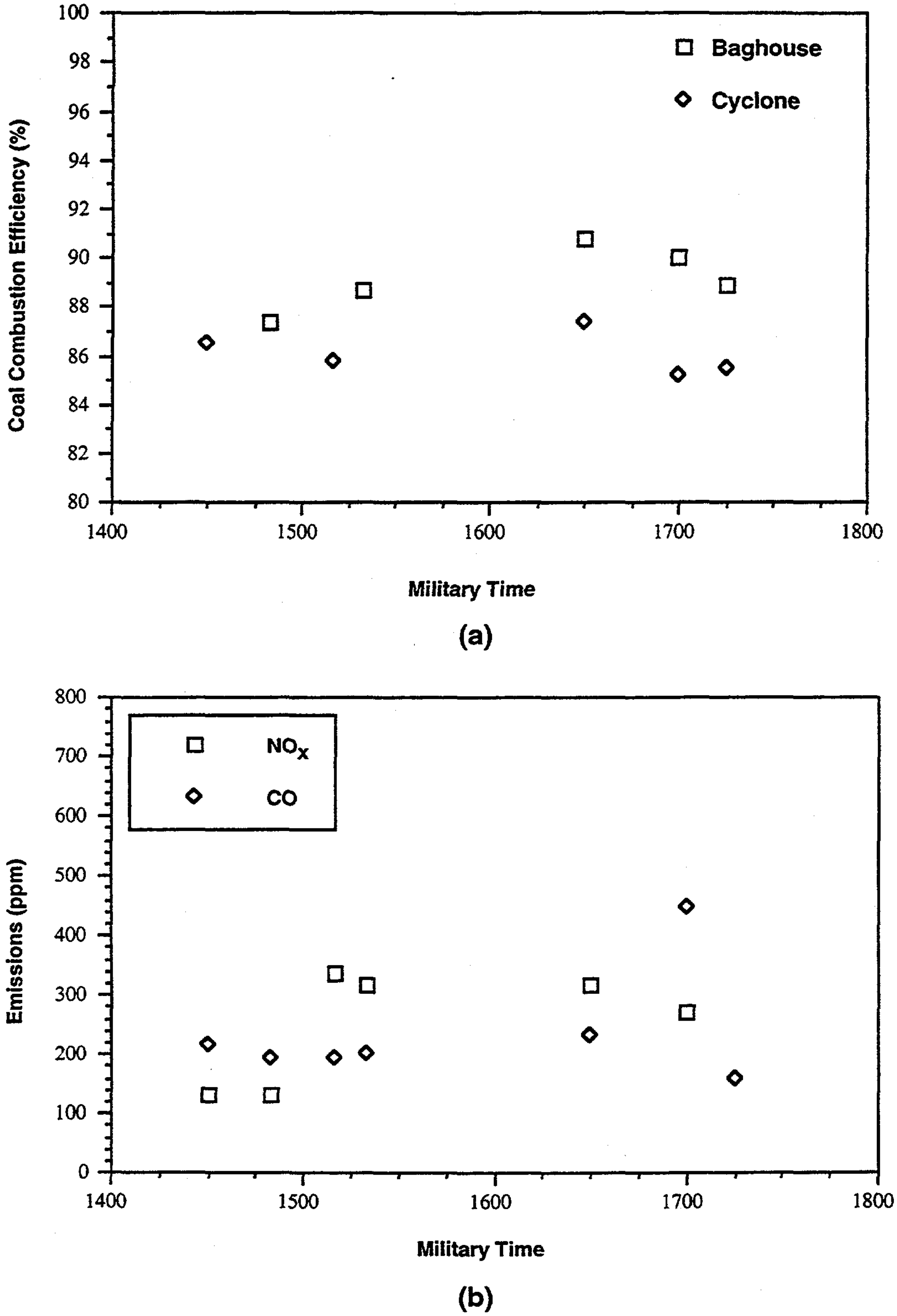
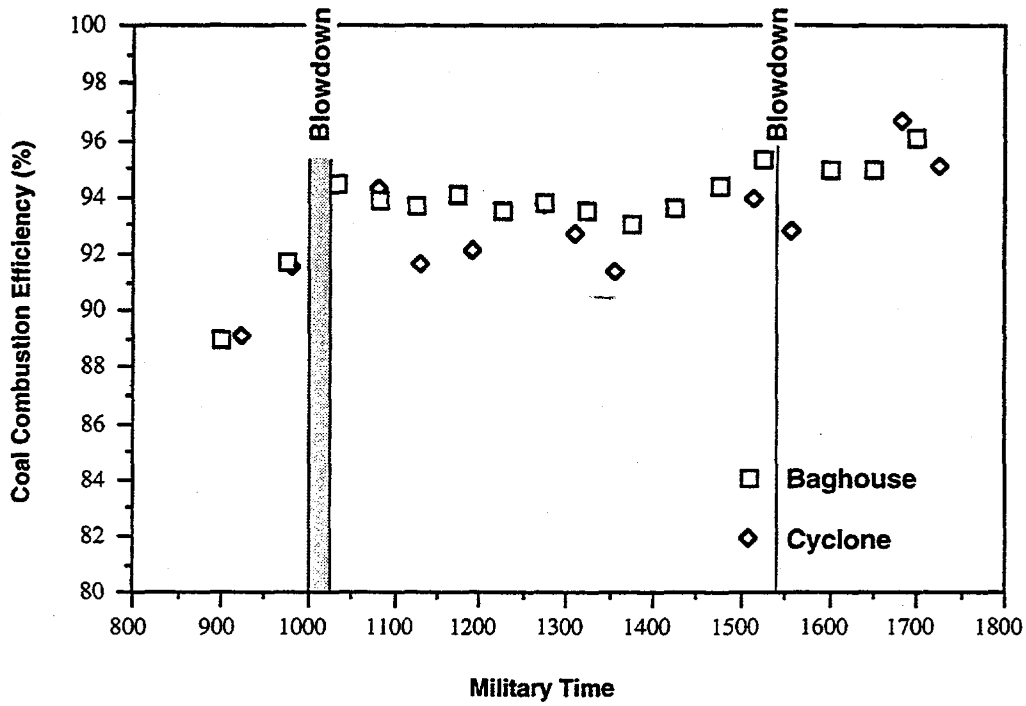
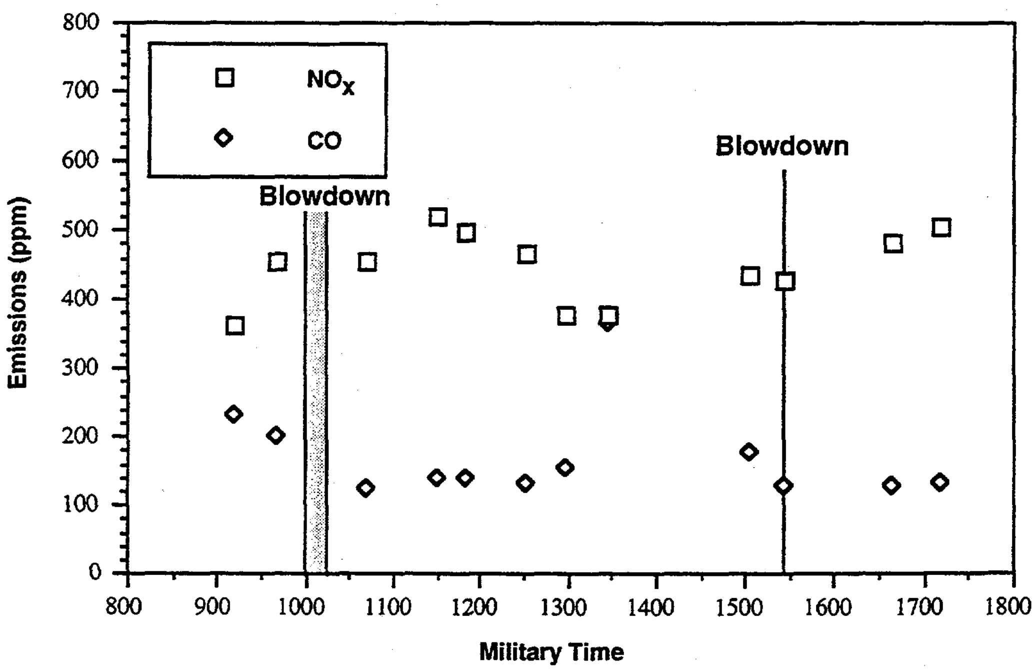


Figure D-3. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 08/23/95



(a)



(b)

Figure D-4. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 08/24/95

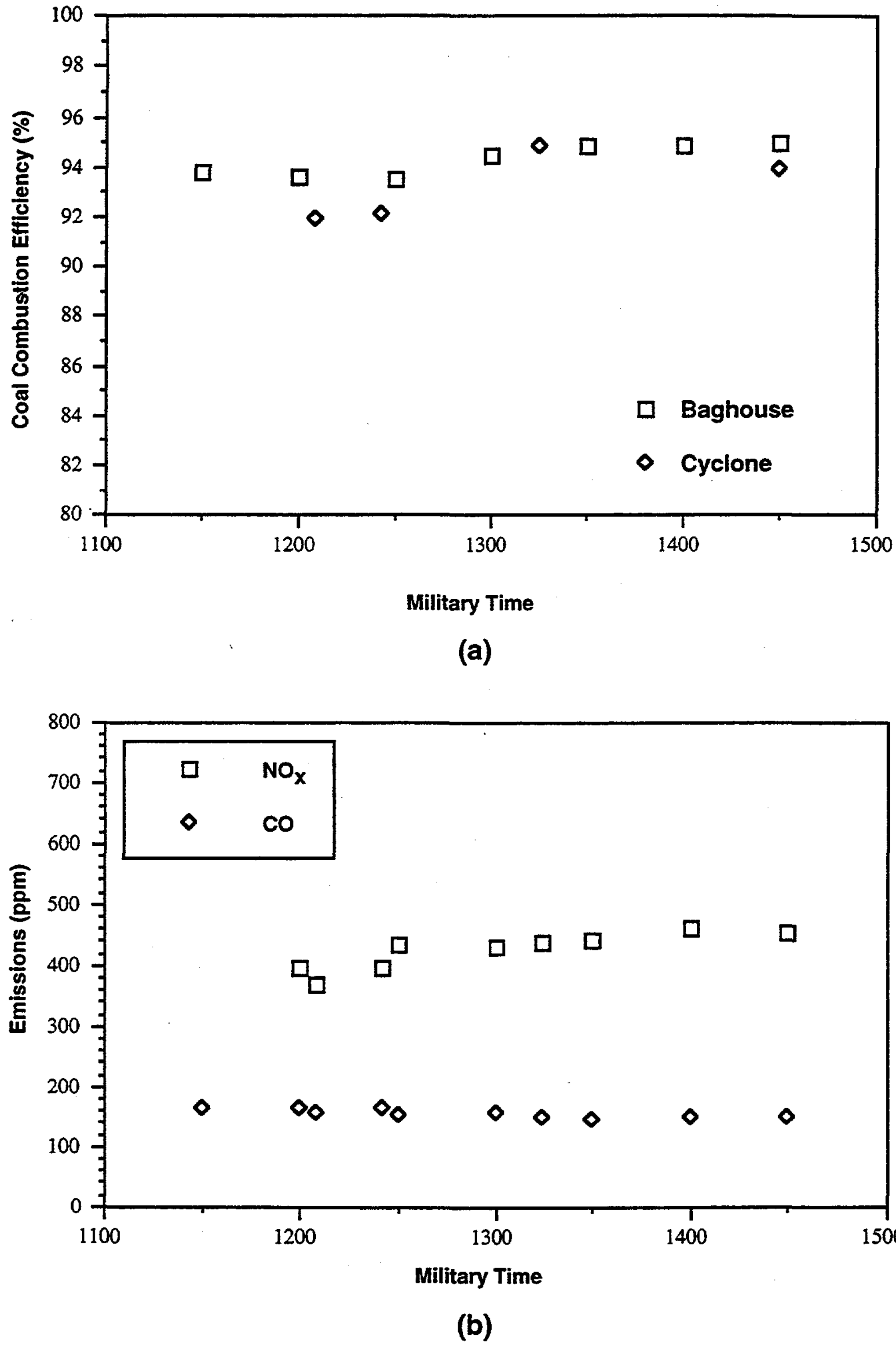


Figure D-5. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 08/25/95

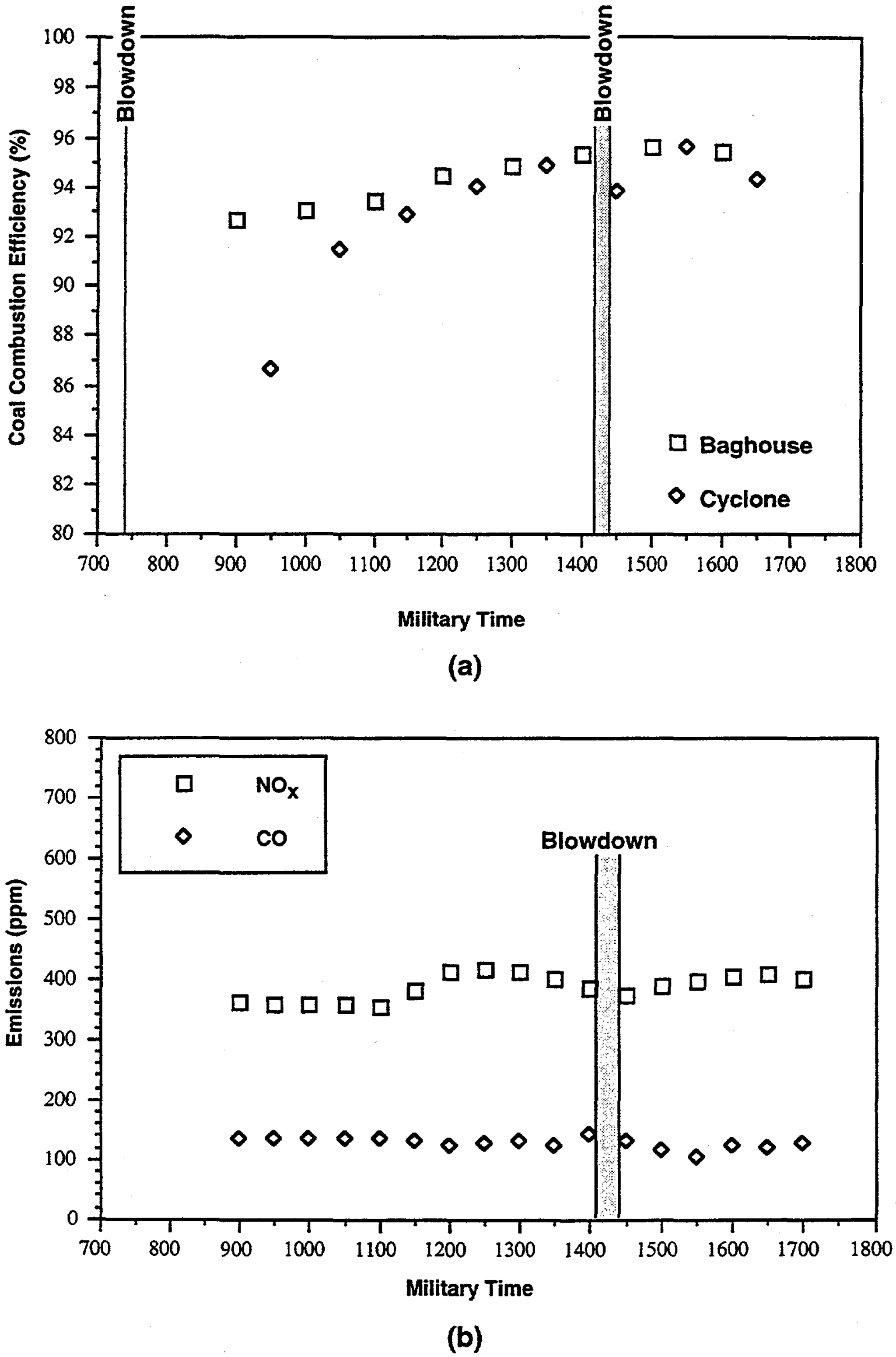
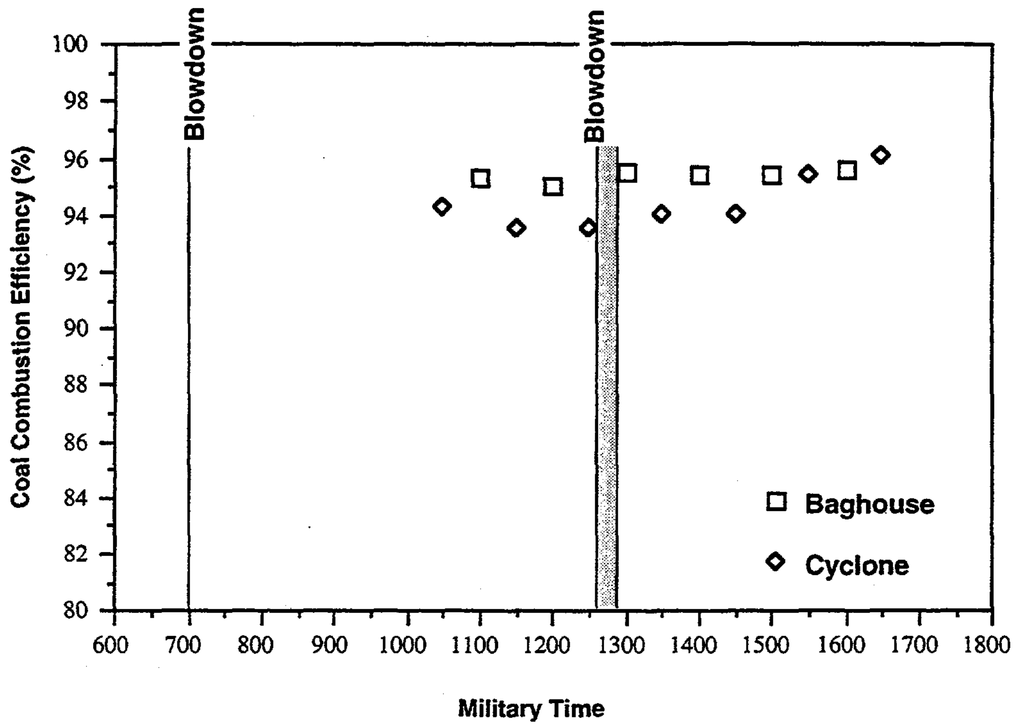
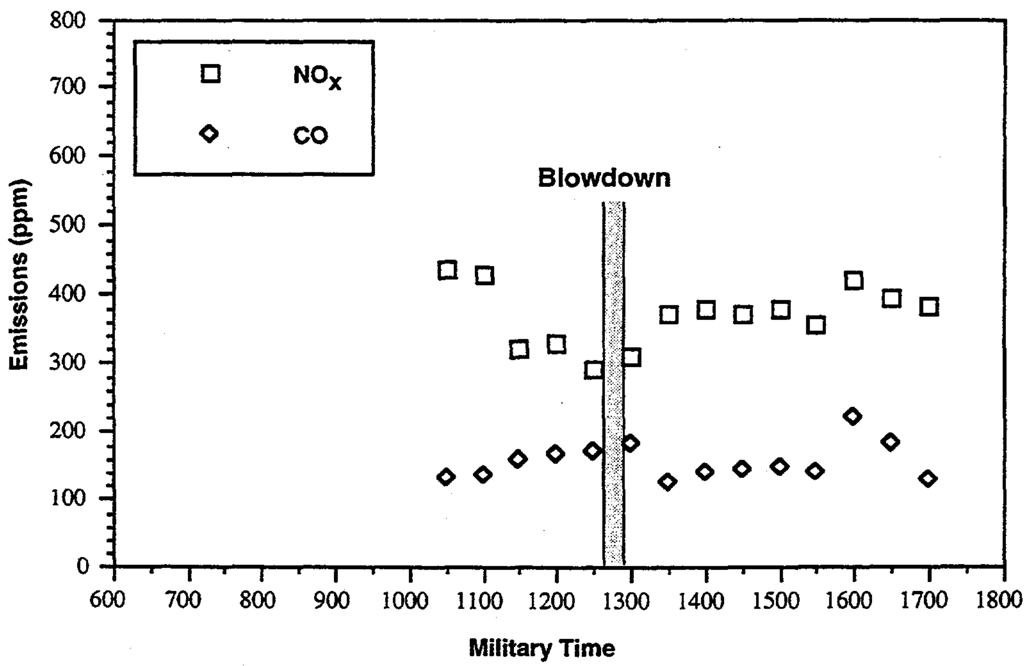


Figure D-6. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 08/28/95

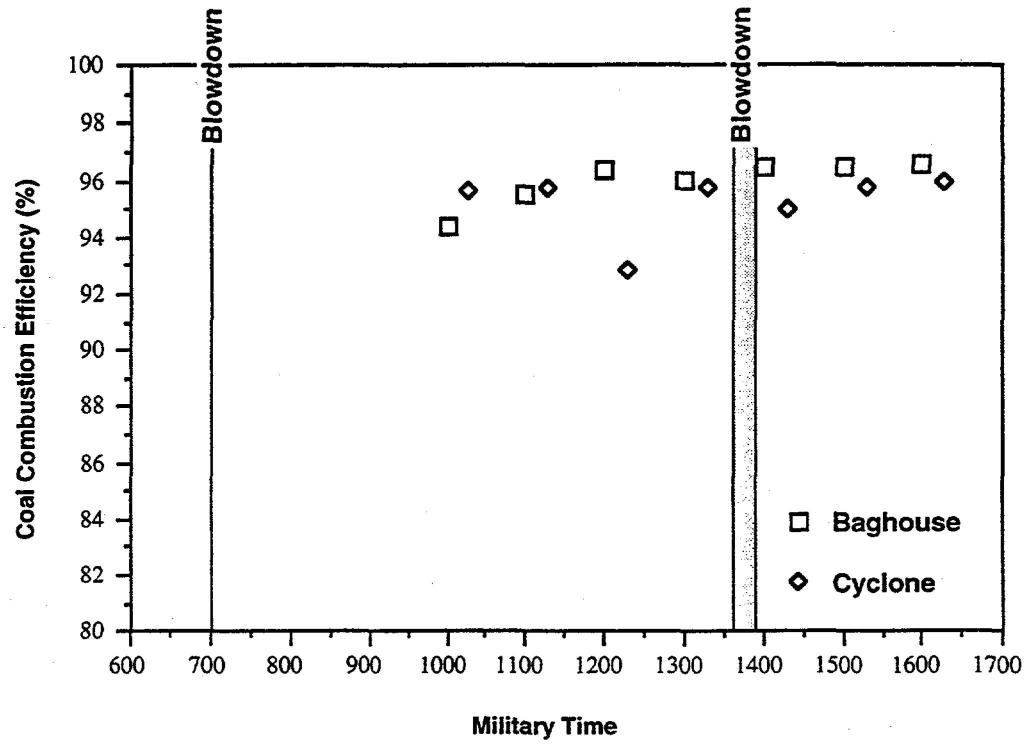


(a)

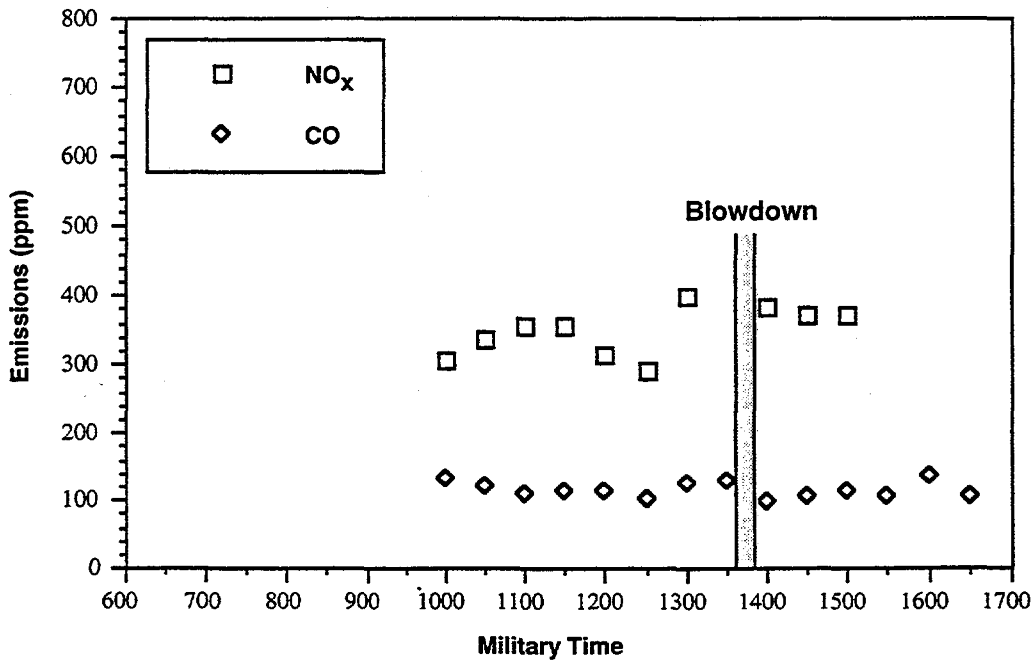


(b)

Figure D-7. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 08/29/95

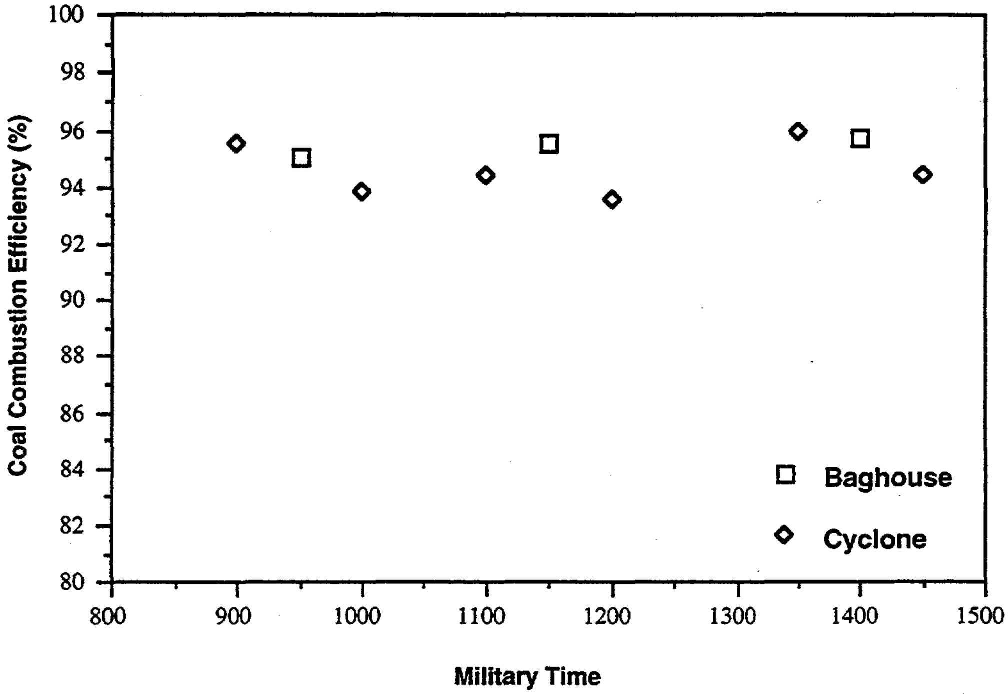


(a)

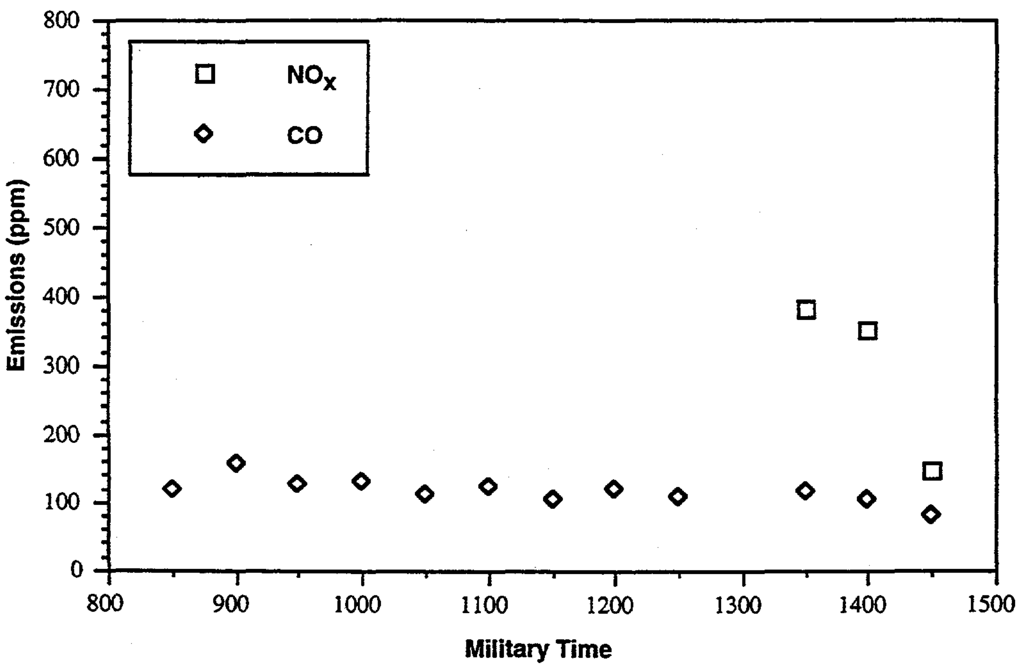


(b)

Figure D-8. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 08/30/95



(a)



(b)

Figure D-9. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 08/31/95

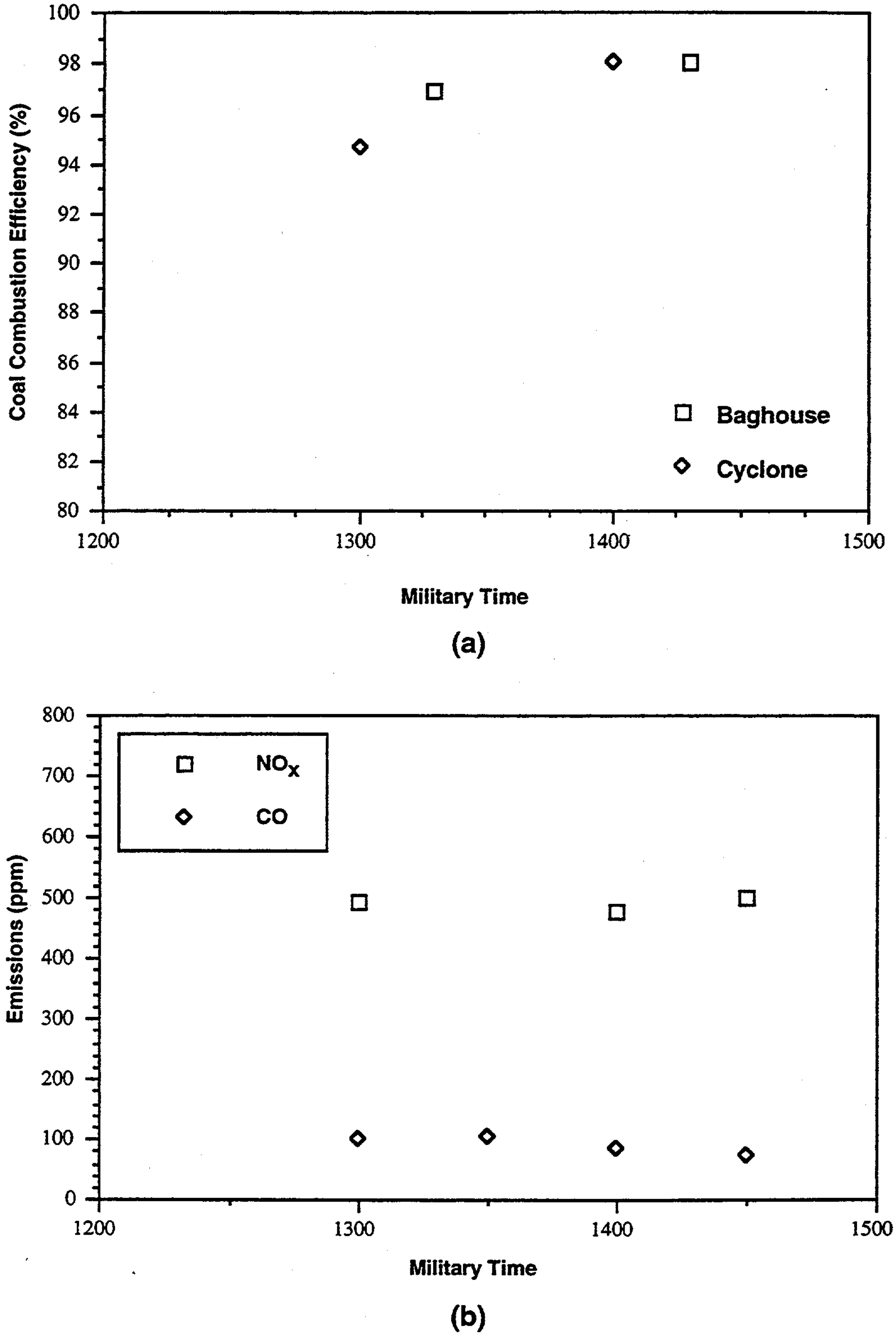


Figure D-10. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 09/05/95

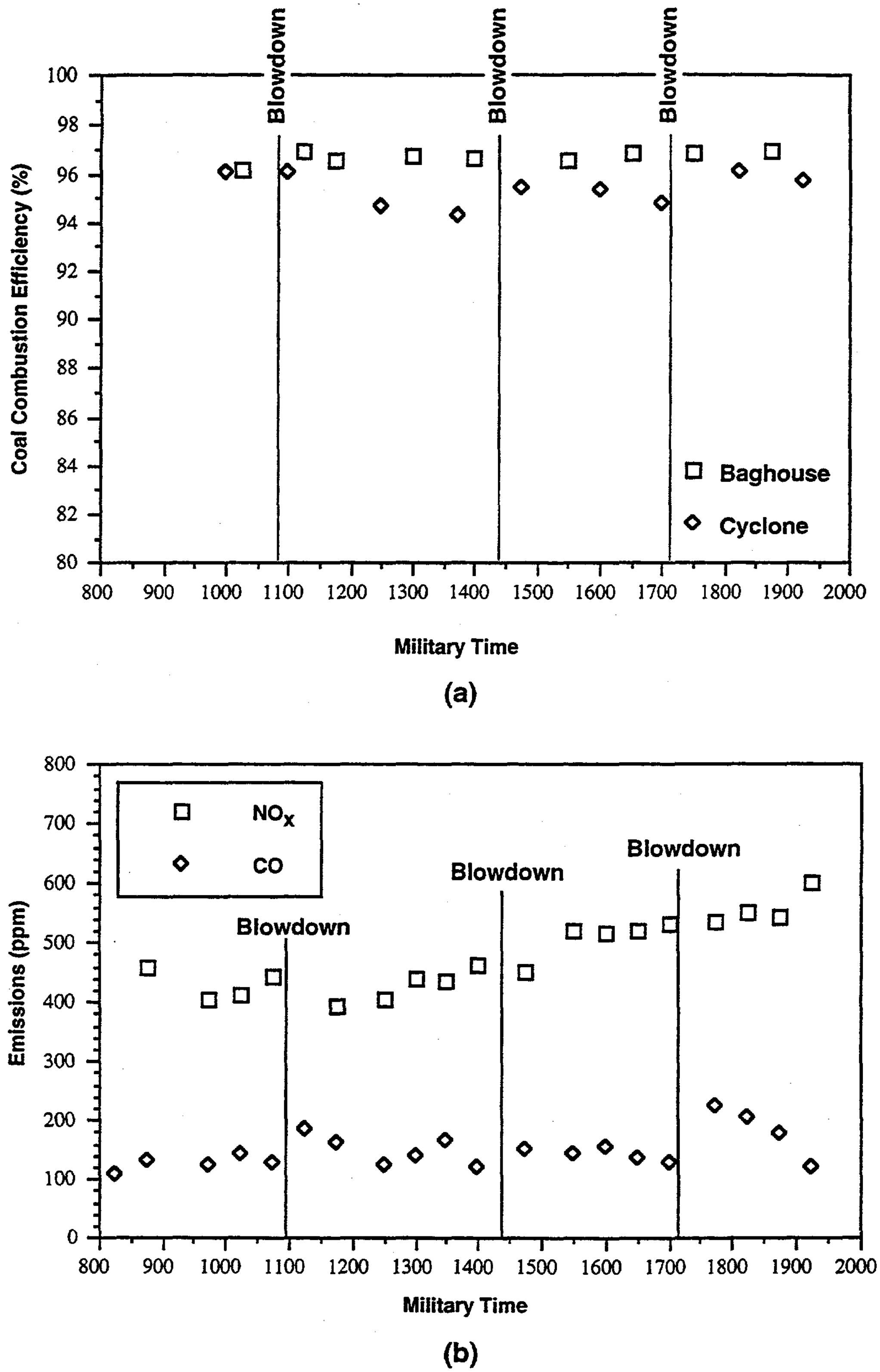
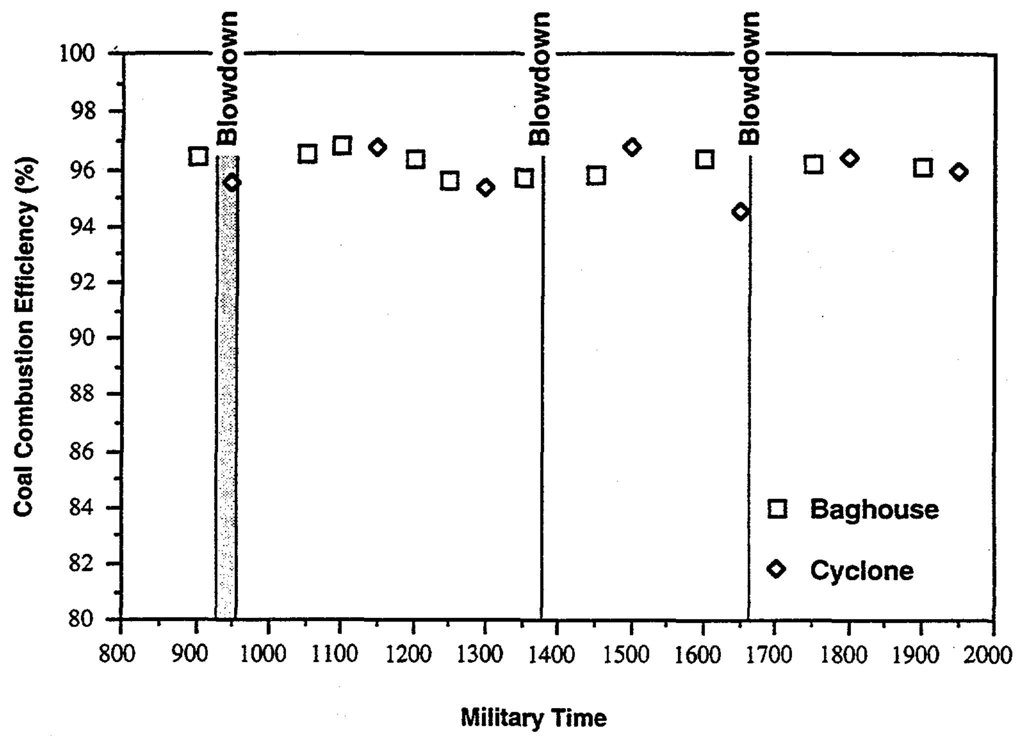
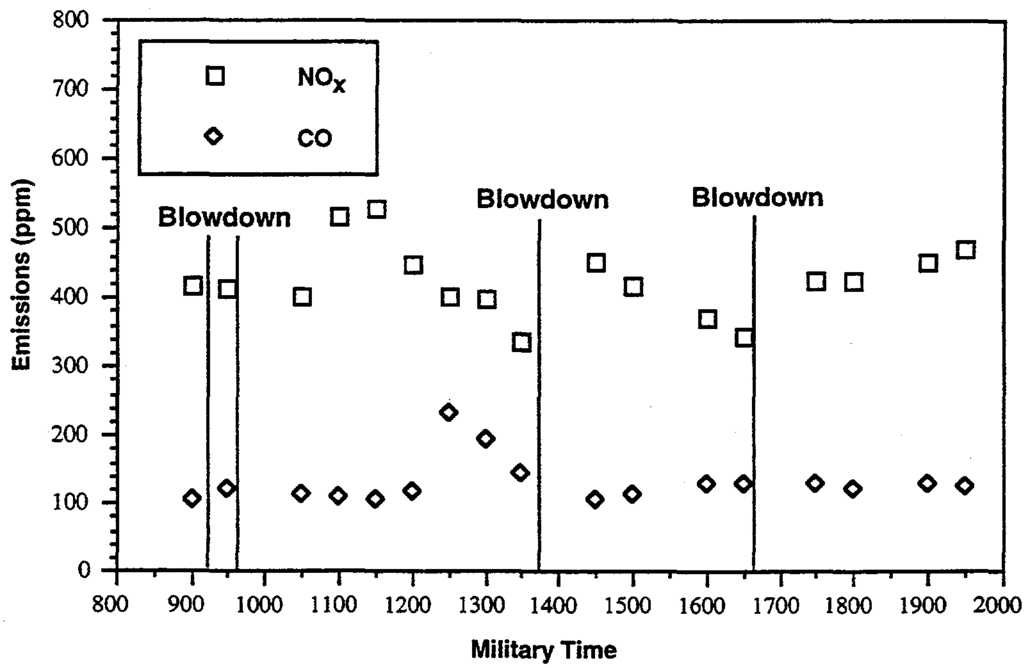


Figure D-11. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 09/06/95

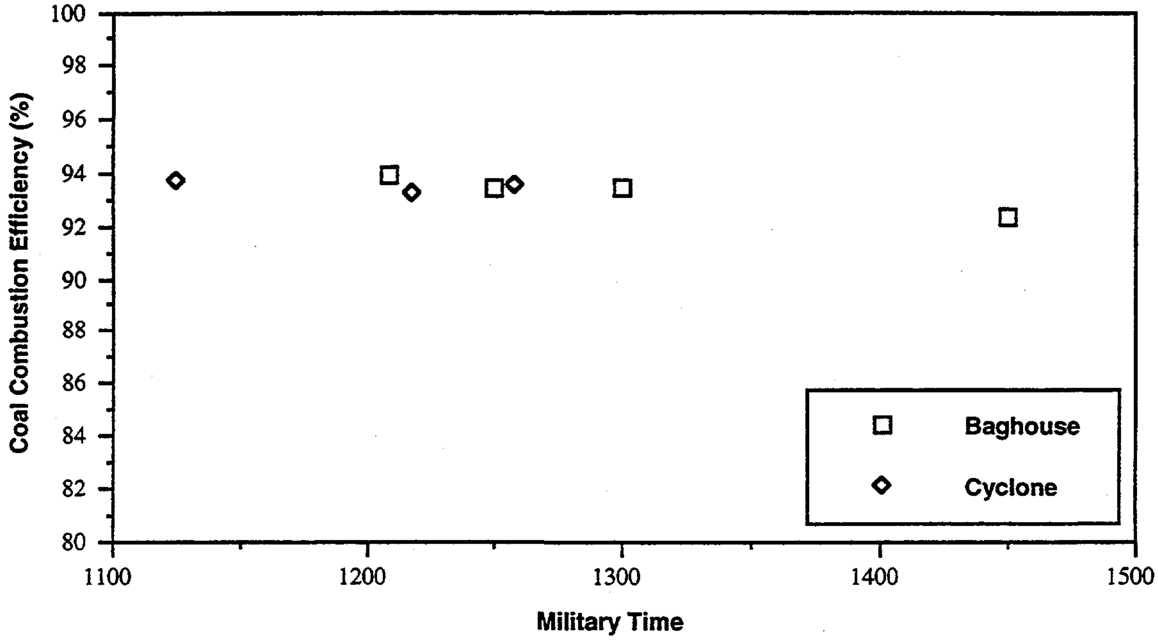


(a)

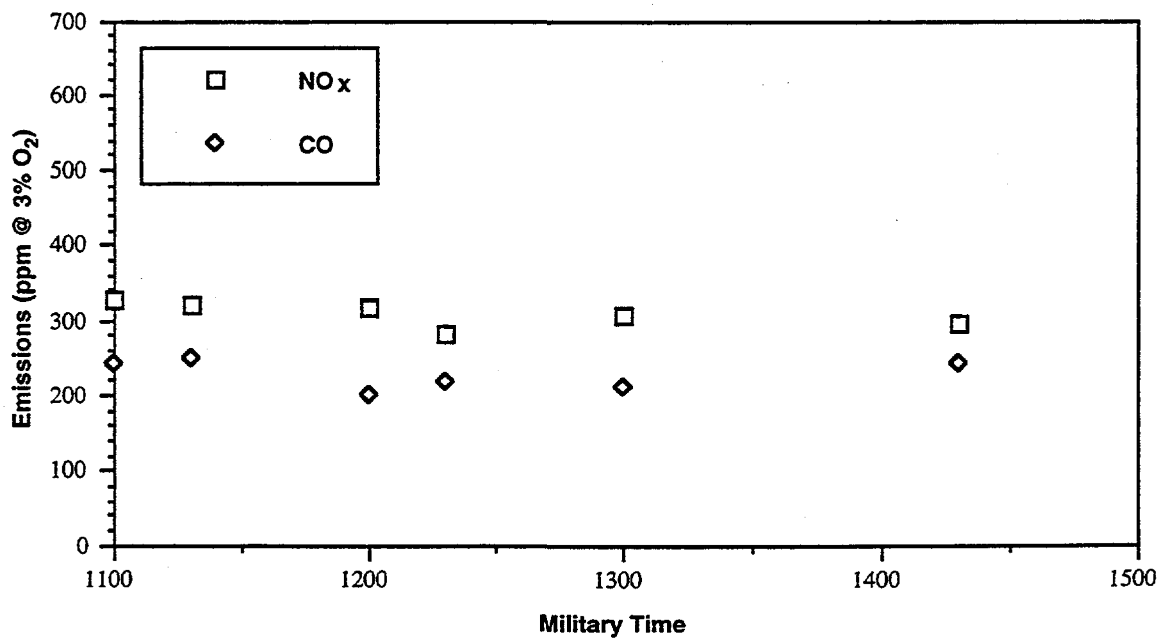


(b)

Figure D-12. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 09/07/95



(a)



(b)

Figure D-13. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/09/95 WITH DAMPER SETTINGS OF 100/100/50/0

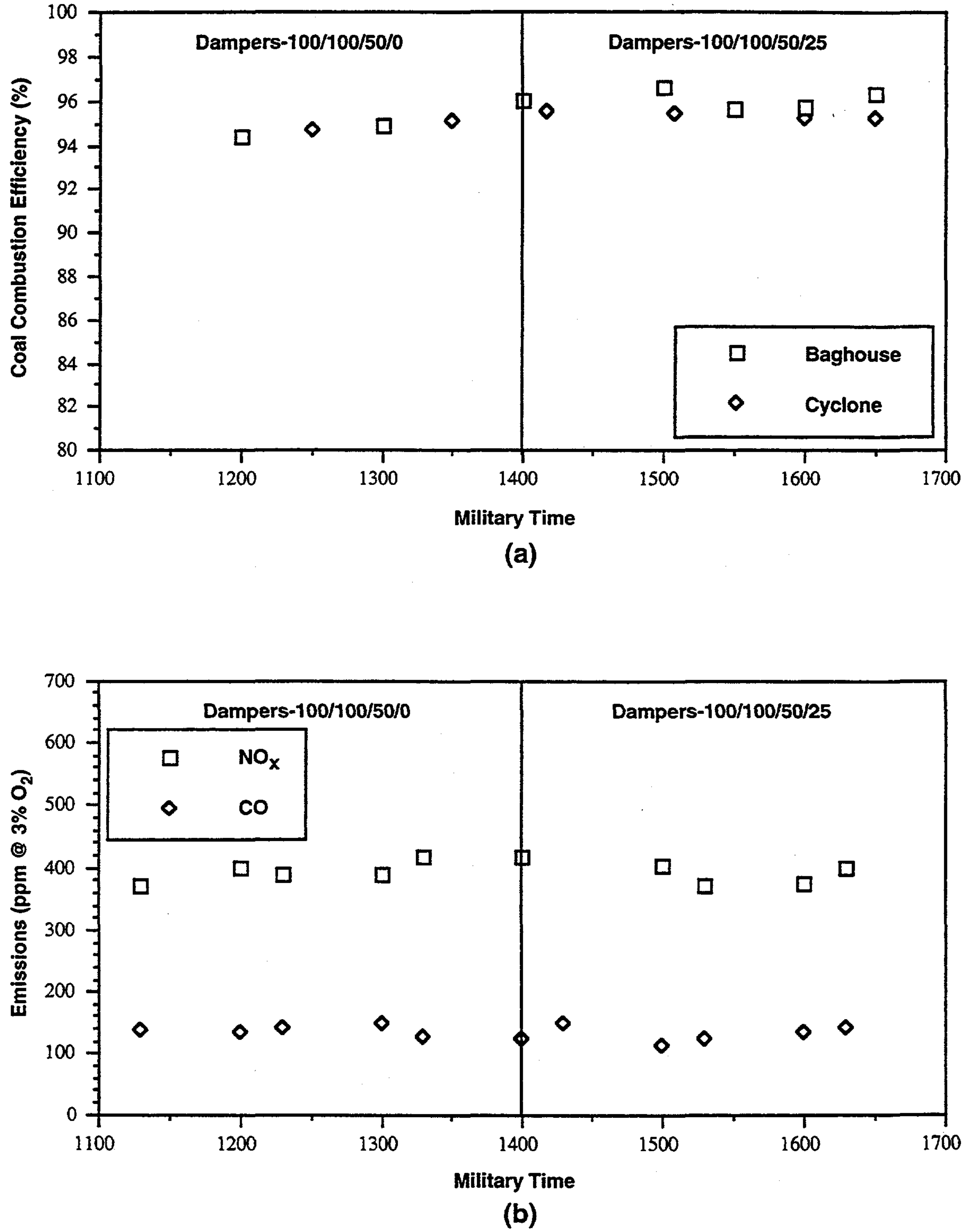
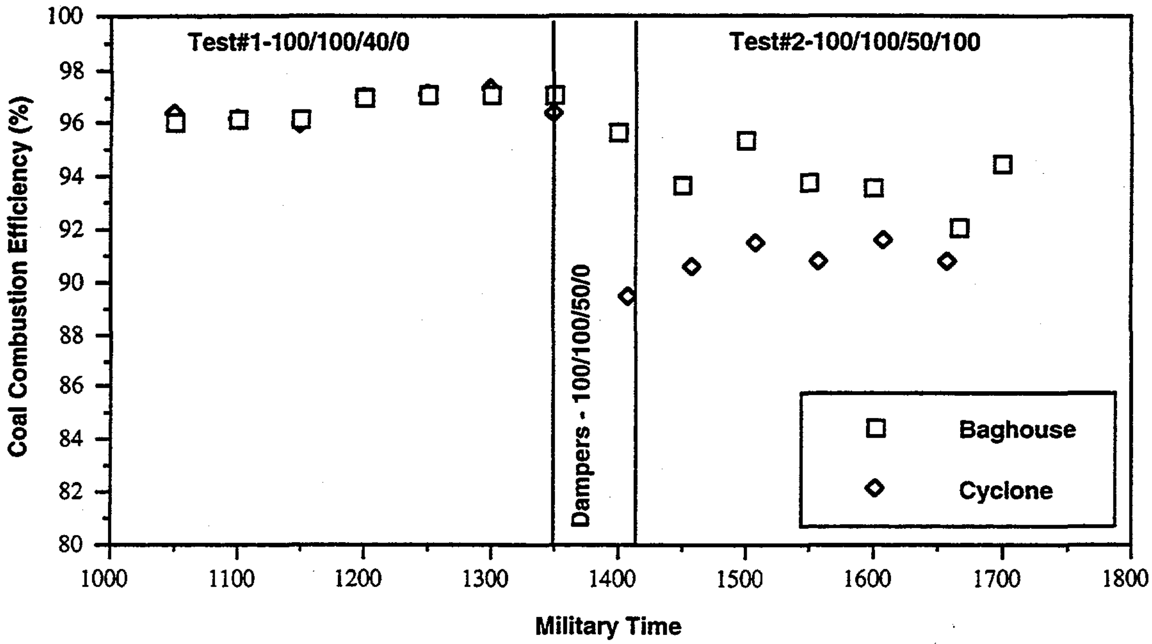
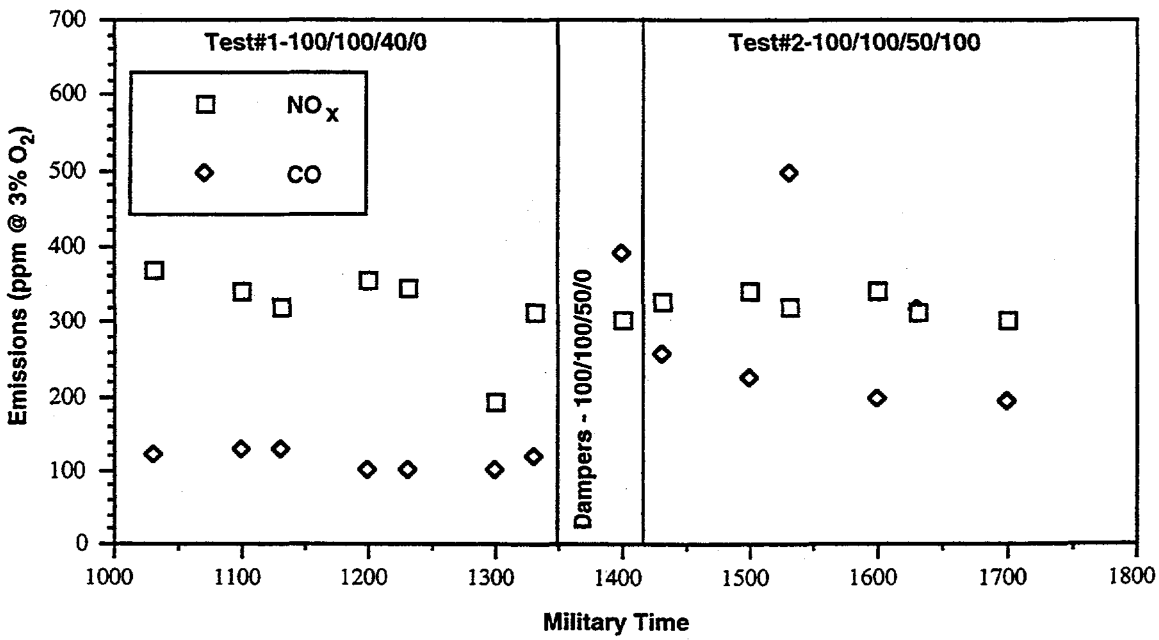


Figure D-14. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/11/95

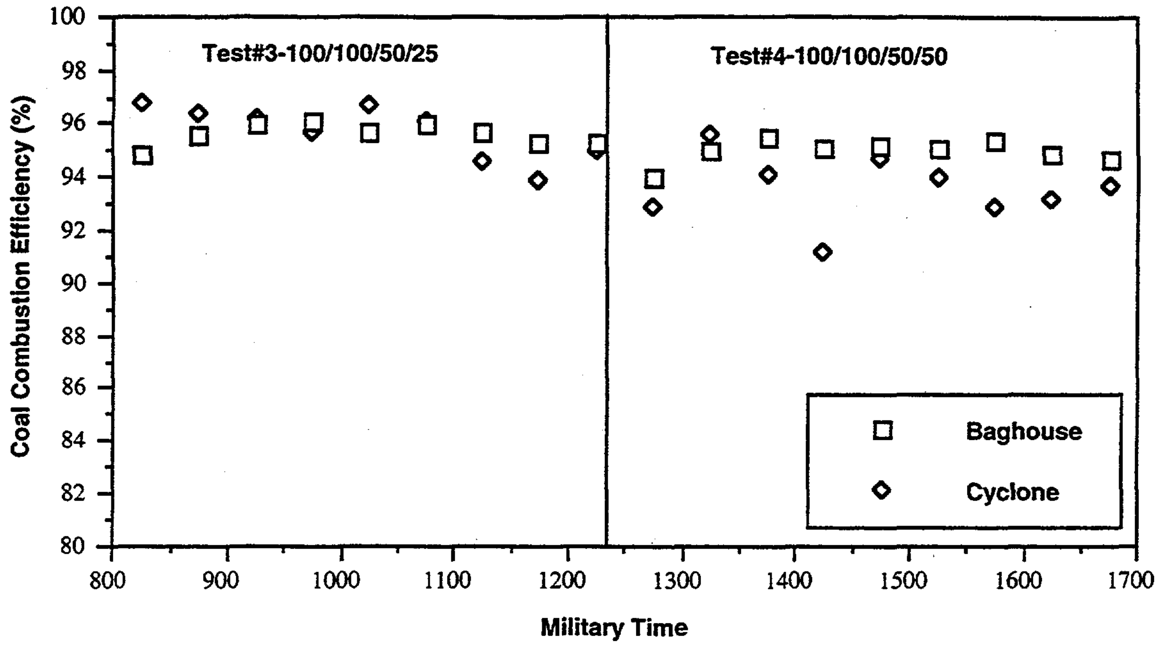


(a)

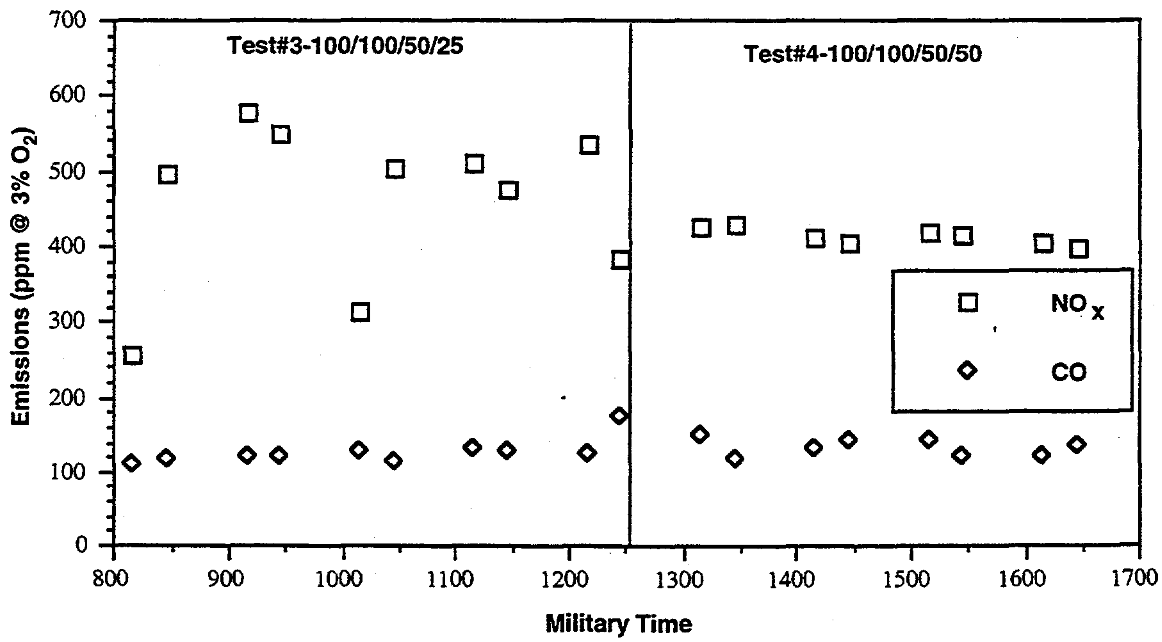


(b)

Figure D-15. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/12/95



(a)



(b)

Figure D-16. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/13/95

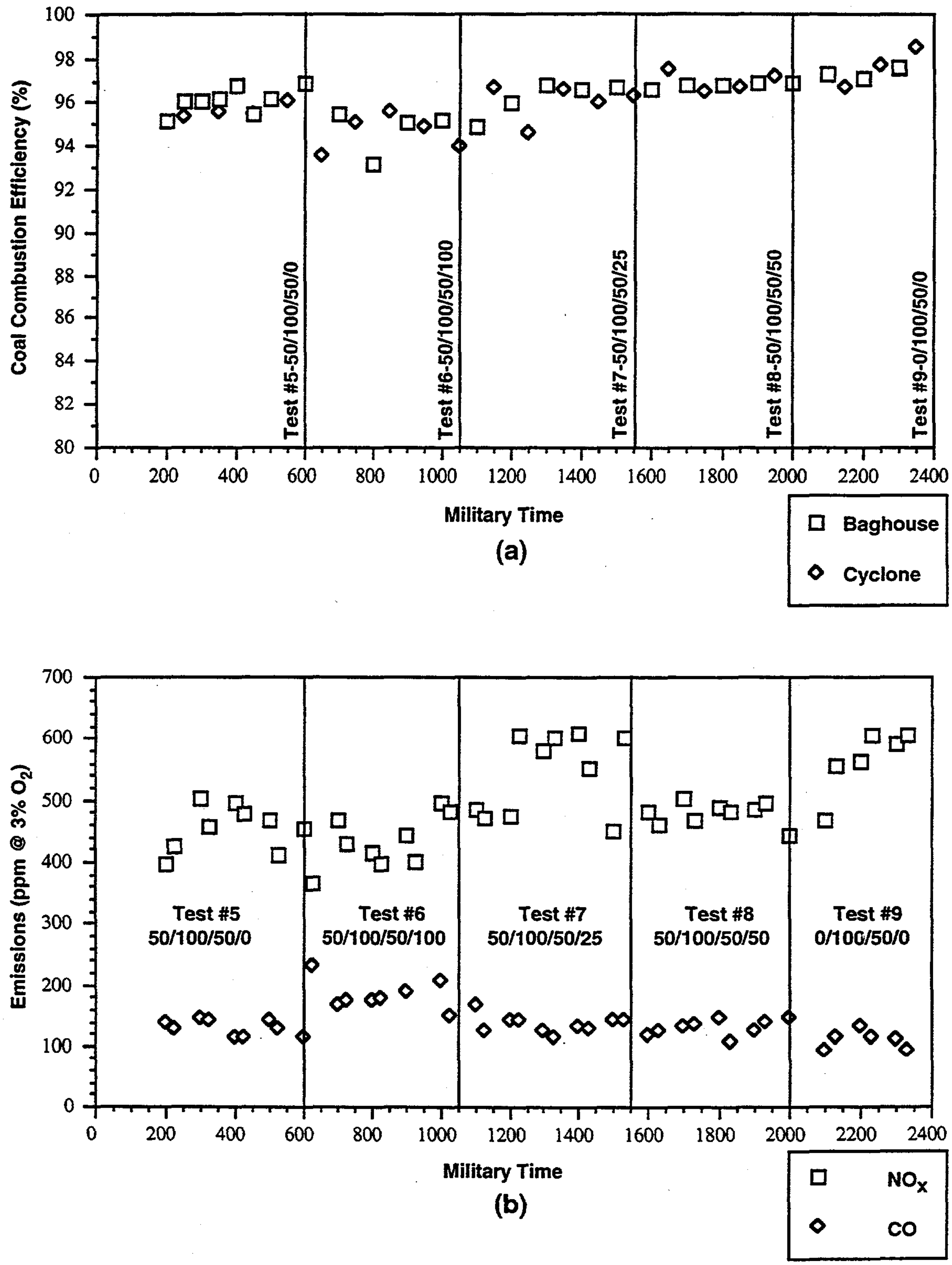


Figure D-17. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/16/95

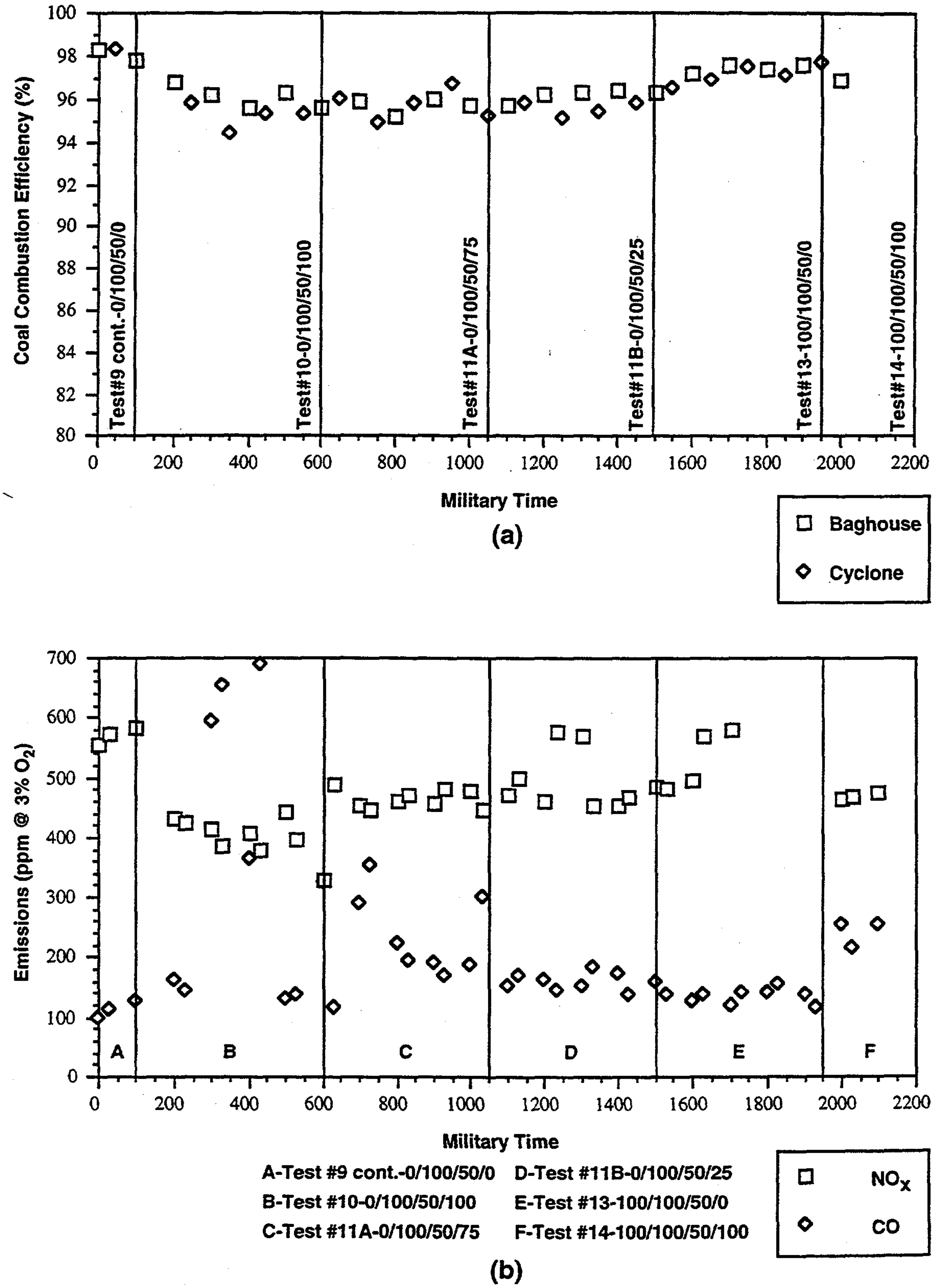
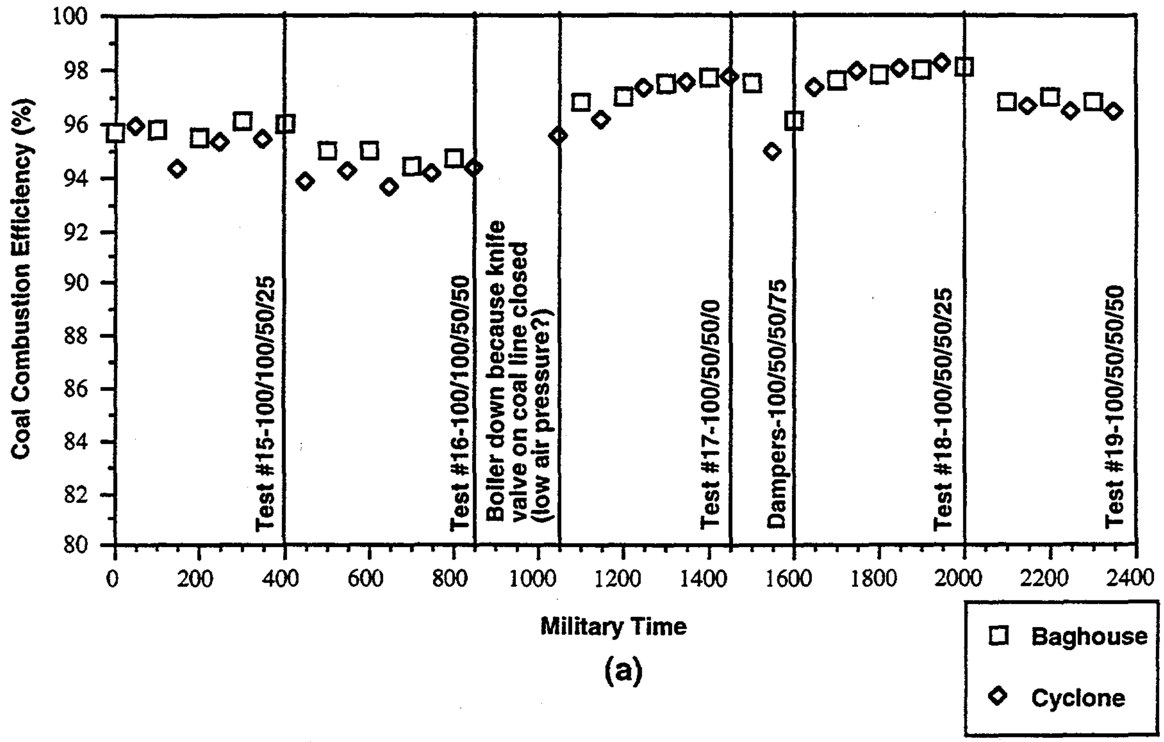
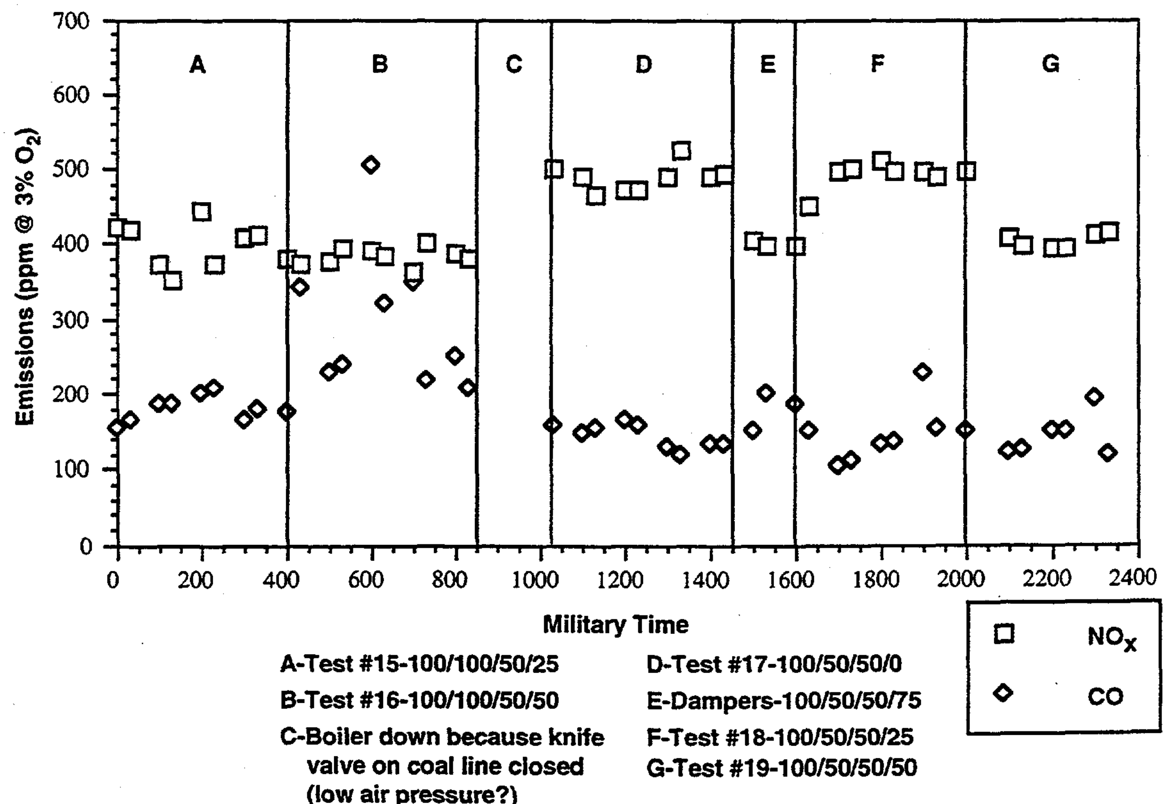


Figure D-18. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/17/95



(a)



(b)

Figure D-19. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/18/95

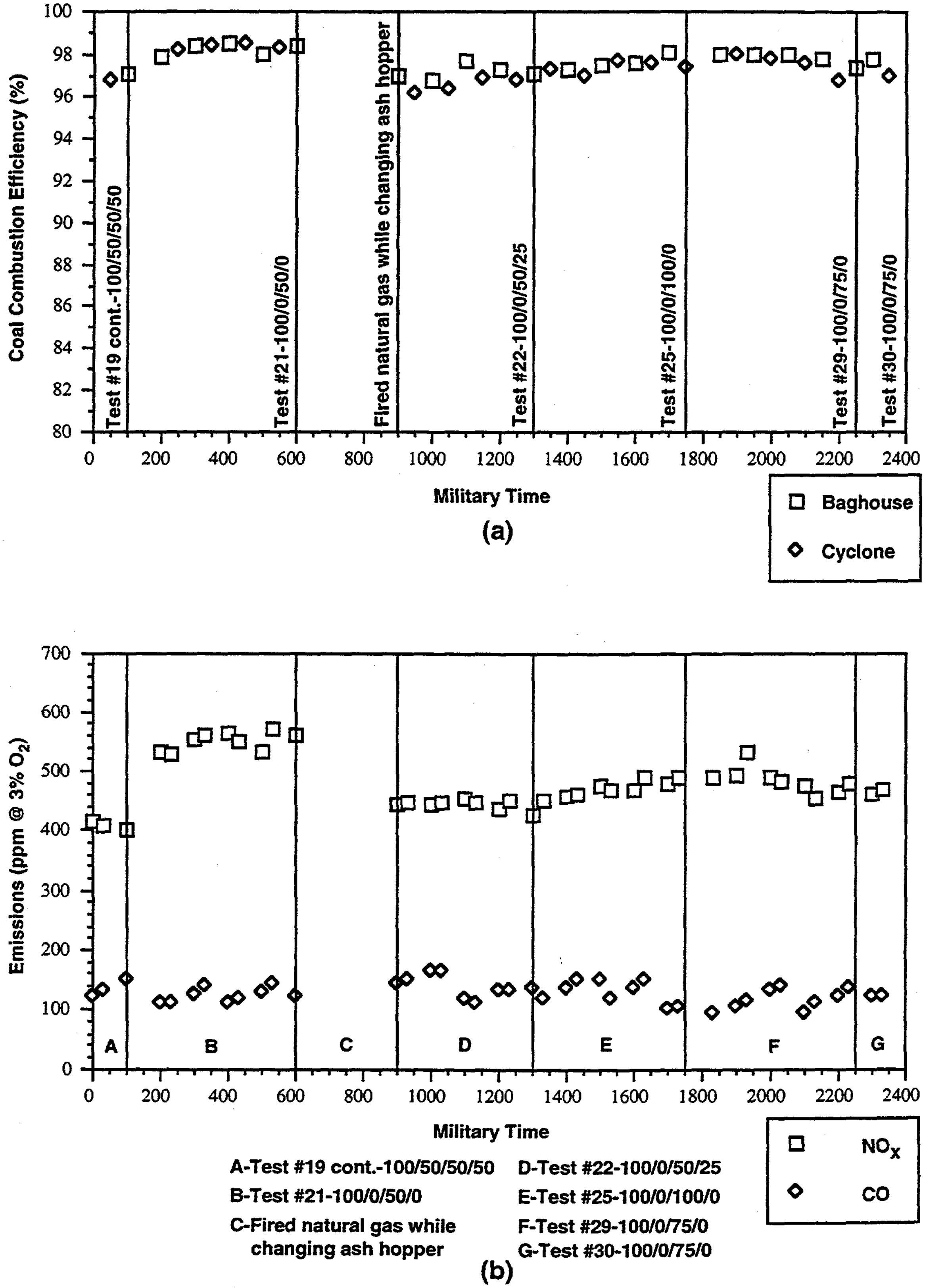


Figure D-20. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/19/95

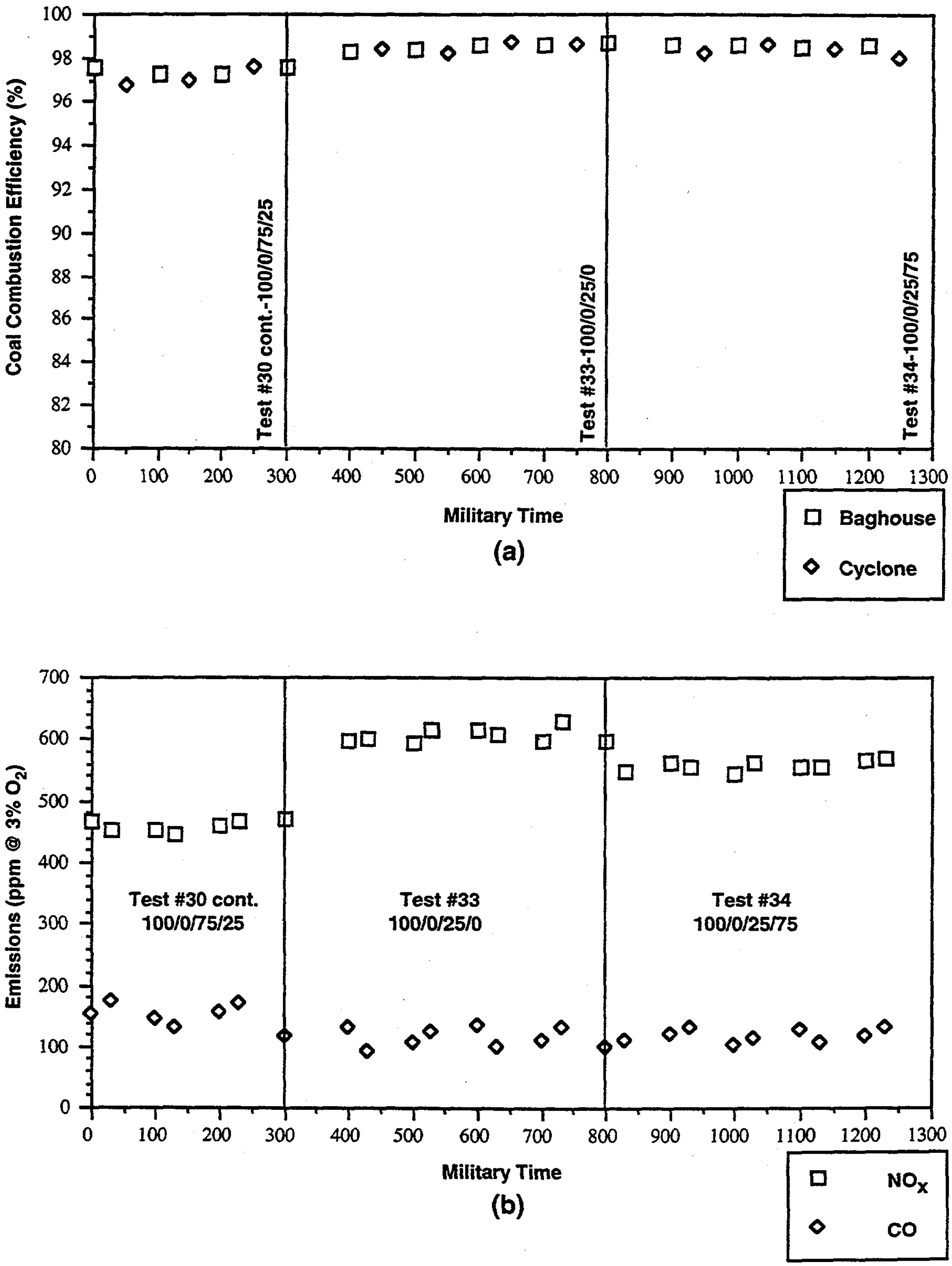
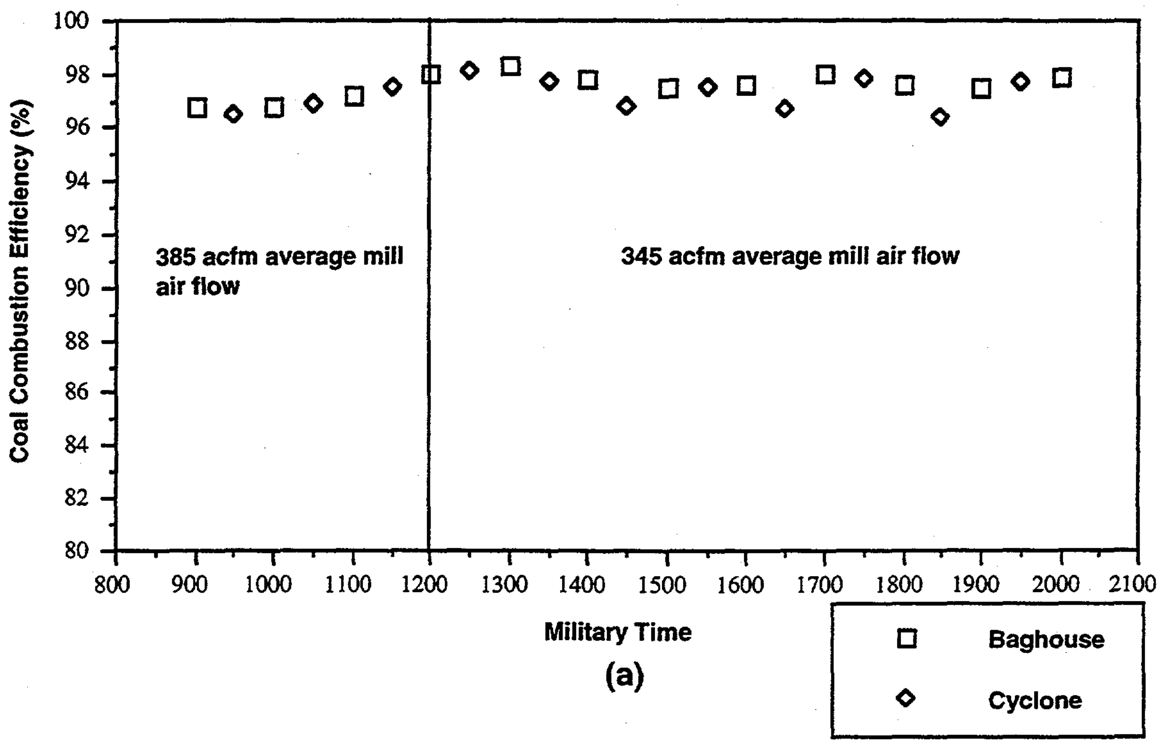


Figure D-21. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/20/95



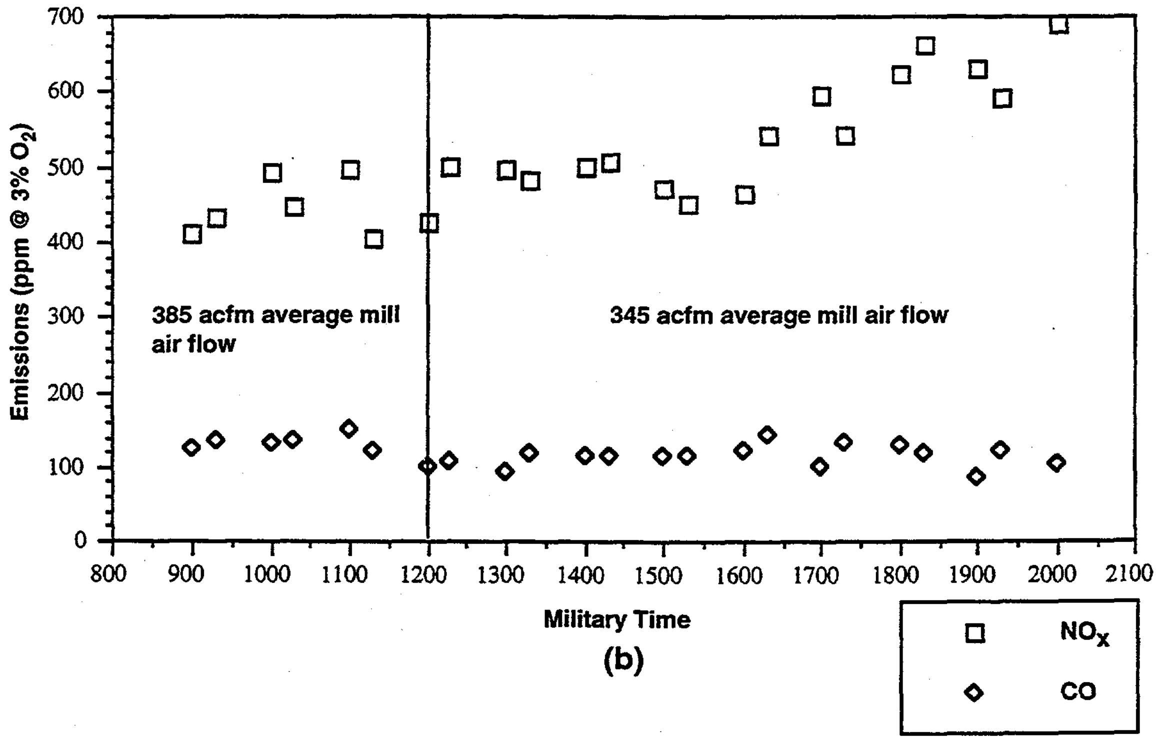
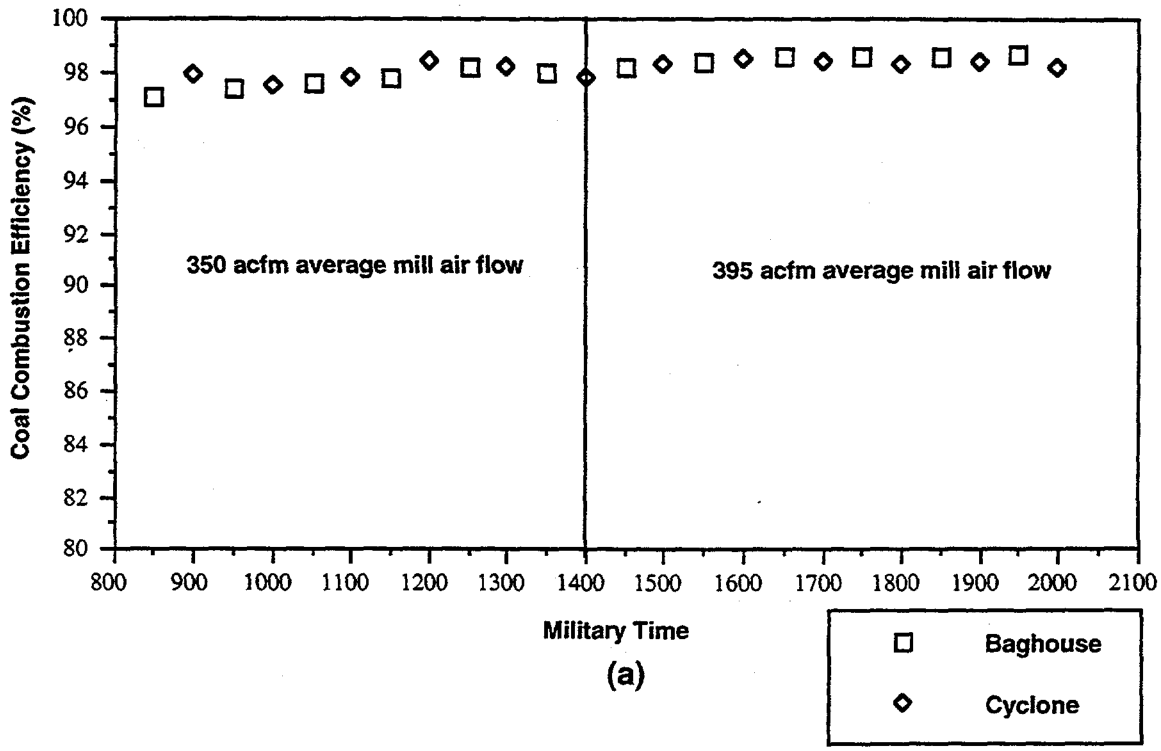
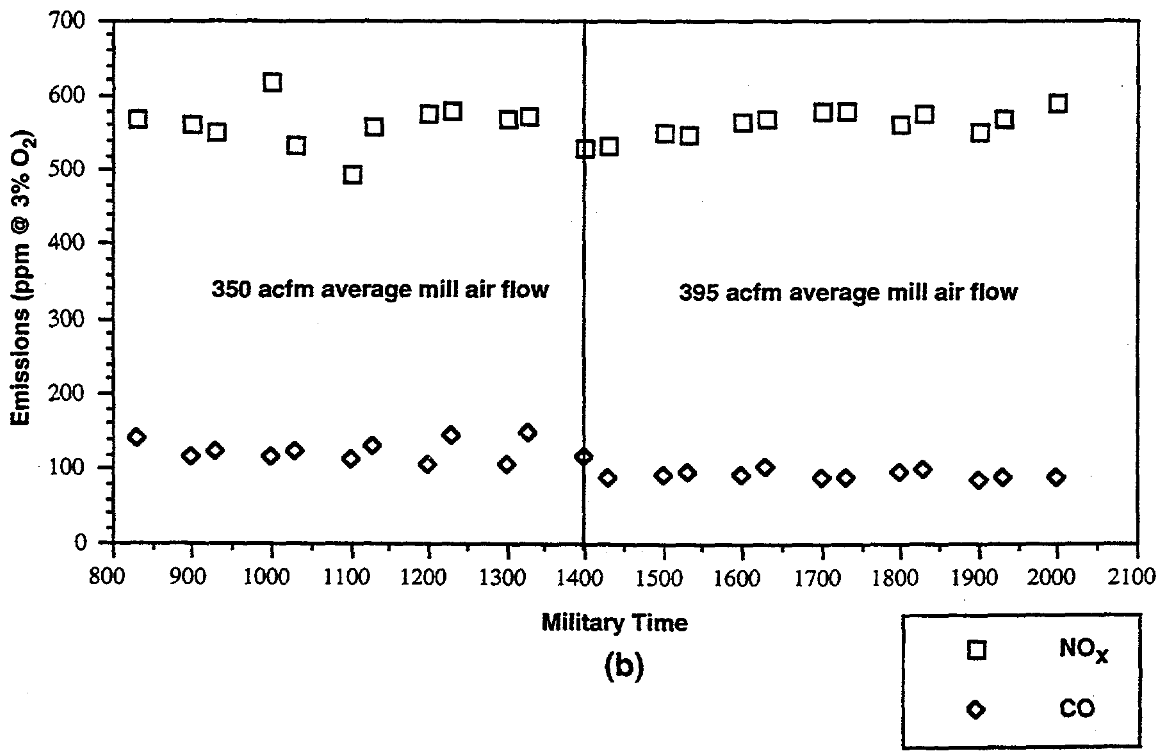


Figure D-22. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/24/95 WITH DAMPER SETTINGS OF 100/100/50/0

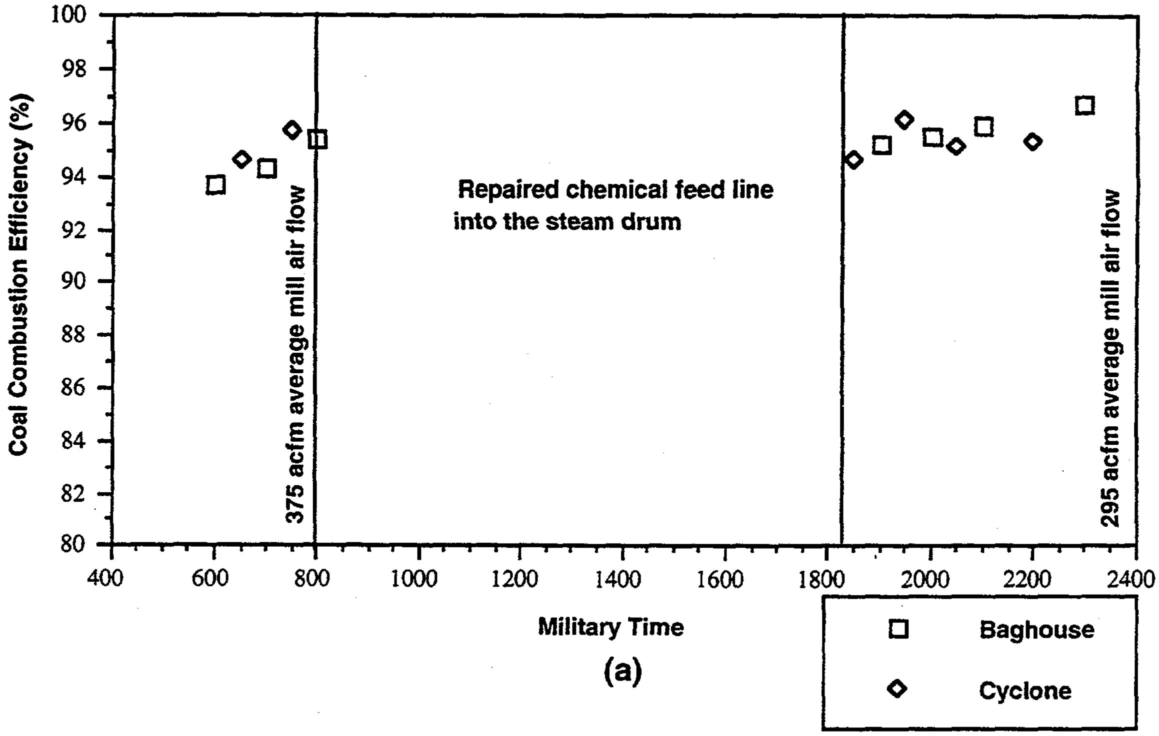


(a)

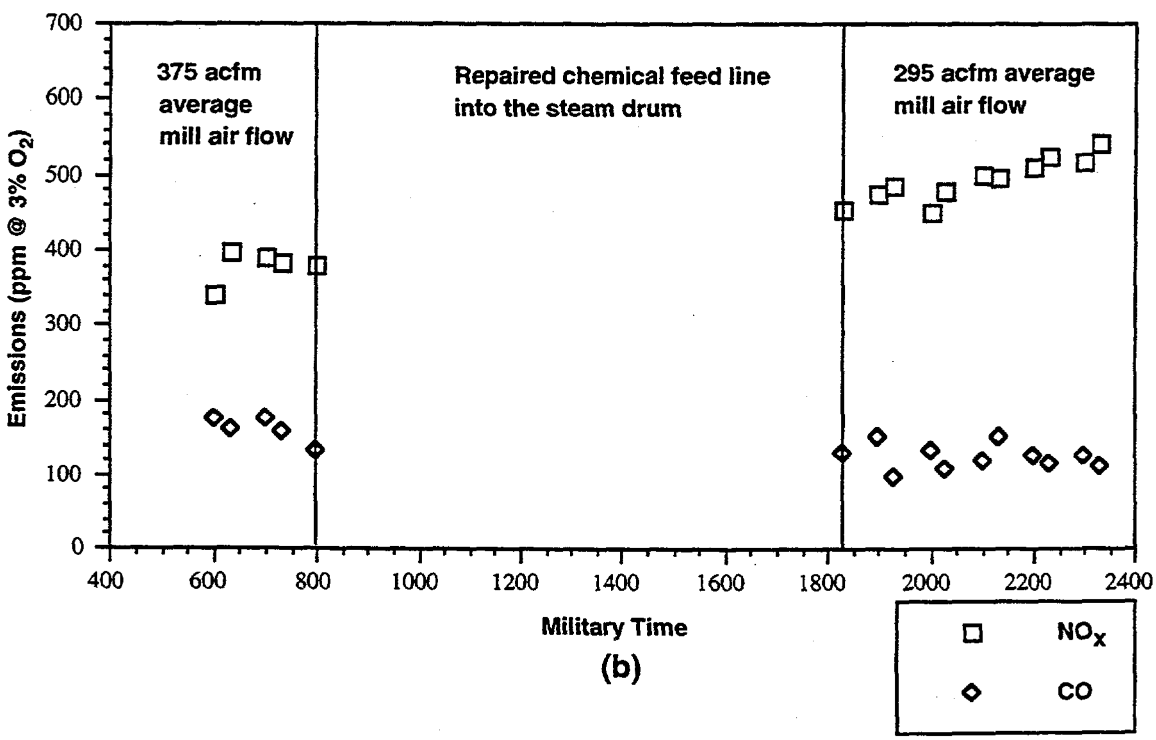


(b)

Figure D-23. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/25/95 WITH DAMPER SETTINGS OF 100/100/50/0



(a)



(b)

Figure D-24. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/30/95 WITH DAMPER SETTINGS OF 100/0/25/0

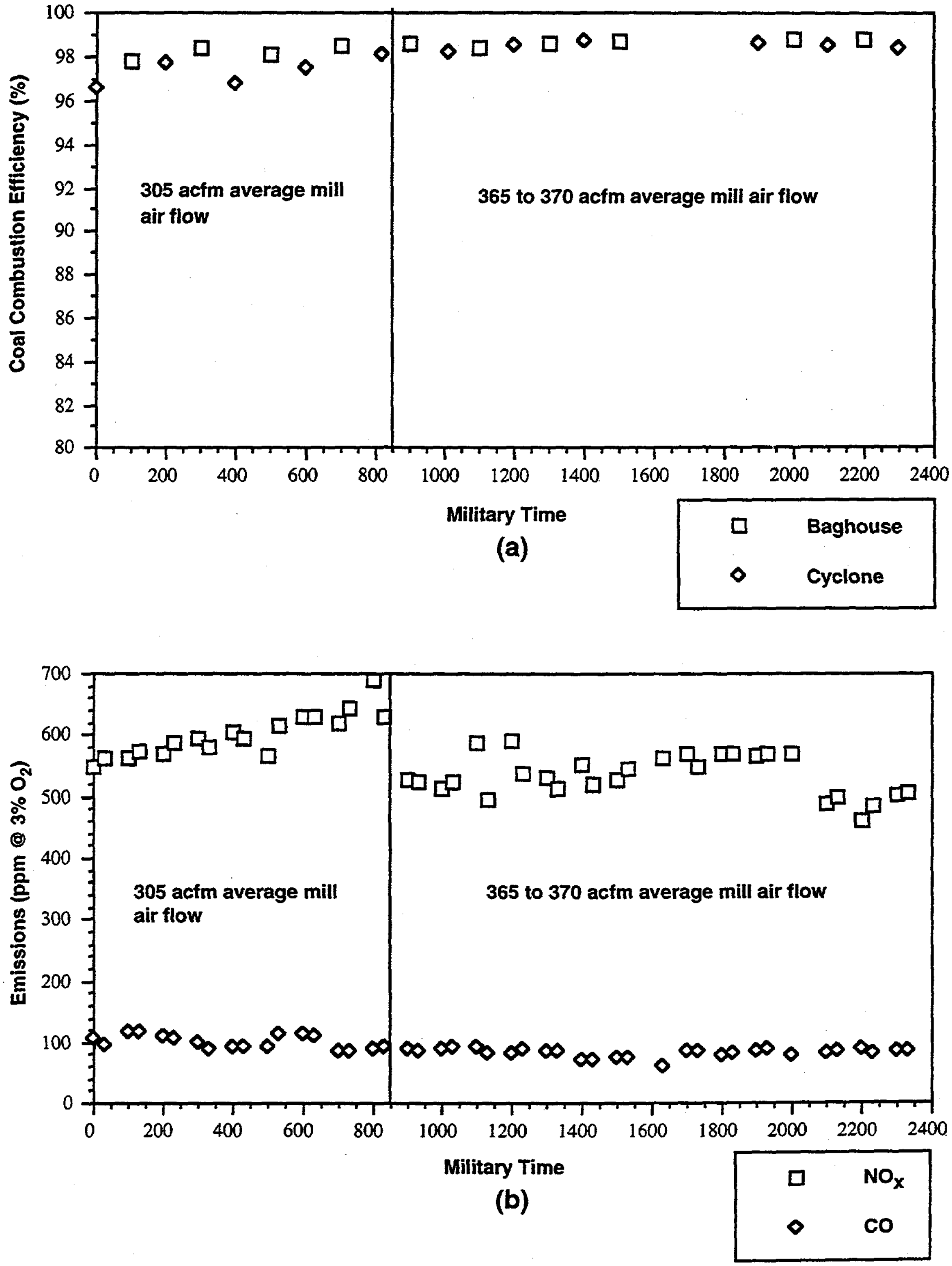
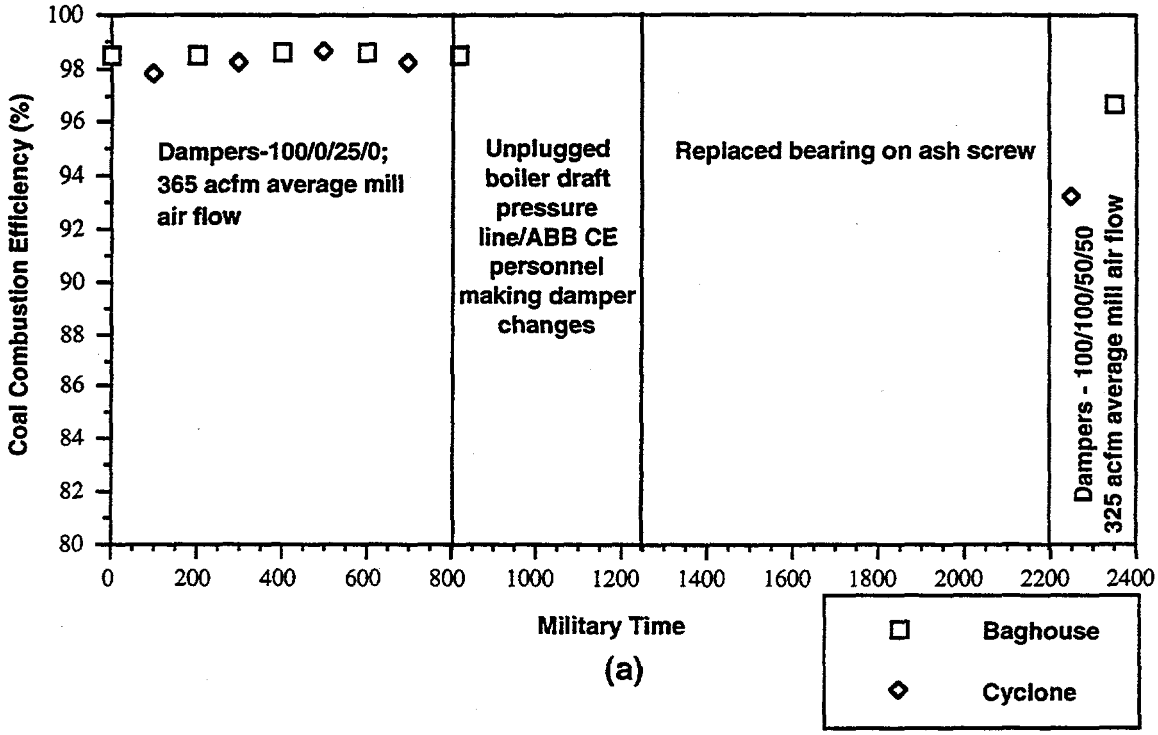
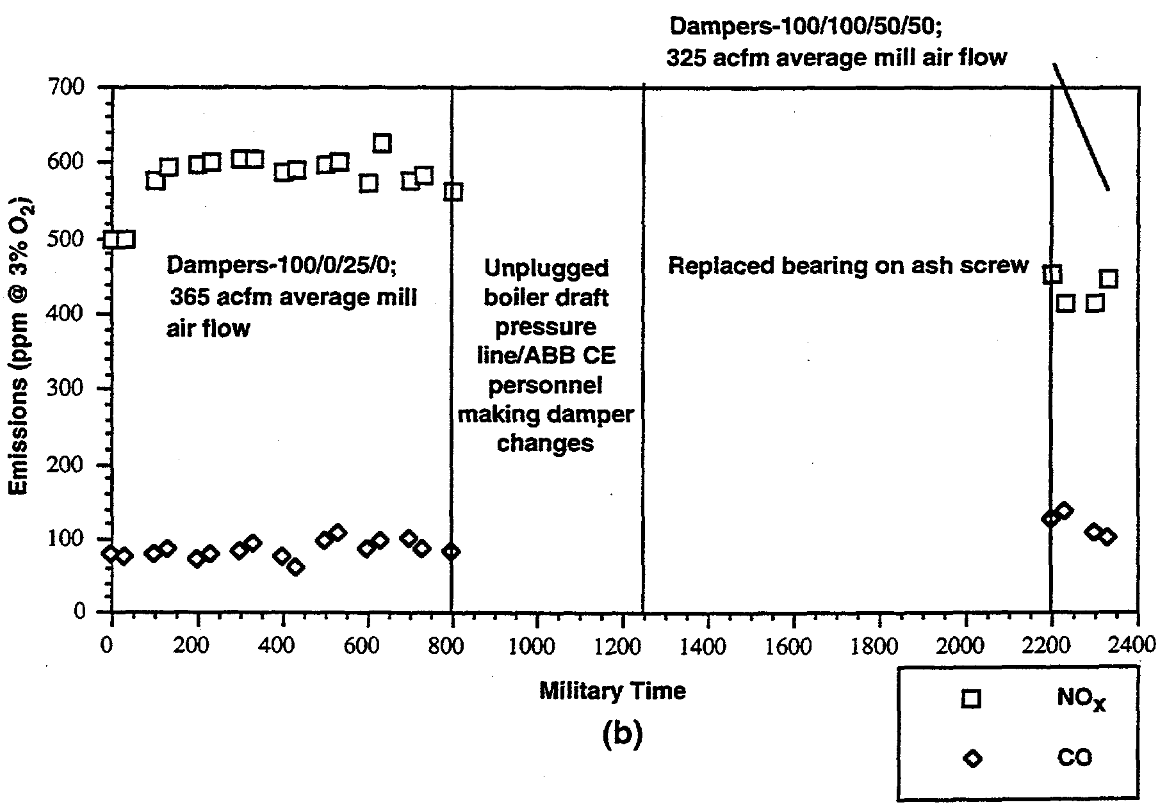


Figure D-25. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 10/31/95 WITH DAMPER SETTINGS OF 100/0/25/0

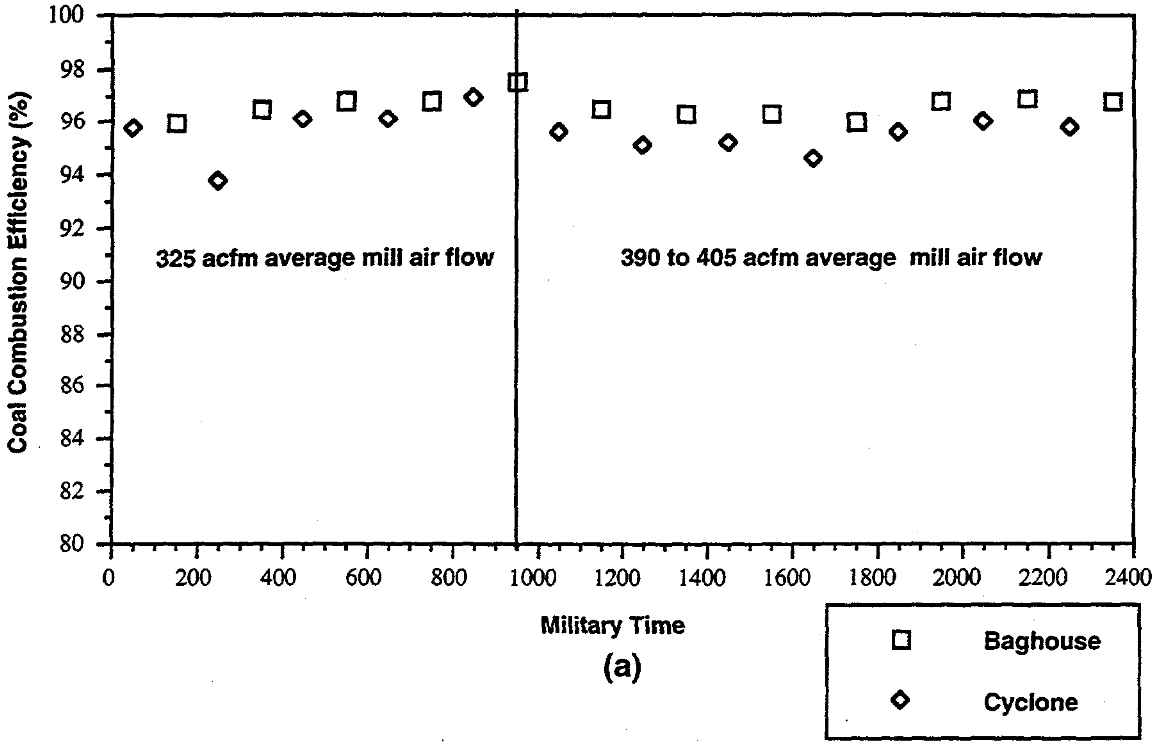


(a)



(b)

Figure D-26. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/01/95



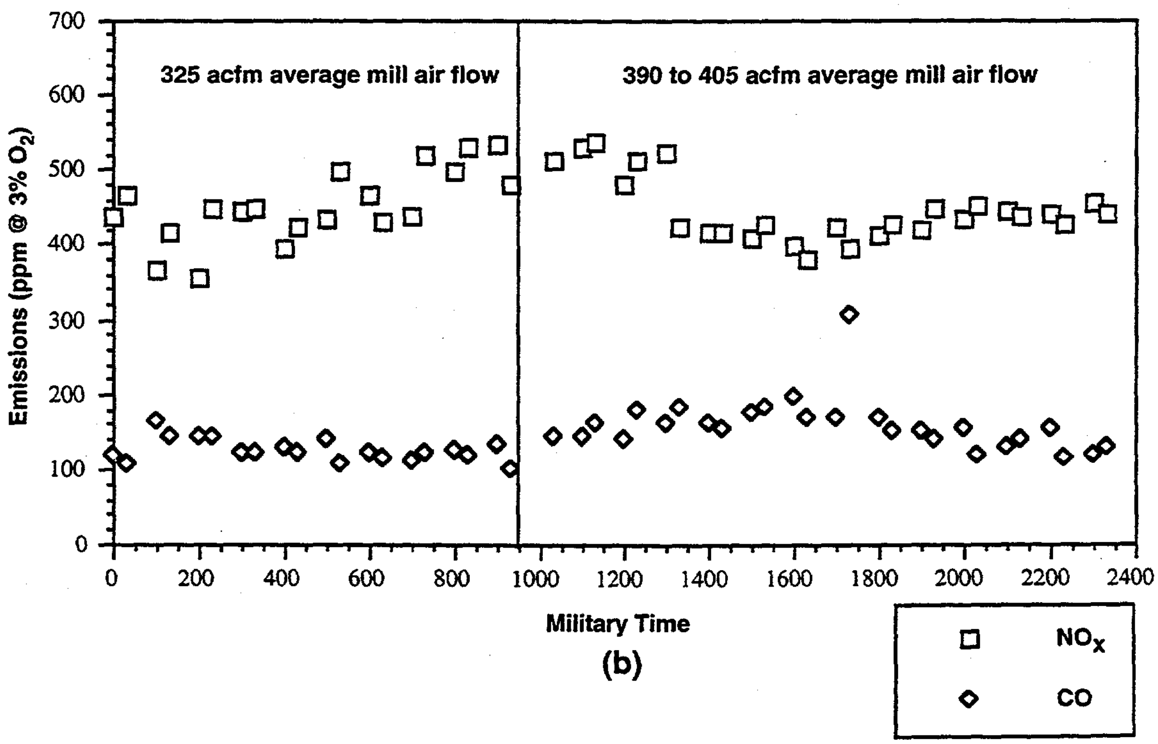
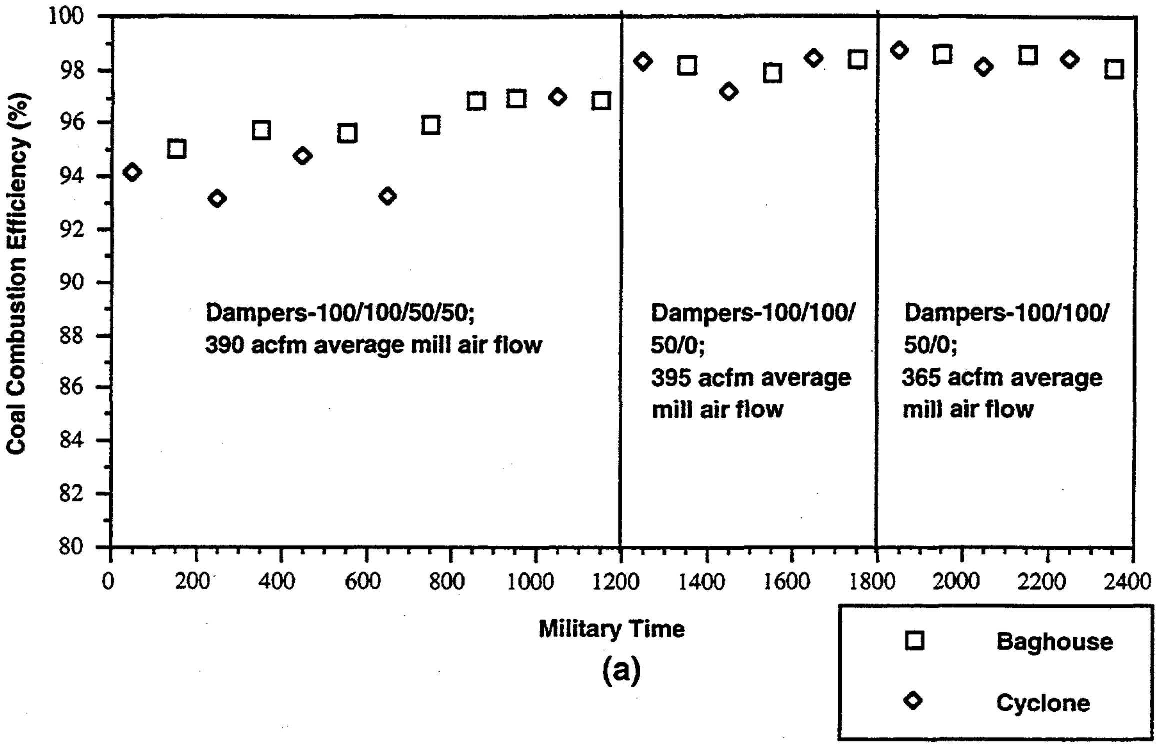
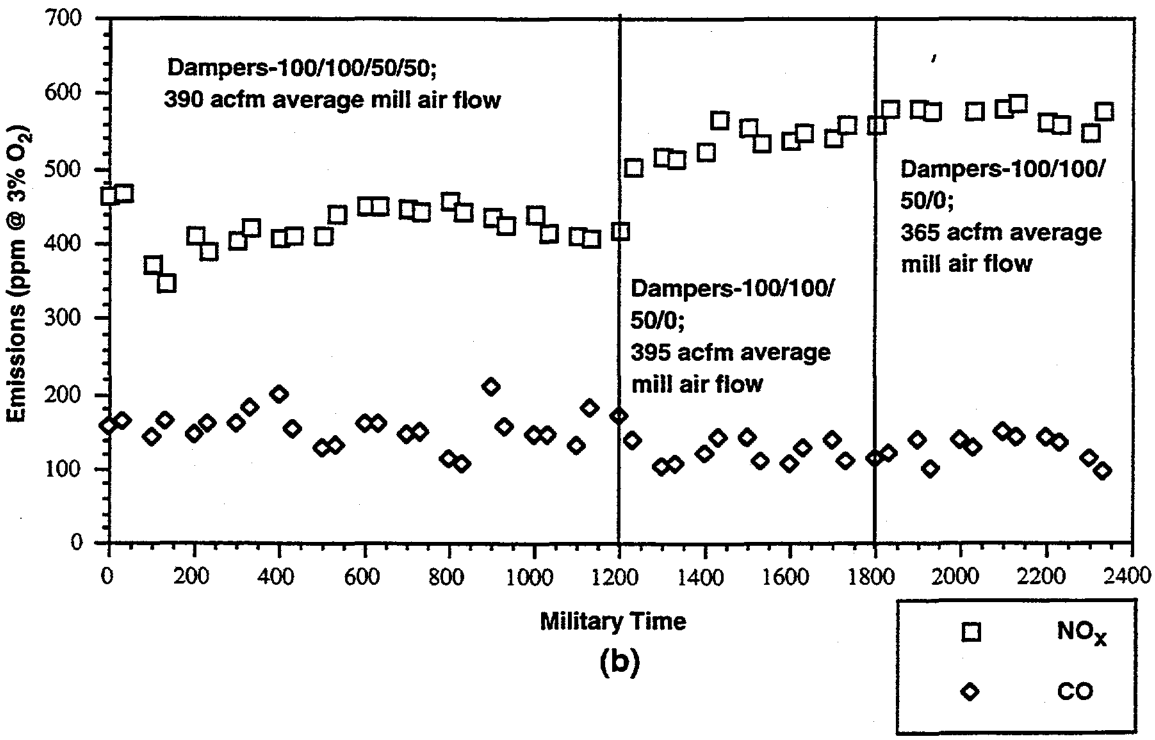


Figure D-27. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/02/95 WITH DAMPER SETTINGS OF 100/100/50/50



(a)



(b)

Figure D-28. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/03/95

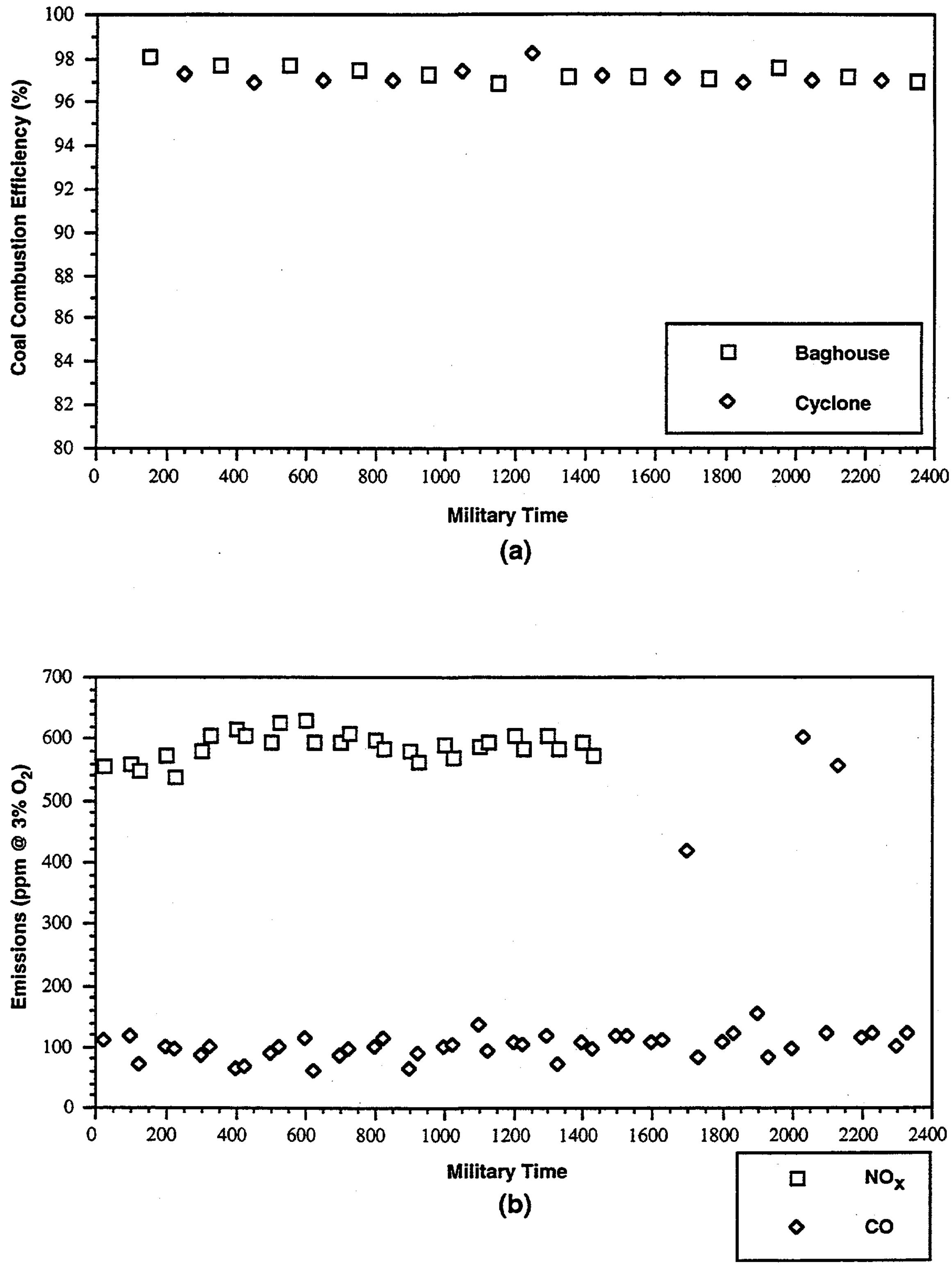
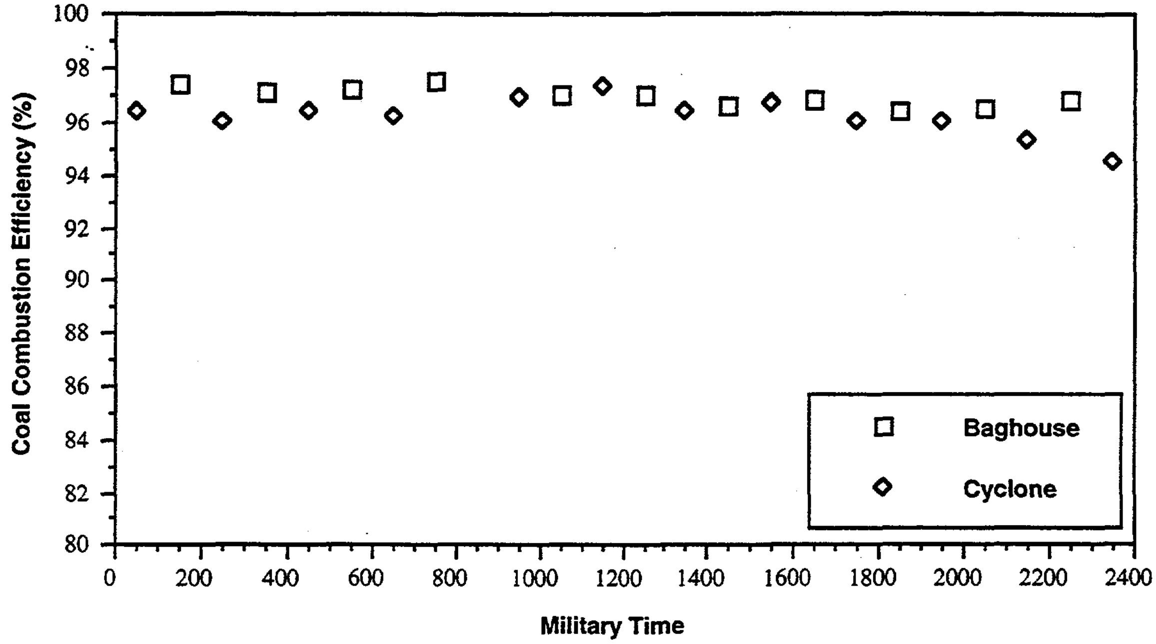
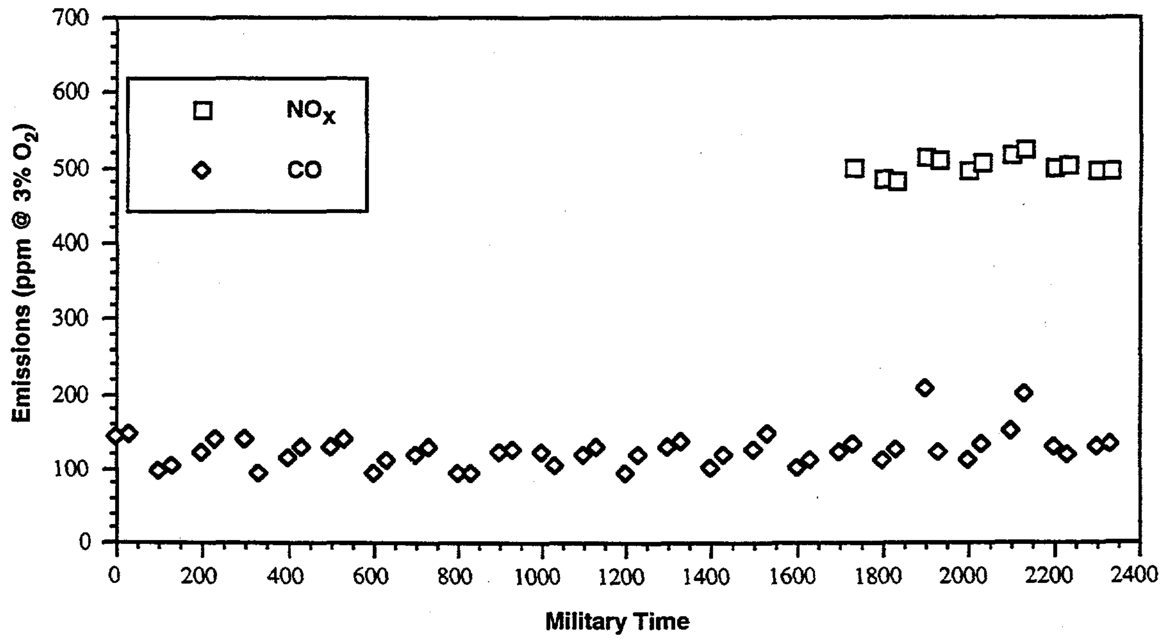


Figure D-29. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/04/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 365 TO 370 ACFM AVERAGE MILL AIR FLOW

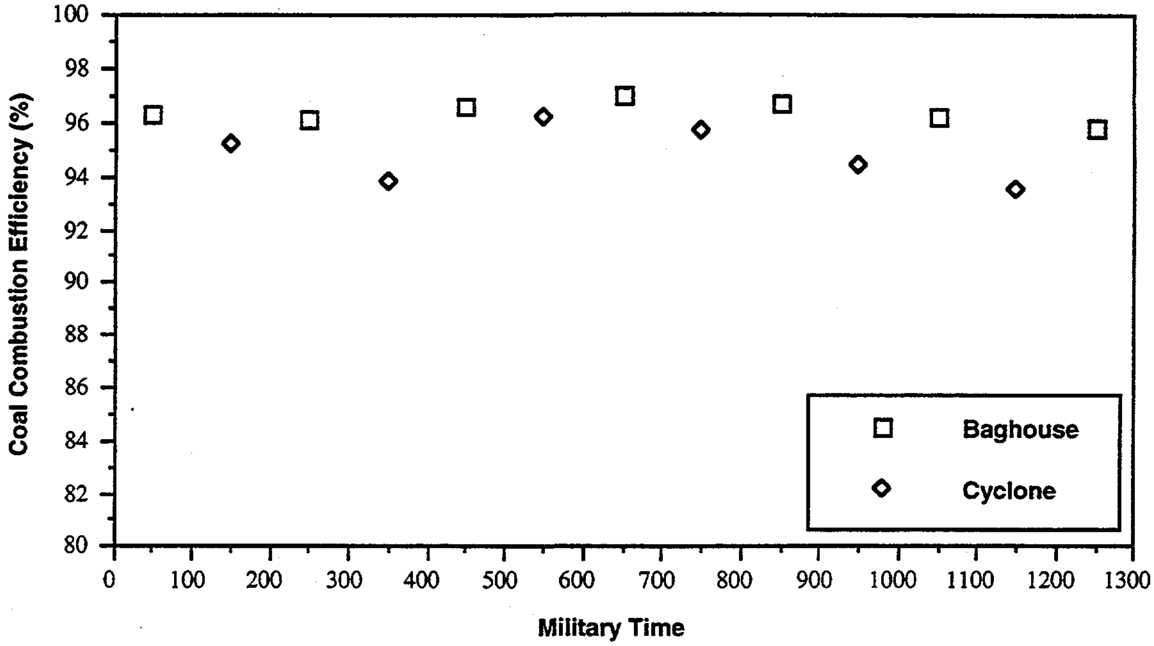


(a)

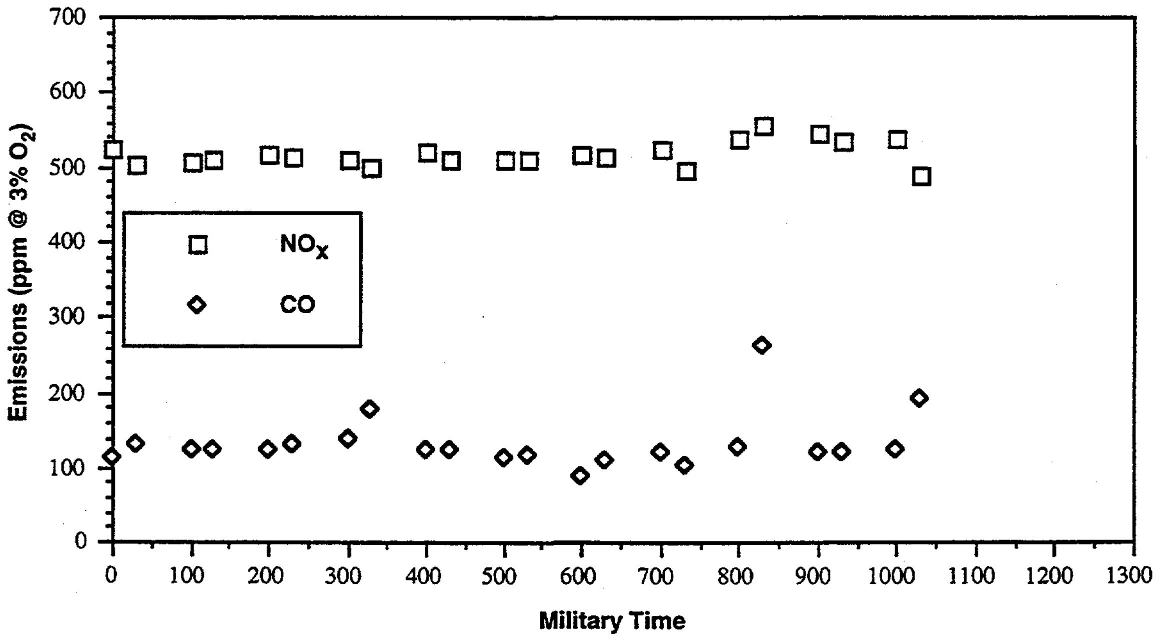


(b)

Figure D-30. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/05/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 360 TO 375 ACFM AVERAGE MILL FLOW

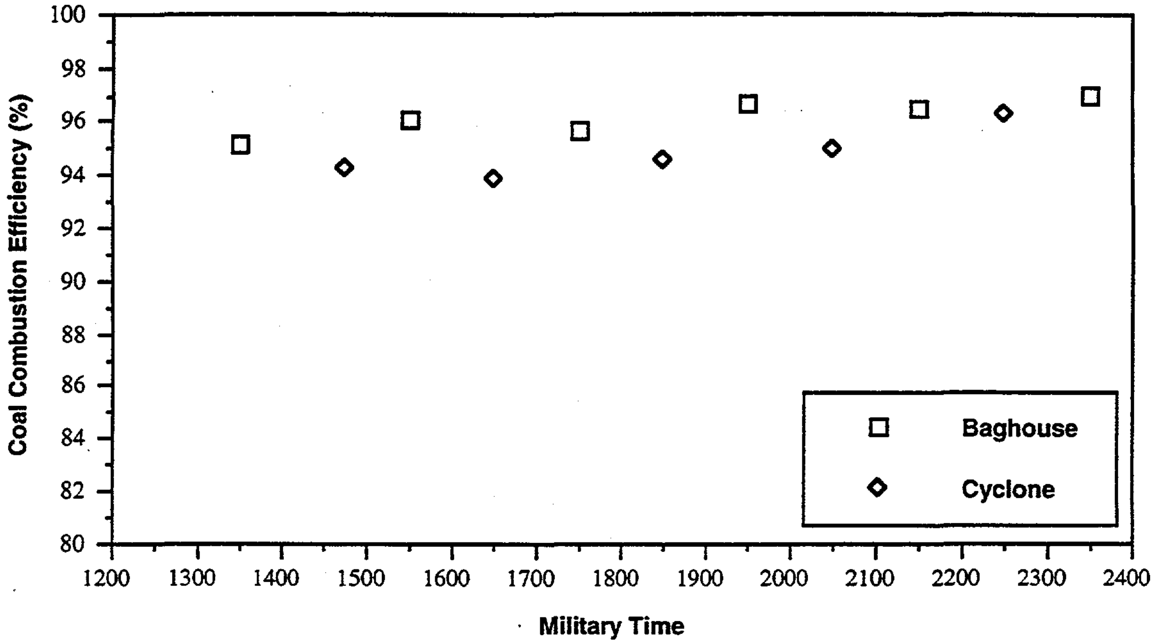


(a)

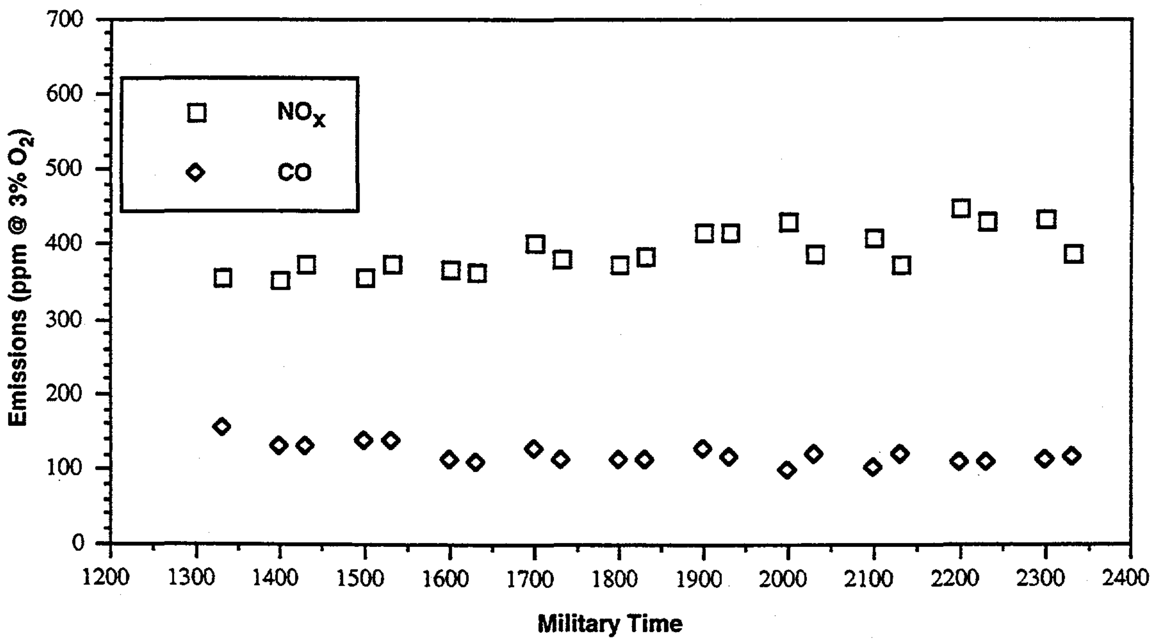


(b)

Figure D-31. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/06/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 365 TO 380 ACFM AVERAGE MILL FLOW

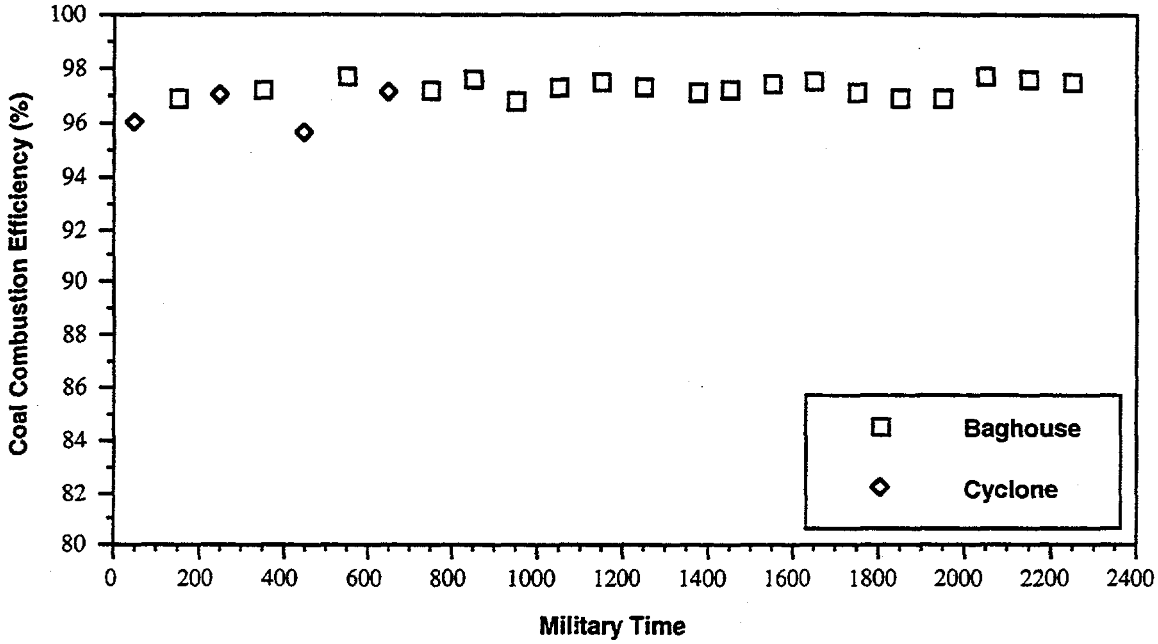


(a)

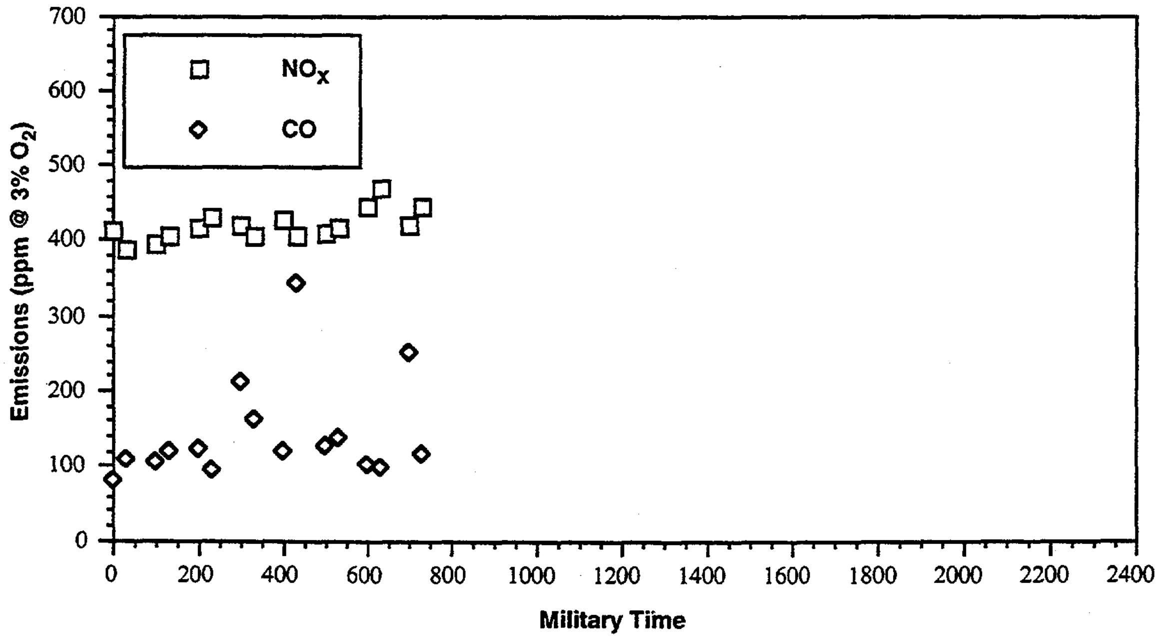


(b)

Figure D-32. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/13/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 375 TO 405 ACFM AVERAGE MILL FLOW

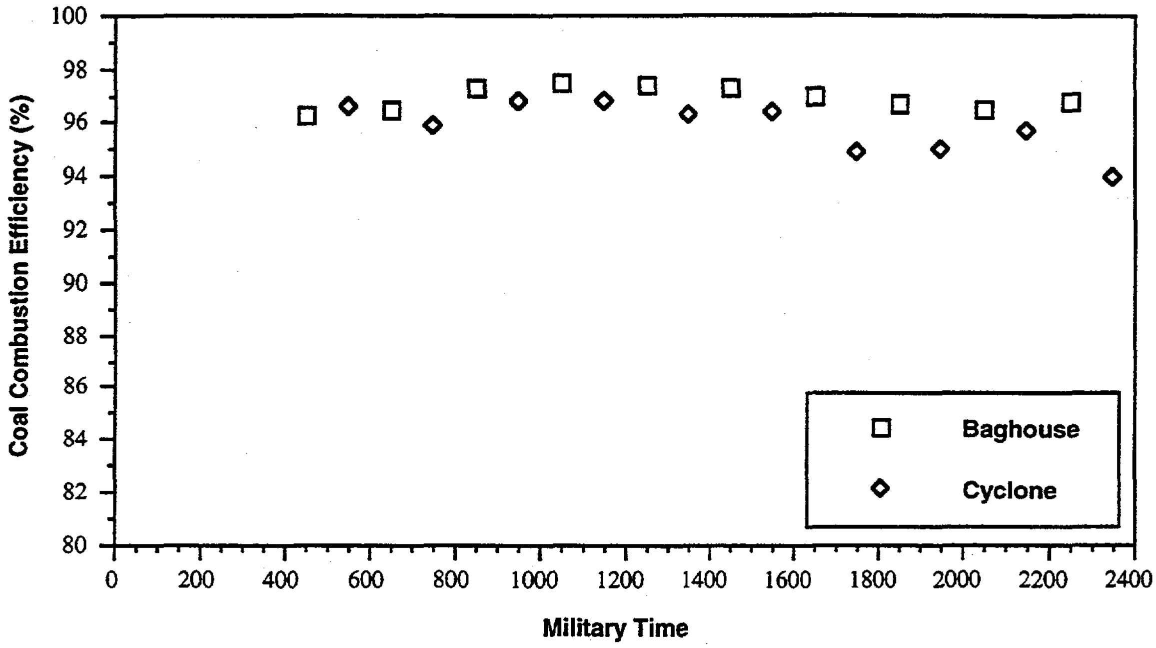


(a)

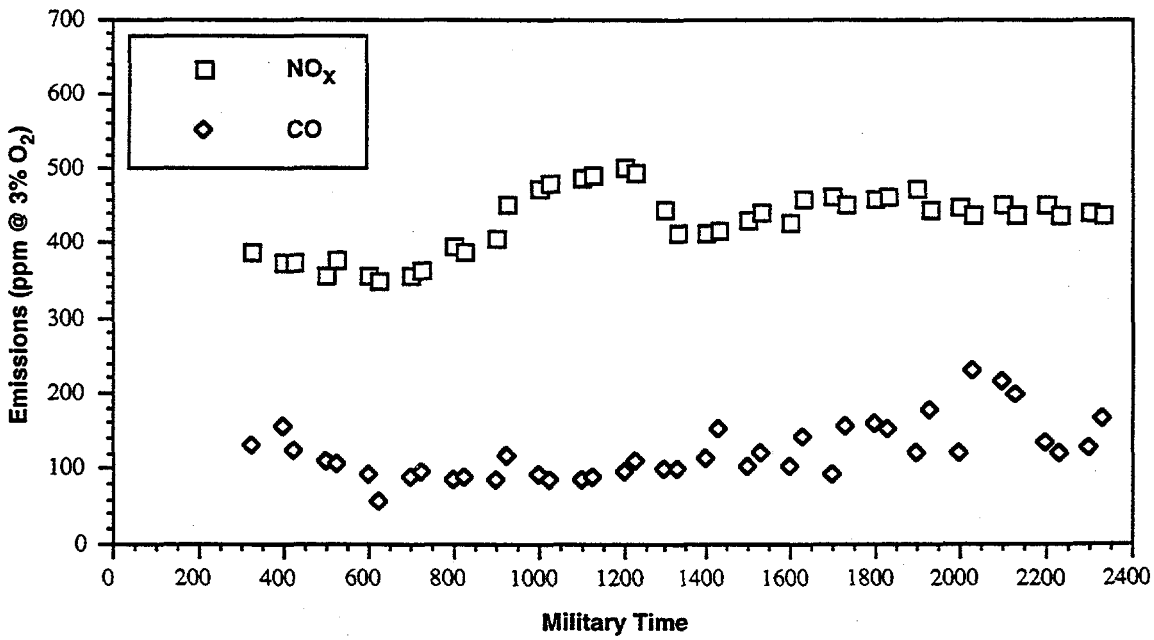


(b)

Figure D-33. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/14/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 365 TO 395 ACFM AVERAGE MILL FLOW



(a)



(b)

Figure D-34. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/16/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 370 TO 410 MILL AIR FLOW

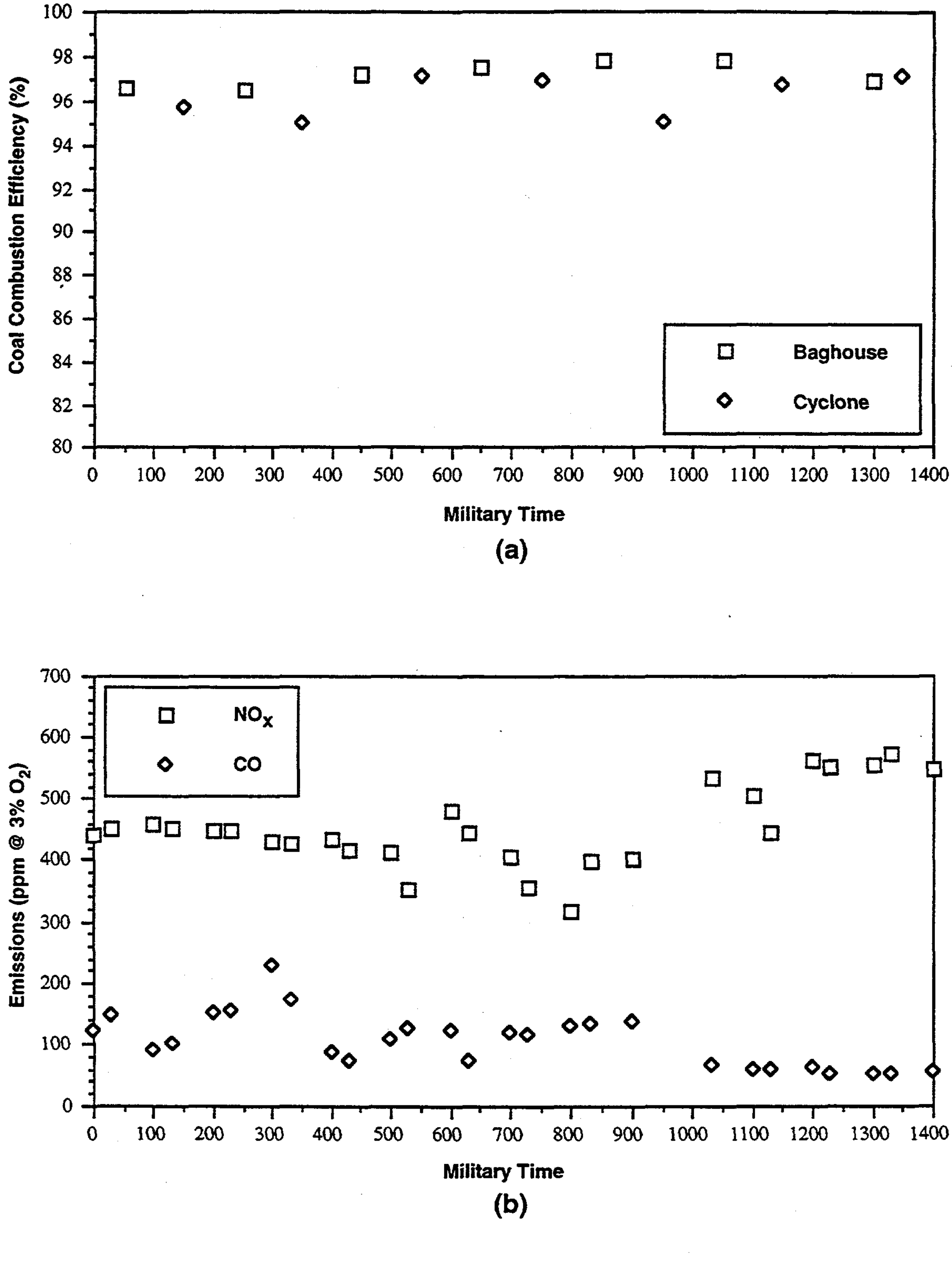
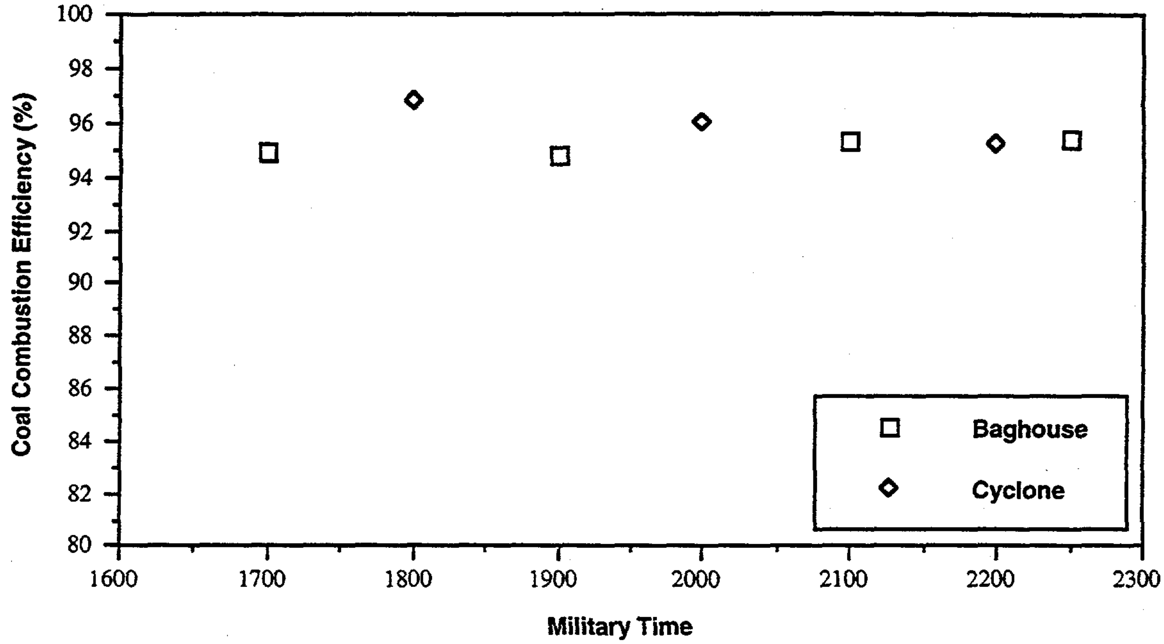
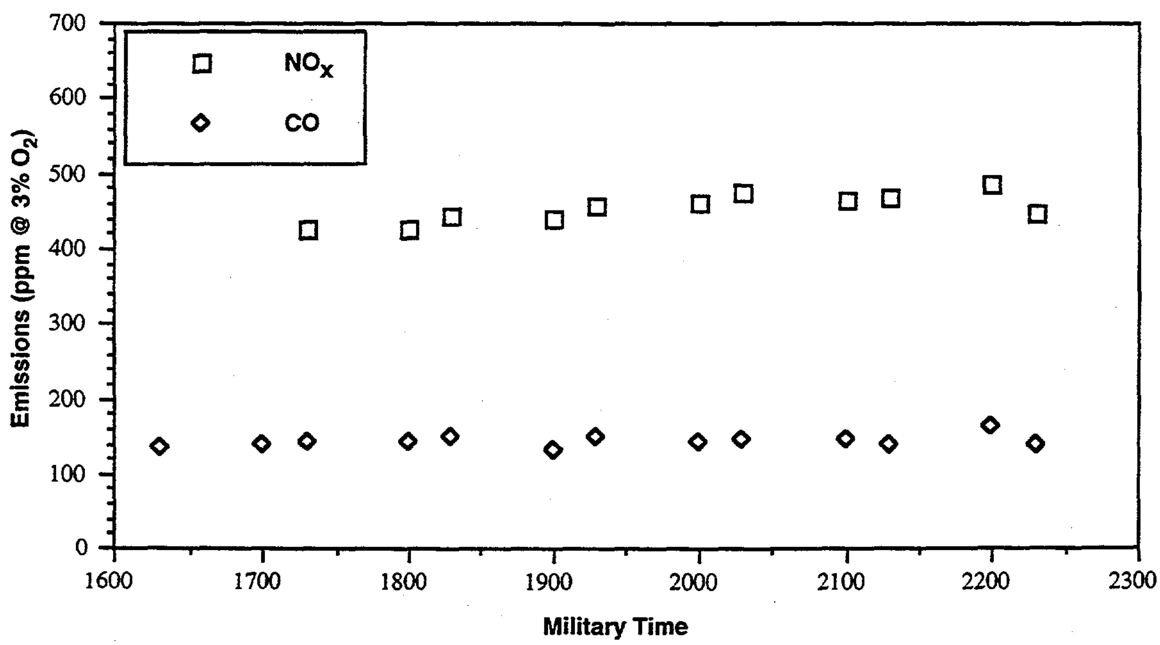


Figure D-35. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/17/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 370 TO 395 MILL AIR FLOW

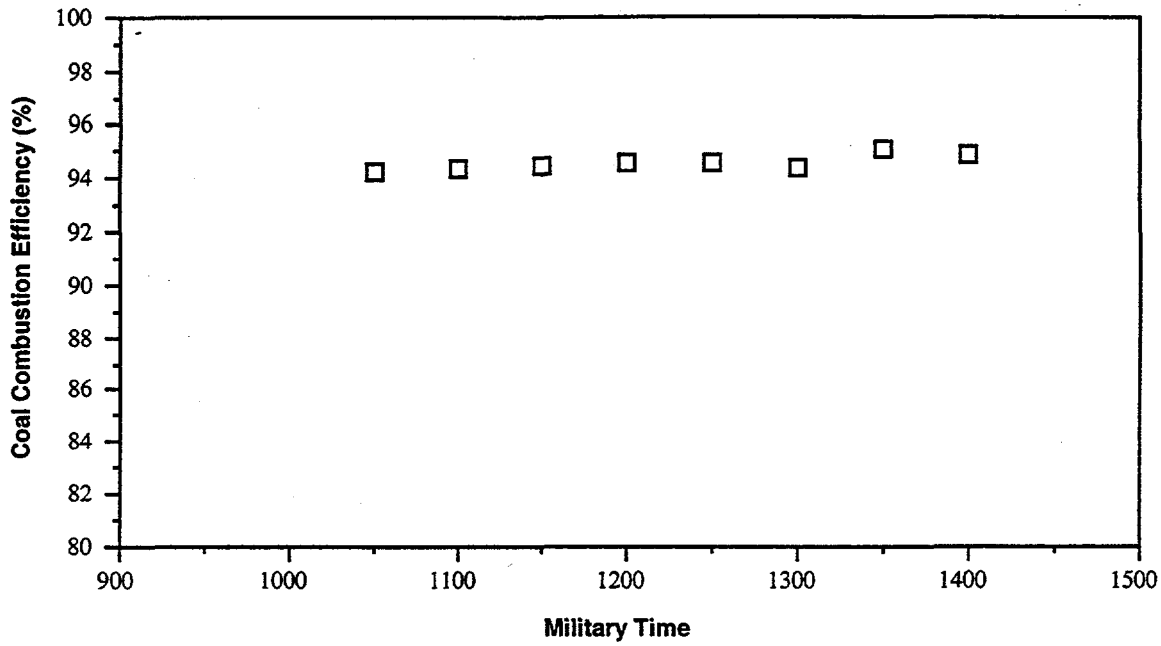


(a)

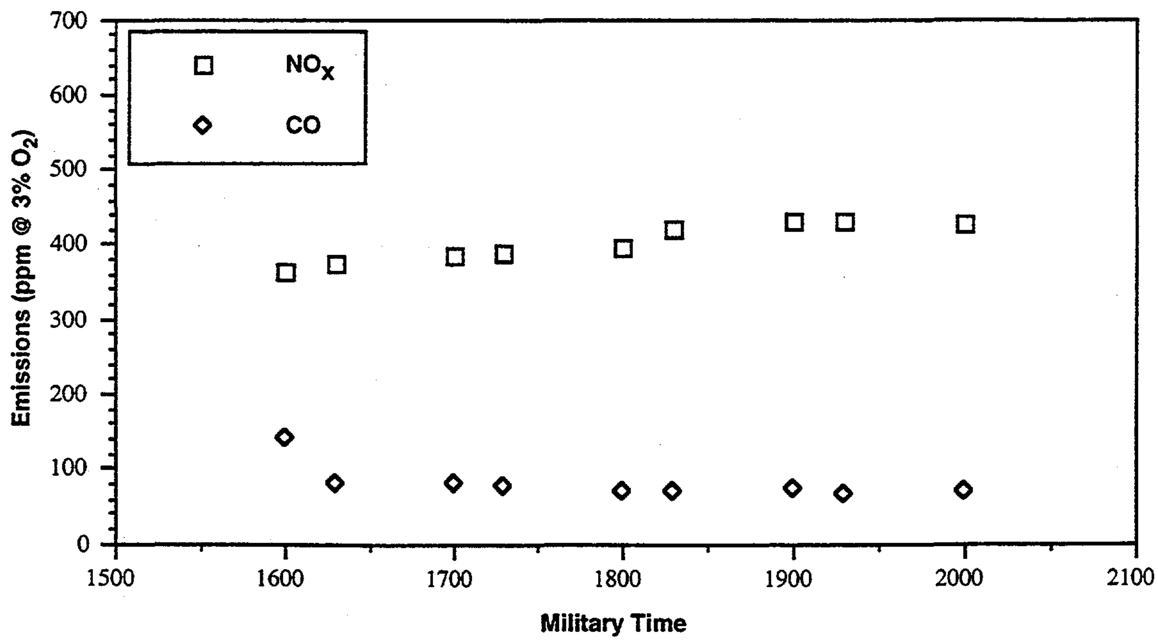


(b)

Figure D-36. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/22/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 380 TO 400 MILL AIR FLOW

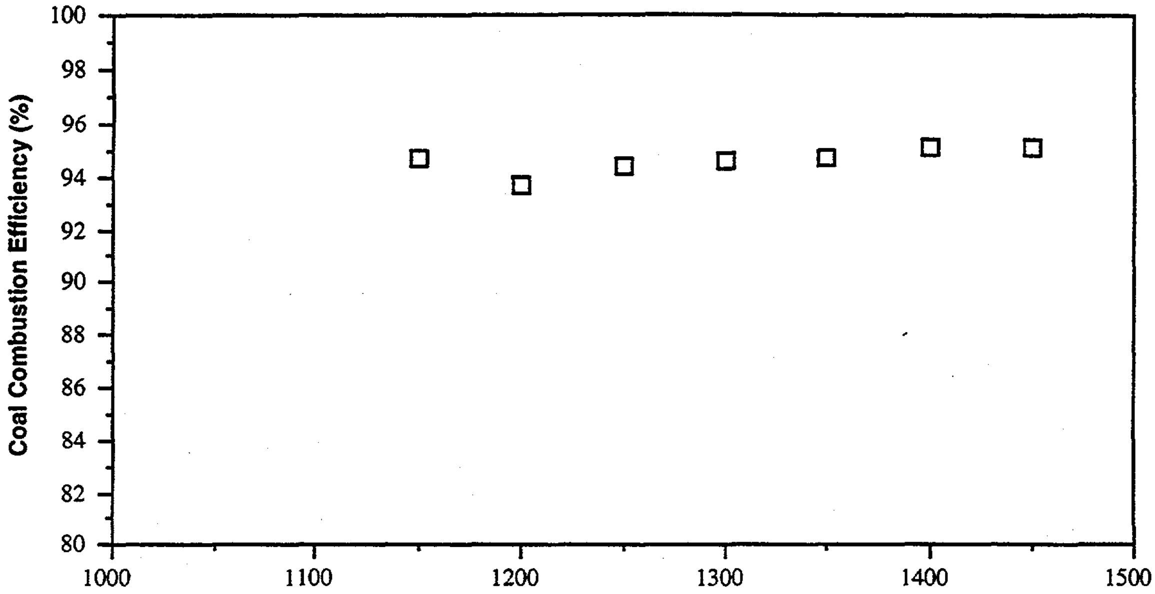


(a)

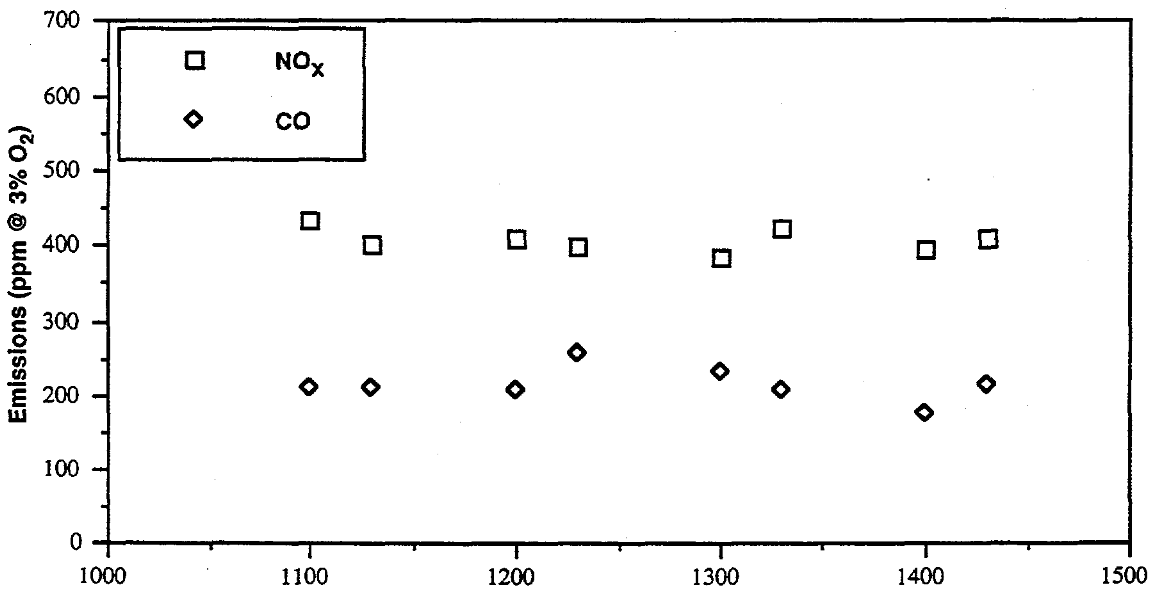


(b)

Figure D-37. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/28/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 385 TO 395 MILL AIR FLOW

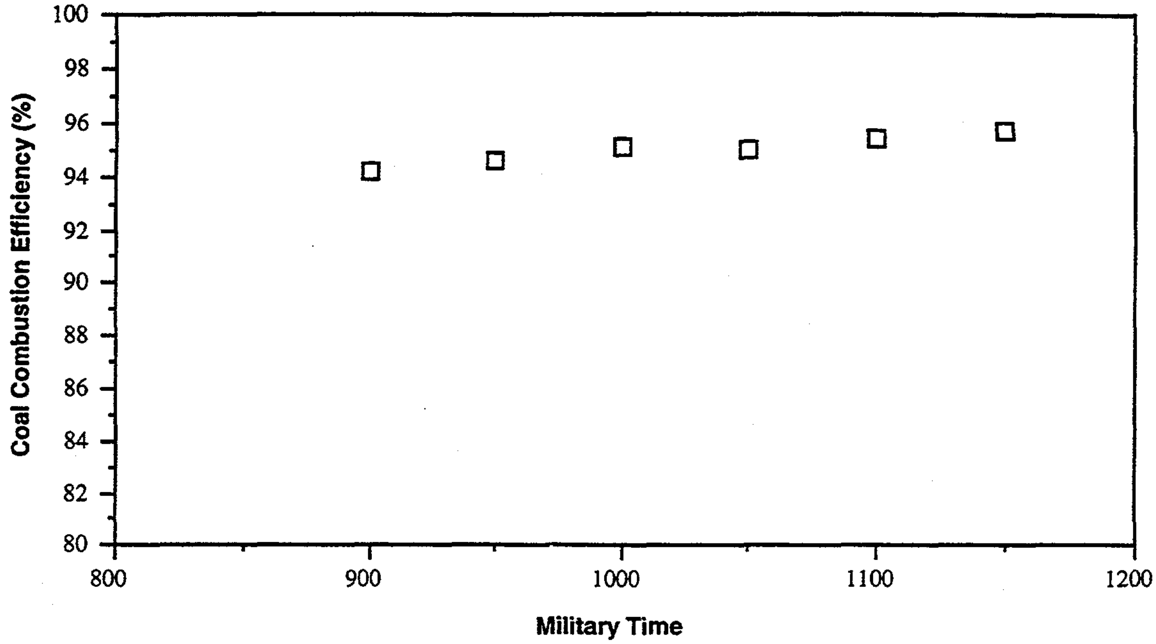


(a)

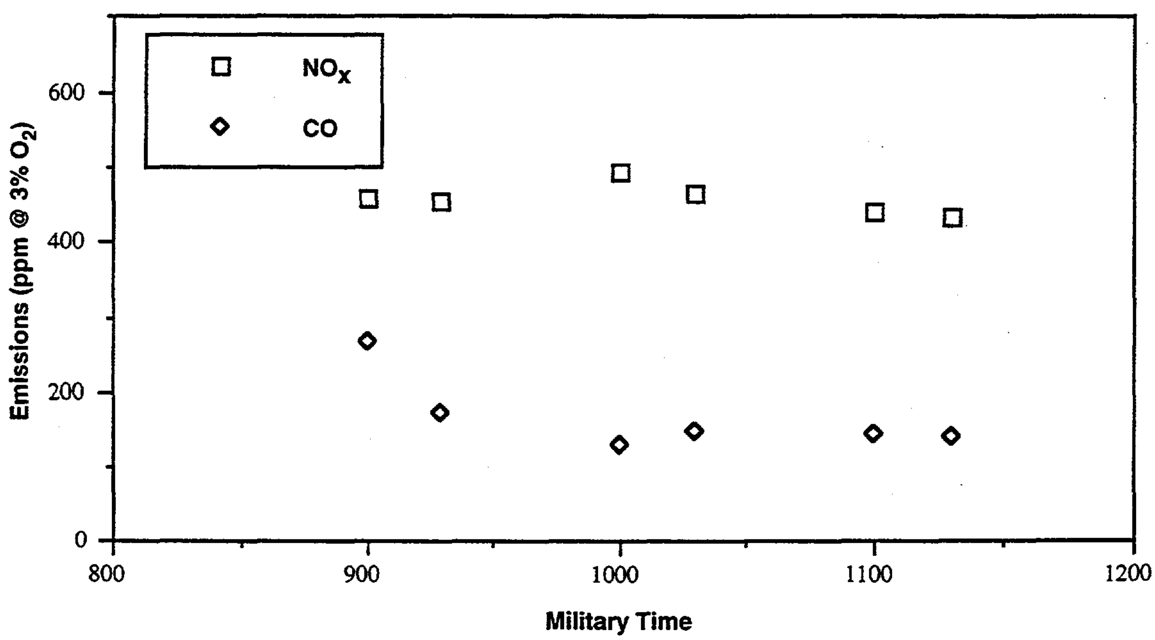


(b)

Figure D-38. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/29/95 WITH DAMPER SETTINGS OF 100/100/50/0, 300 TO 325 ACFM MILL AIR FLOW, AND COAL GUN POSITION OF 36.5"

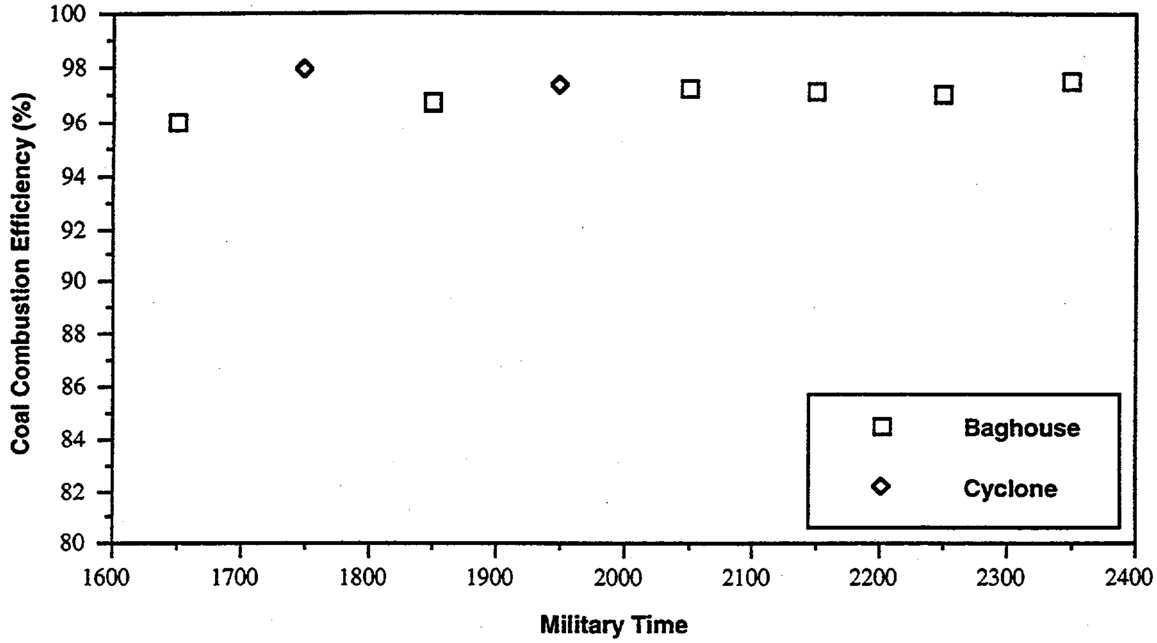


(a)

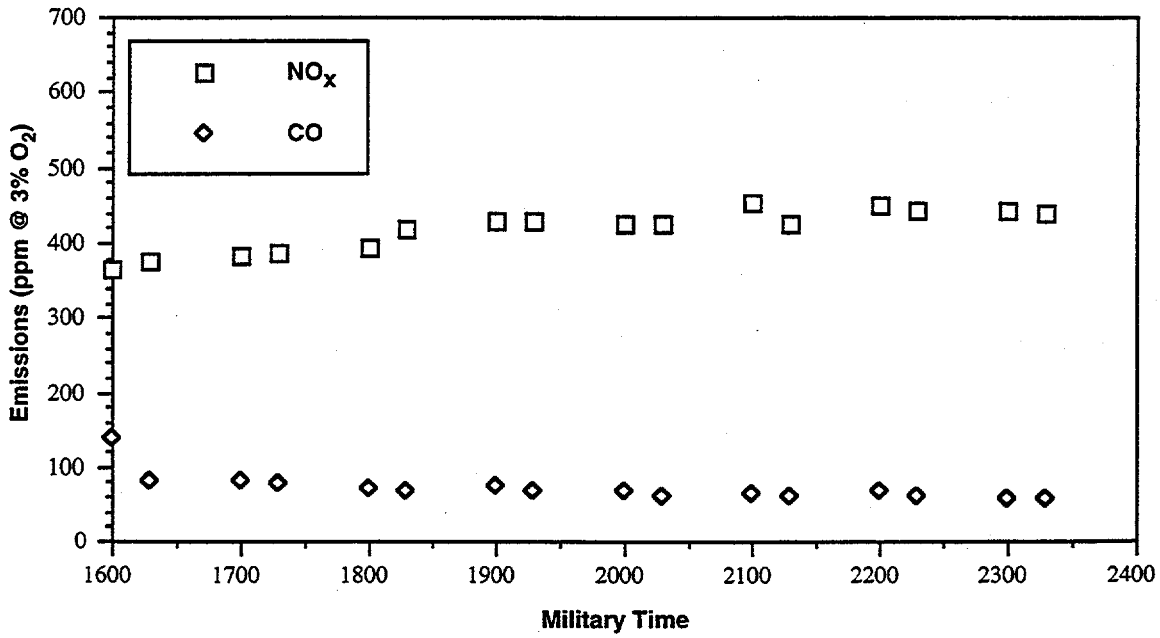


(b)

Figure D-39. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 11/30/95 WITH DAMPER SETTINGS OF 100/100/50/0, 300 TO 320 ACFM MILL AIR FLOW, AND COAL GUN POSITION OF 39.5"



(a)



(b)

Figure D-40. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 12/13/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 360 TO 375 ACFM MILL AIR FLOW

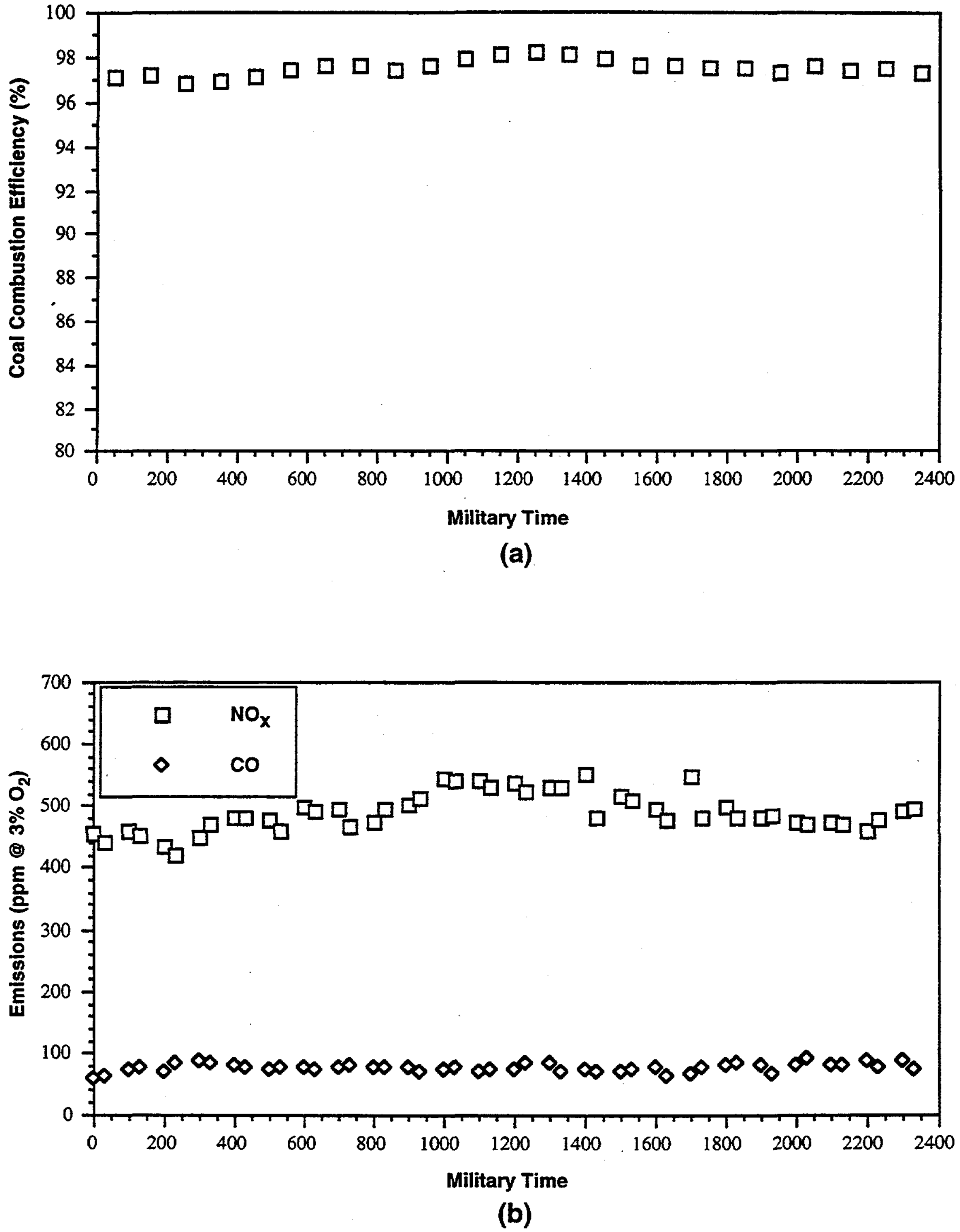
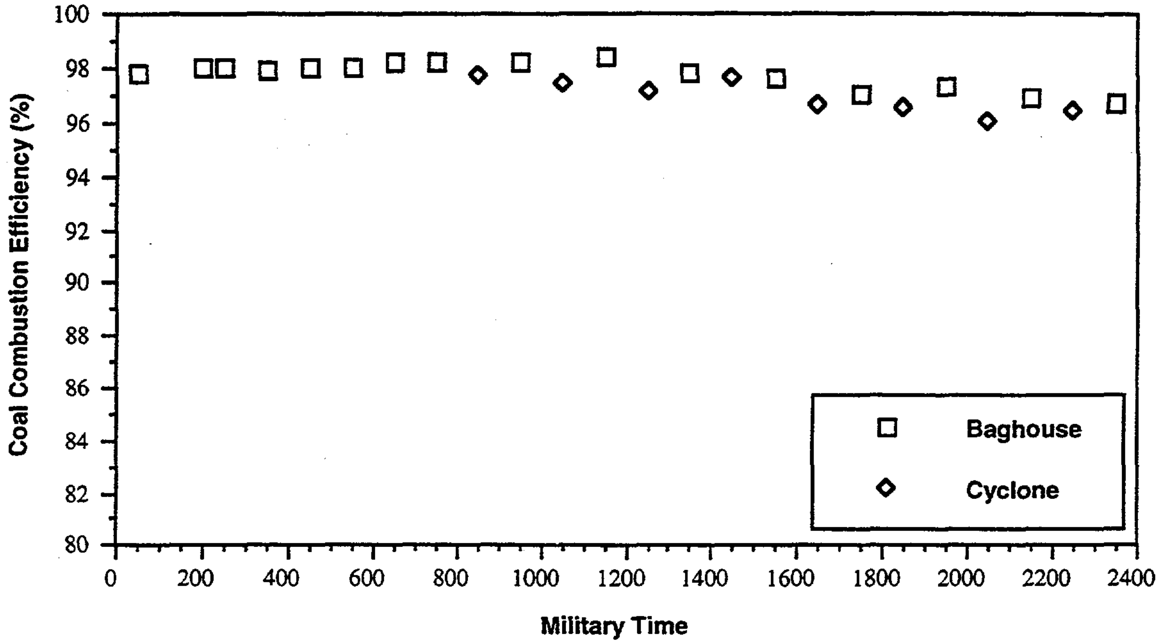
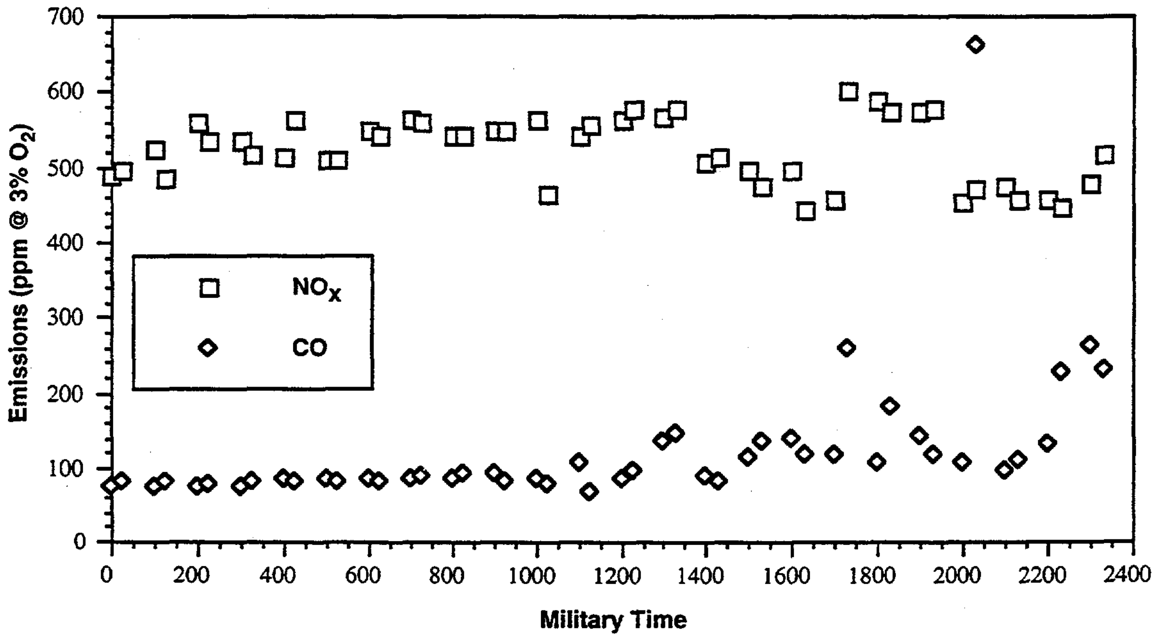


Figure D-41. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 12/14/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 365 TO 385 ACFM MILL AIR FLOW

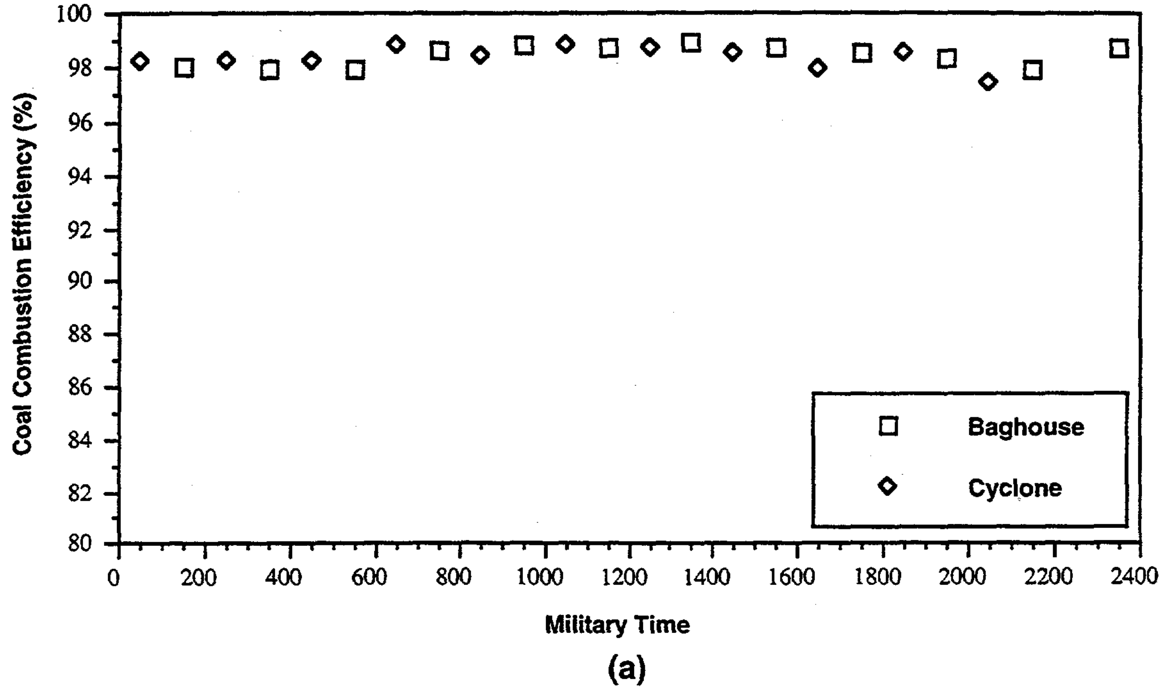


(a)



(b)

Figure D-42. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 12/15/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 360 TO 395 ACFM MILL AIR FLOW



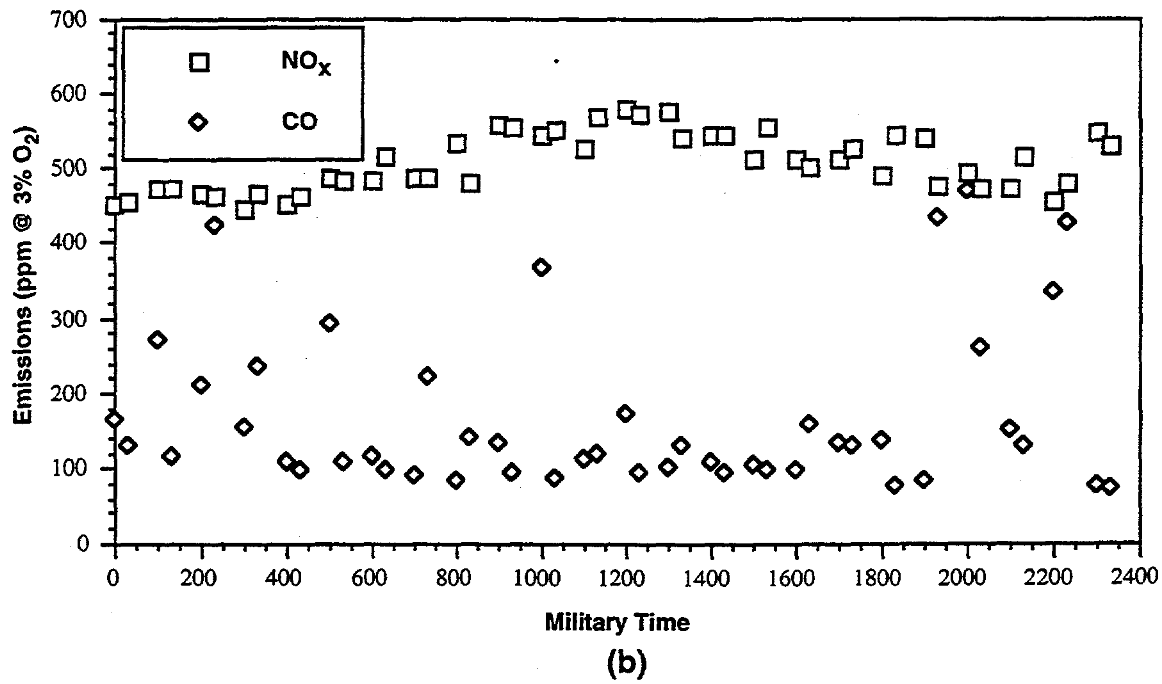
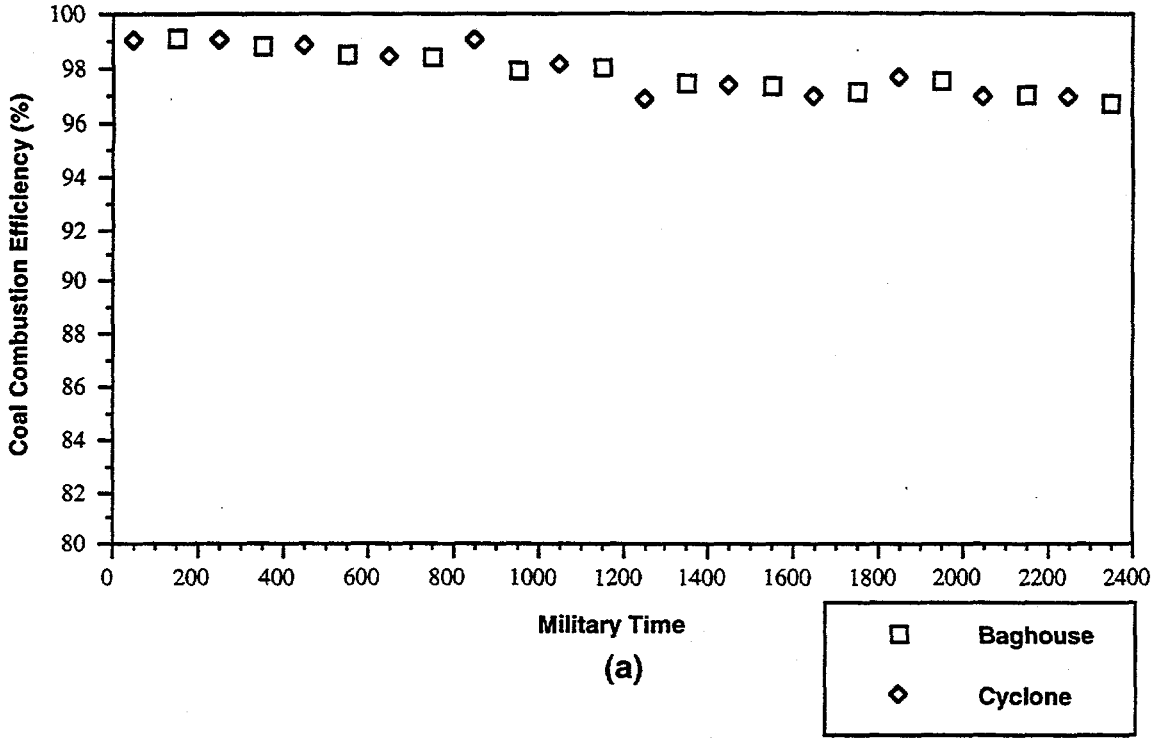
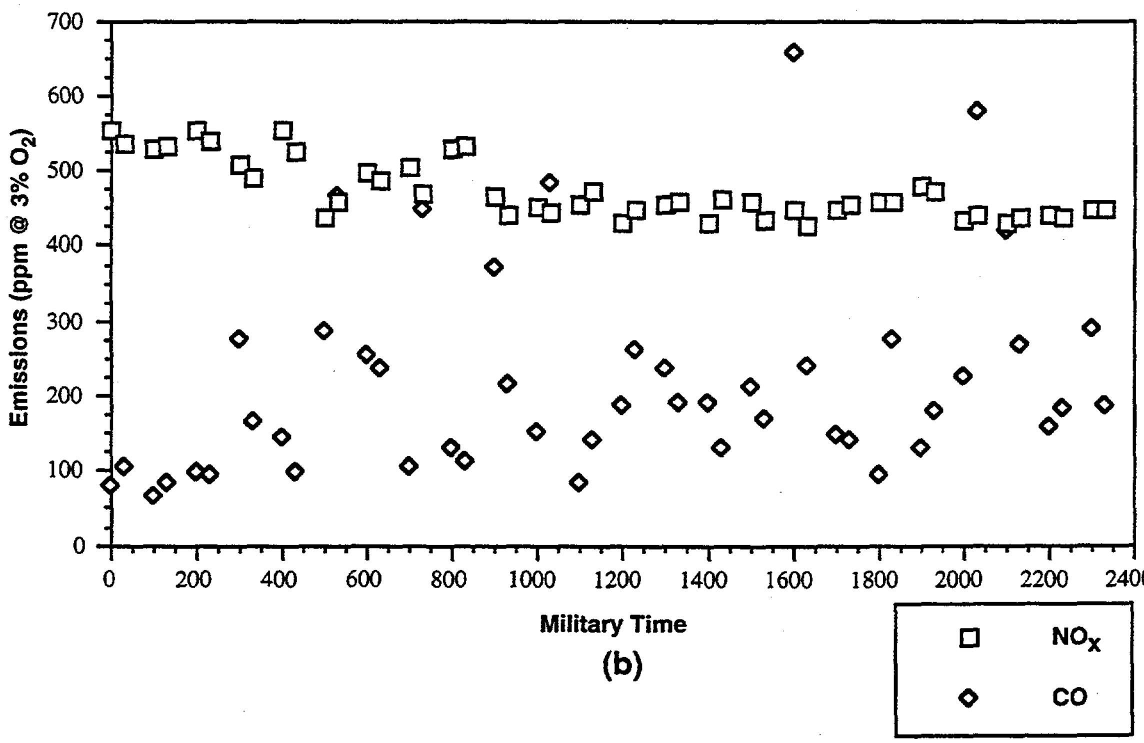


Figure D-43. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 12/16/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 360 TO 385 ACFM MILL AIR FLOW

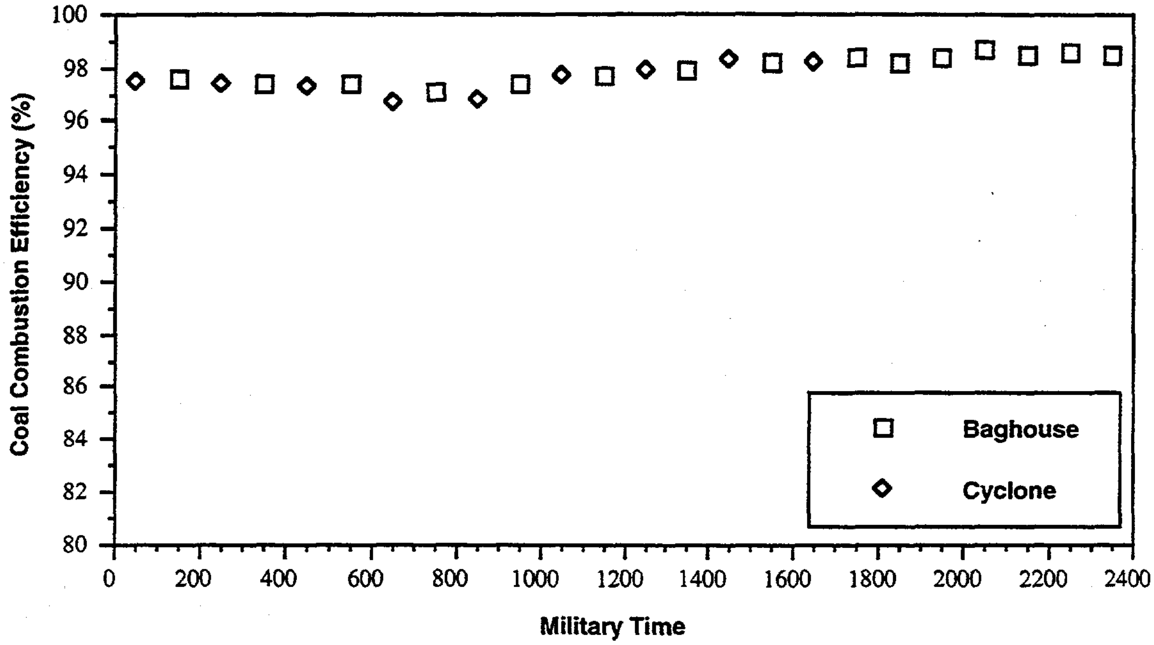


(a)

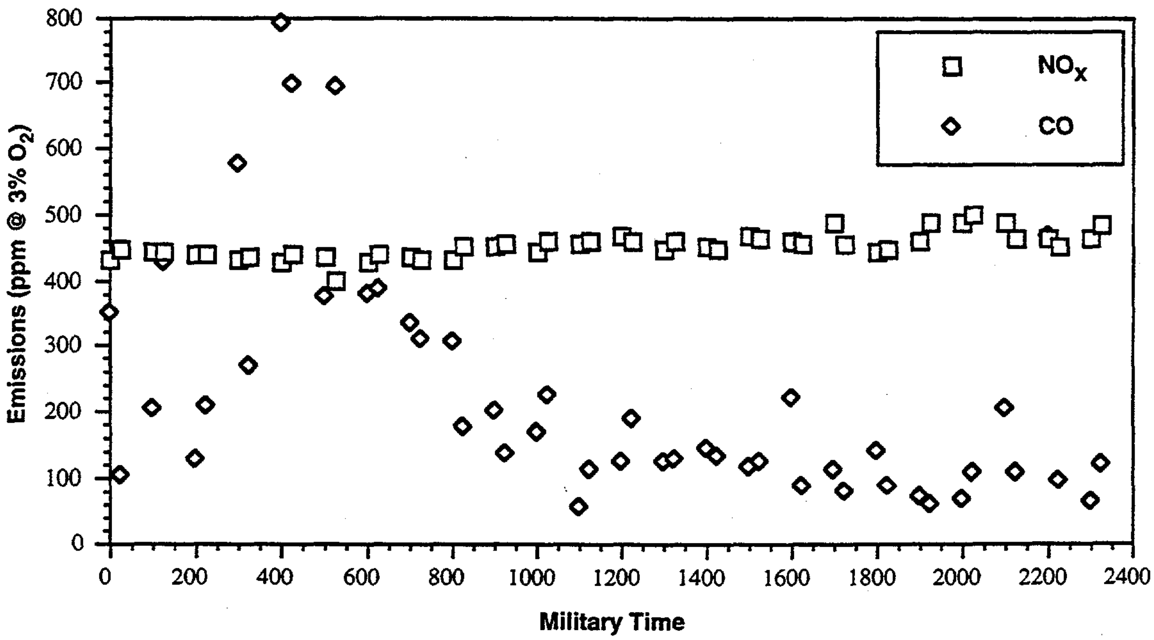


(b)

Figure D-44. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 12/17/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 375 TO 390 ACFM MILL AIR FLOW

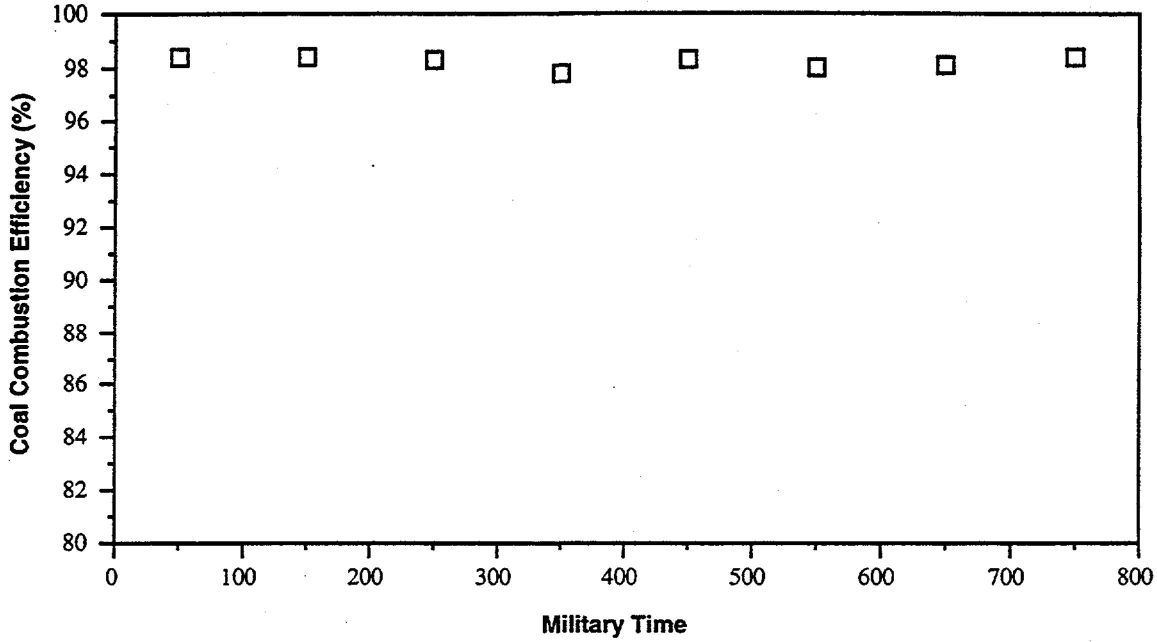


(a)

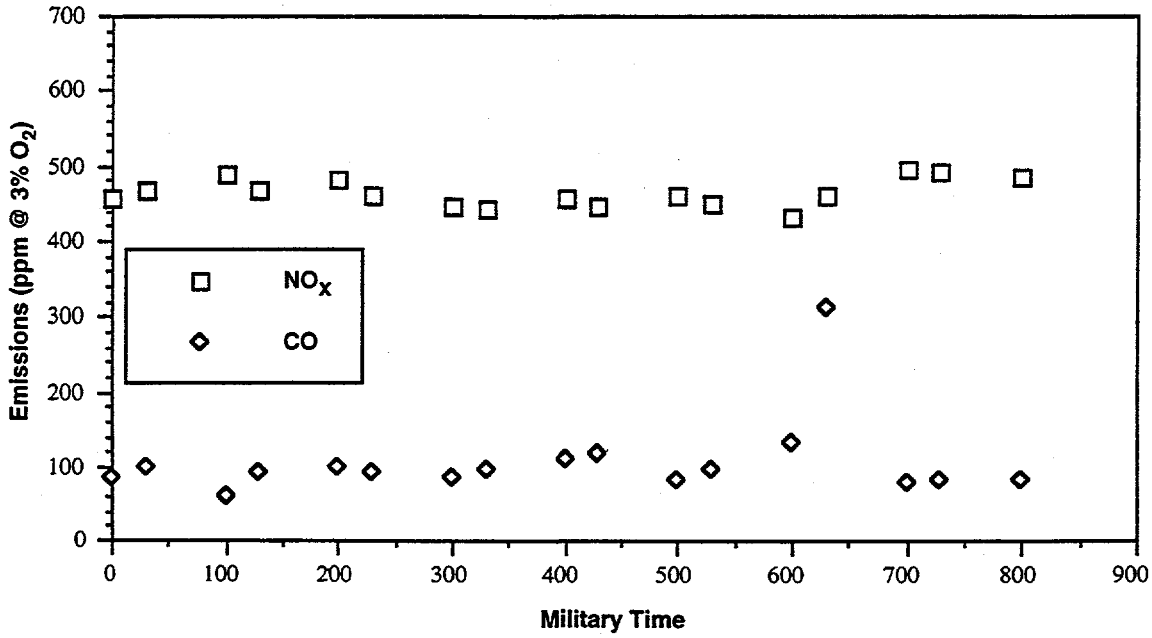


(b)

Figure D-45. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 12/18/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 360 TO 395 ACFM MILL AIR FLOW

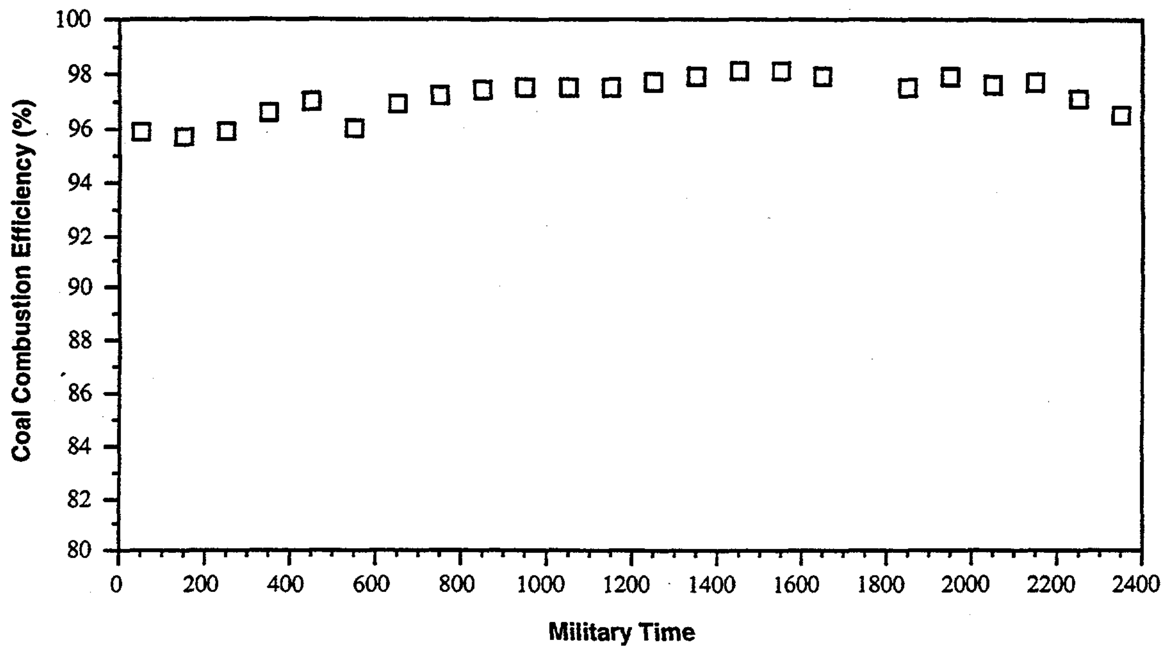


(a)

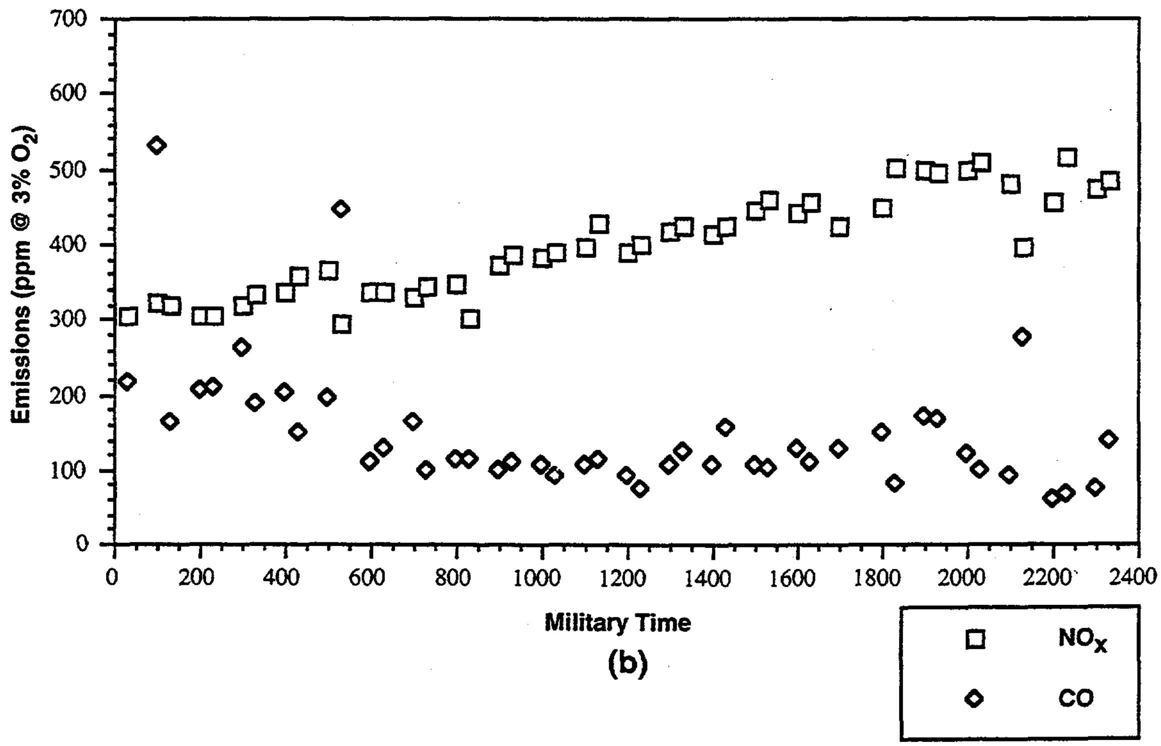


(b)

Figure D-46. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 12/19/95 WITH DAMPER SETTINGS OF 100/100/50/0 AND 360 TO 380 ACFM MILL AIR FLOW

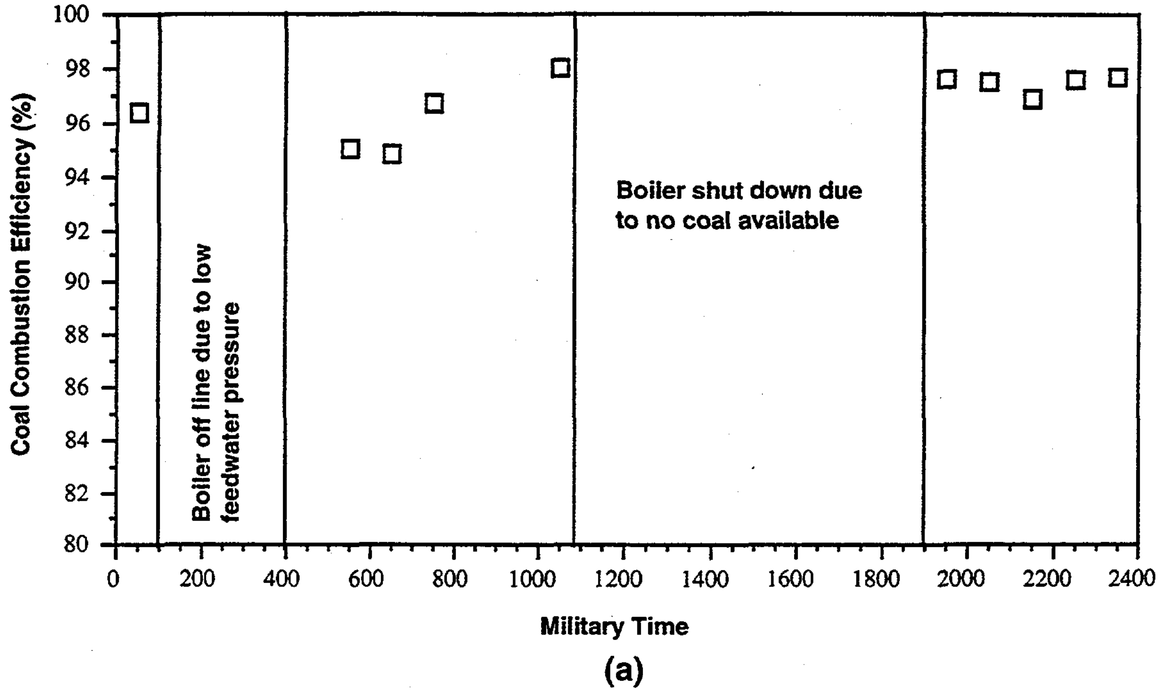


(a)



(b)

Figure D-47. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/09/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 370 TO 400 ACFM MILL AIR FLOW



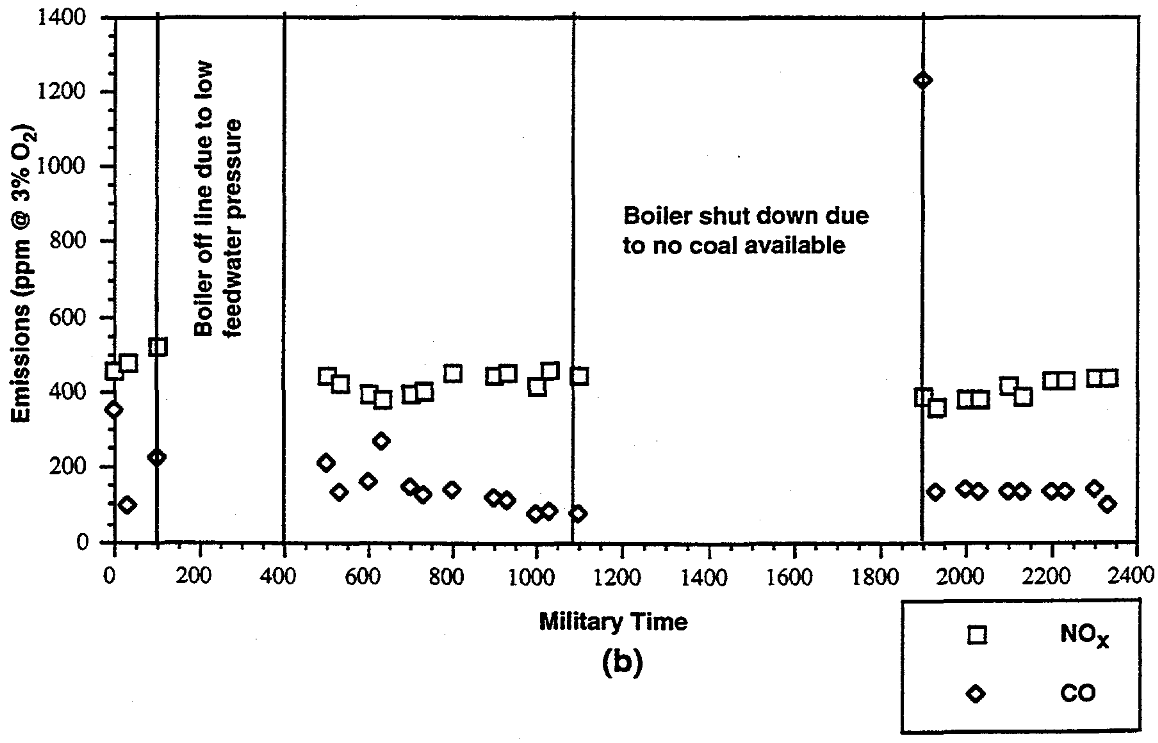
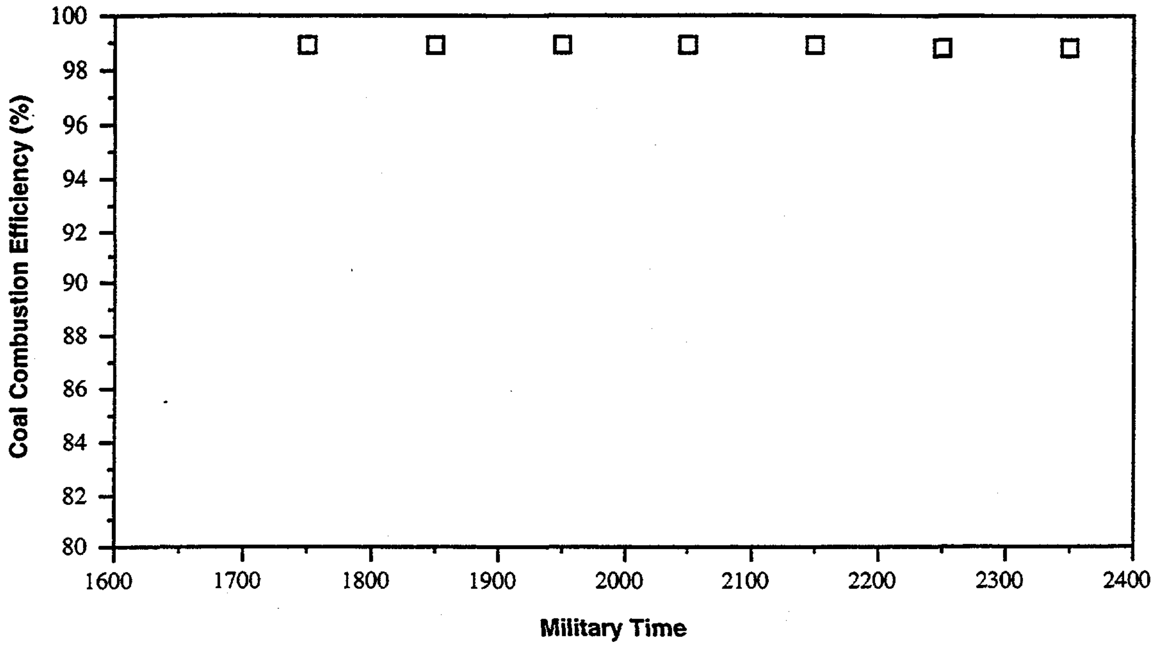
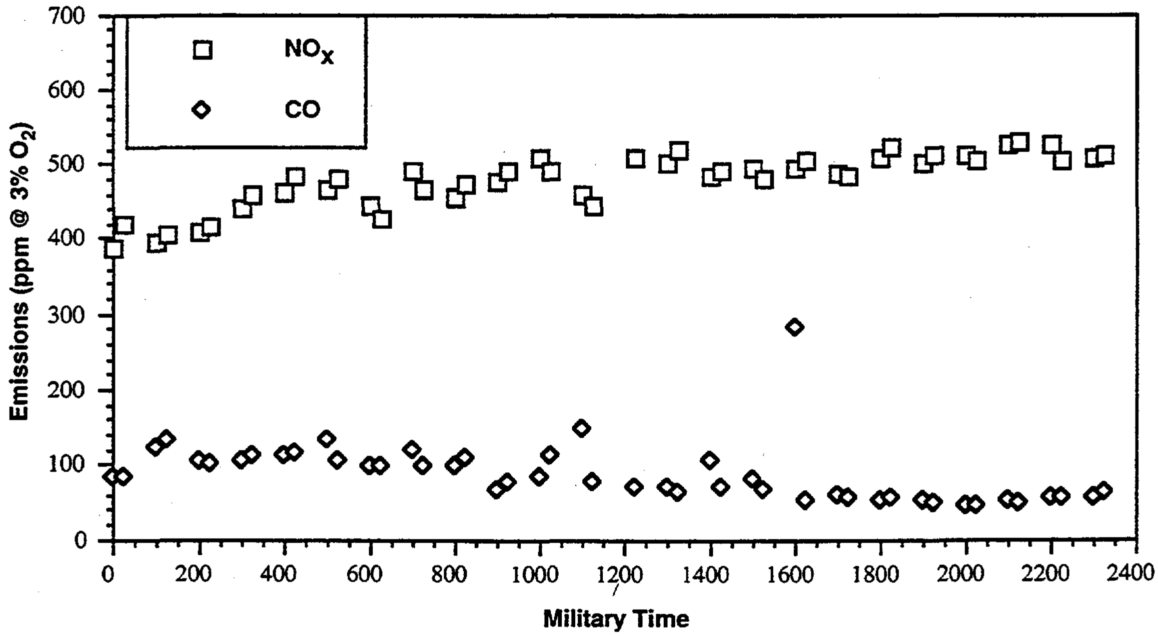


Figure D-48. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/10/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 365 TO 395 ACFM MILL AIR FLOW

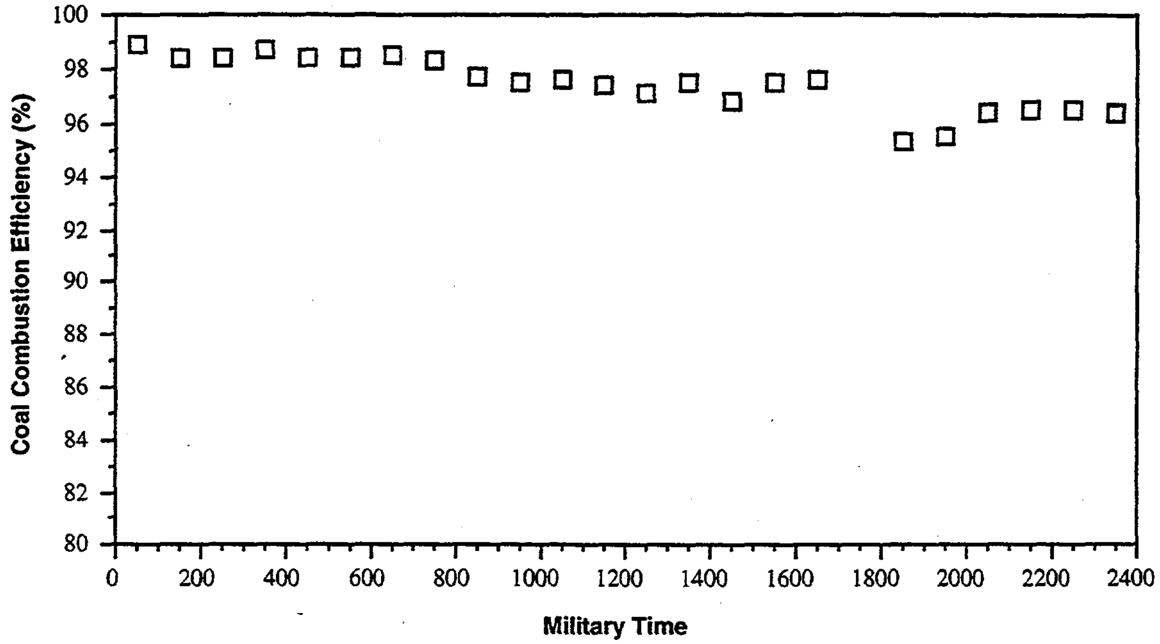


(a)

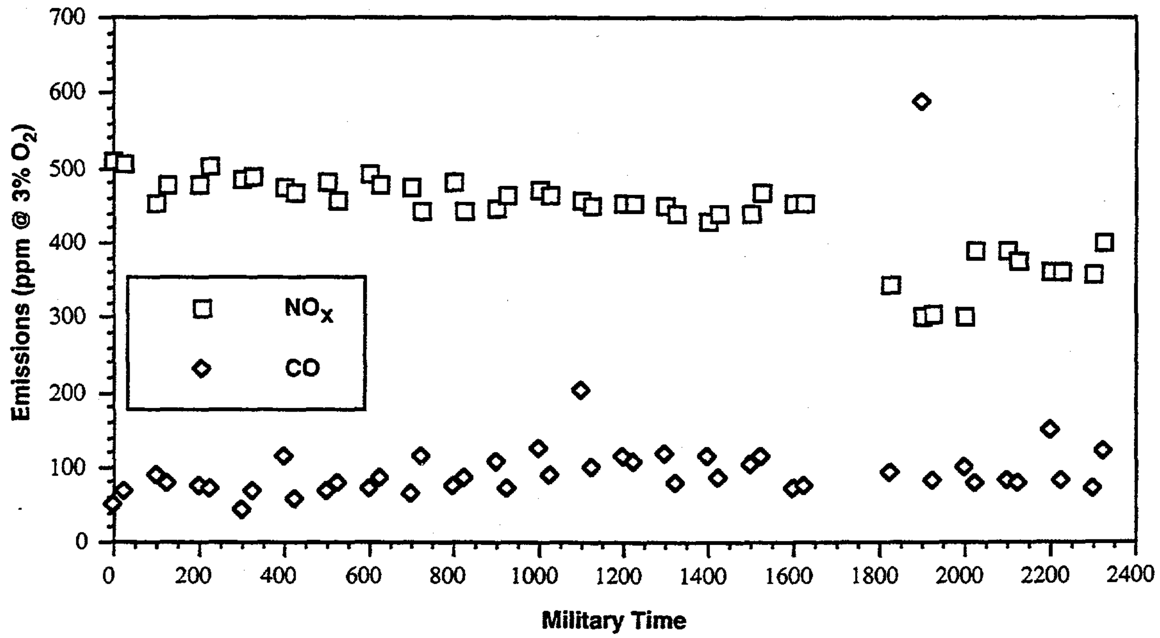


(b)

Figure D-49. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/11/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 365 TO 395 ACFM MILL AIR FLOW

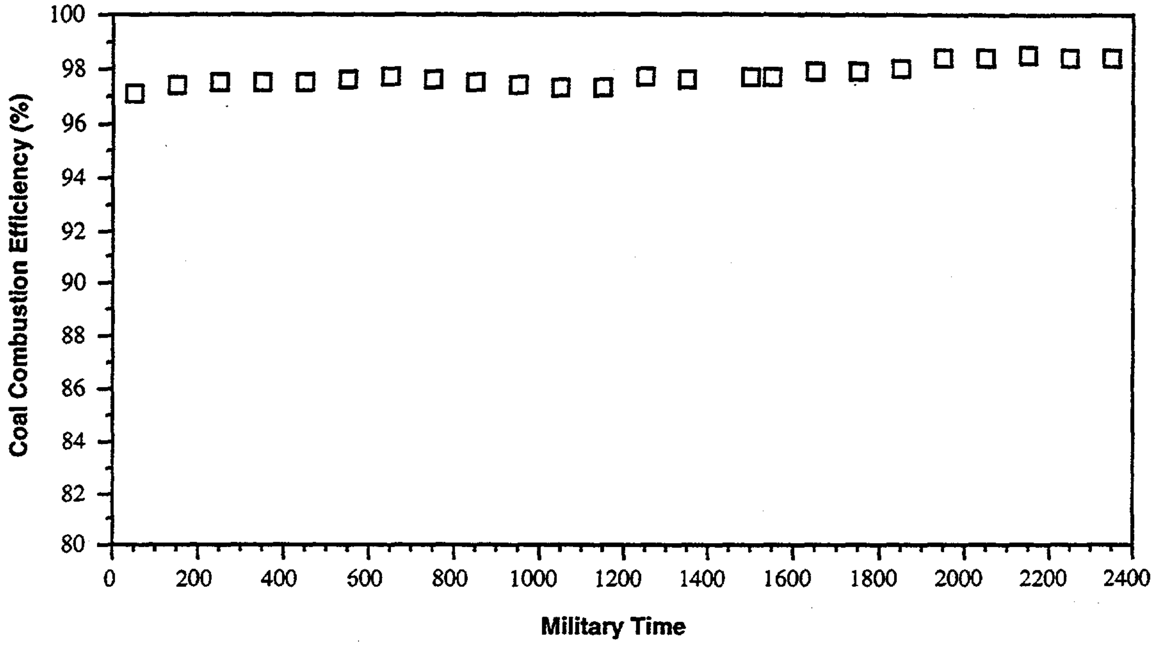


(a)

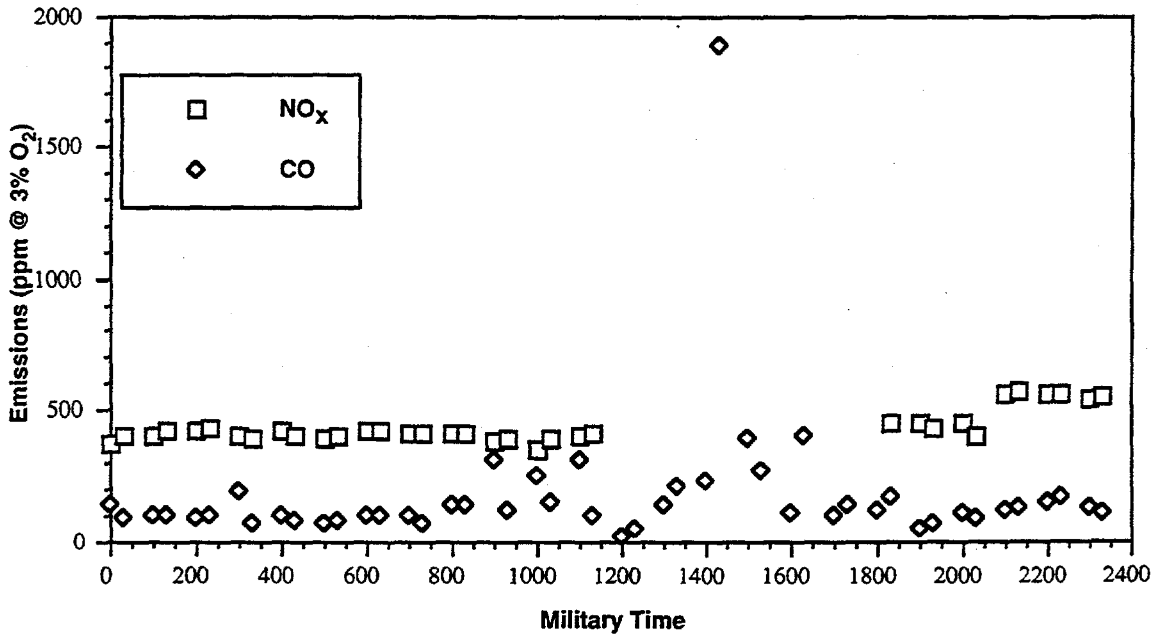


(b)

Figure D-50. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/12/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 370 TO 400 ACFM MILL AIR FLOW

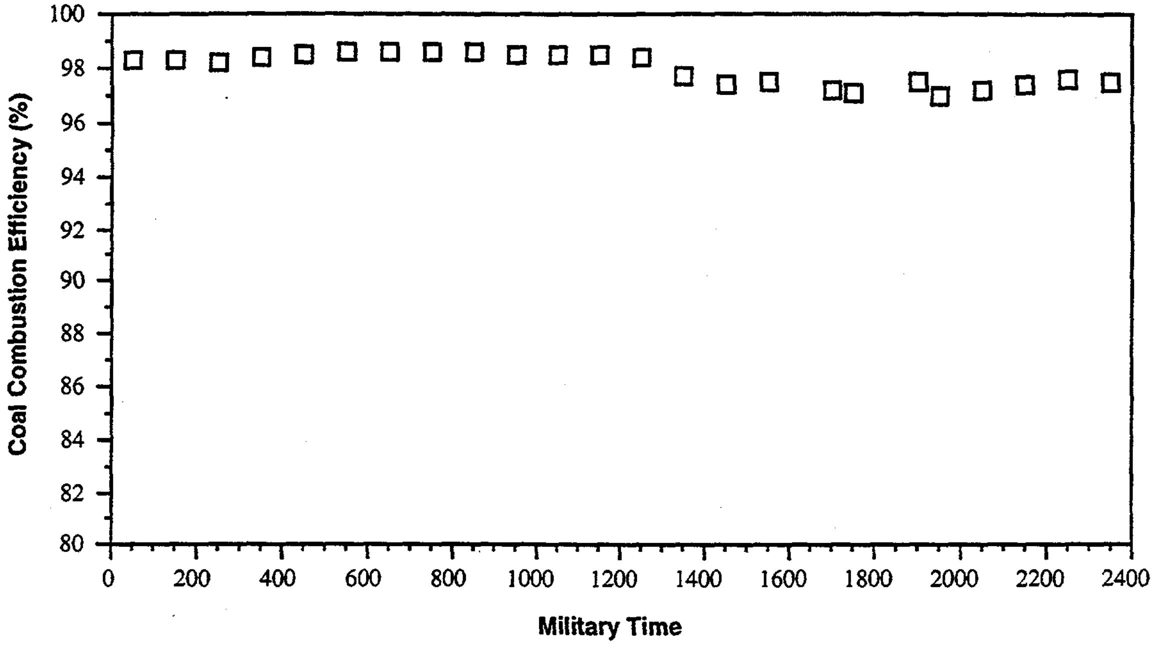


(a)

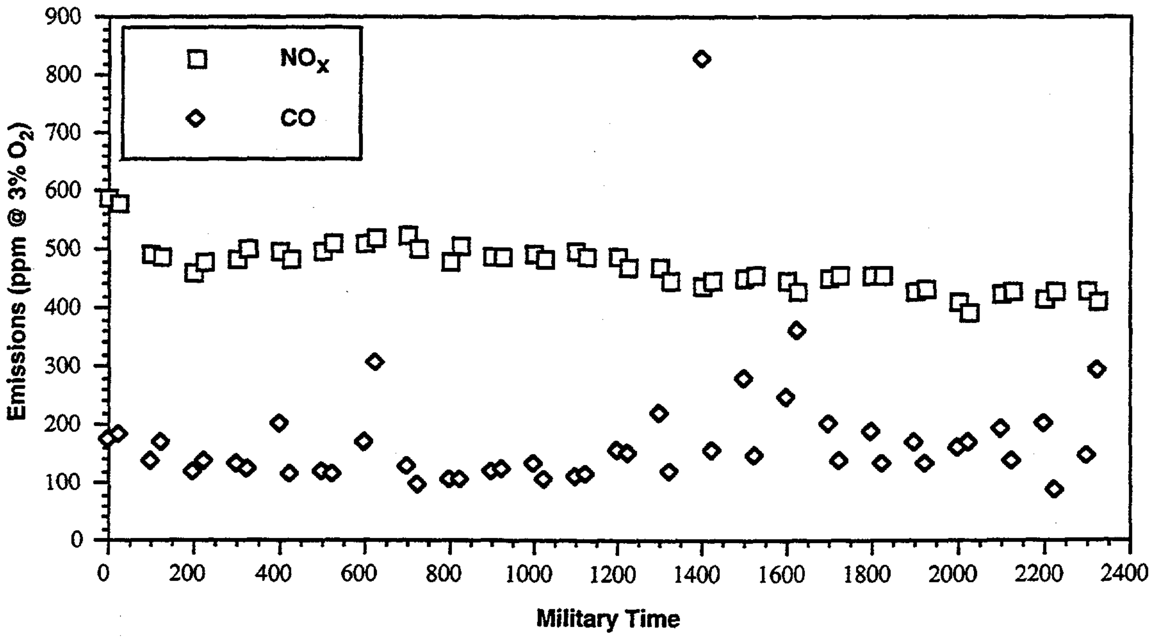


(b)

Figure D-51. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/13/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 370 TO 395 ACFM MILL AIR FLOW

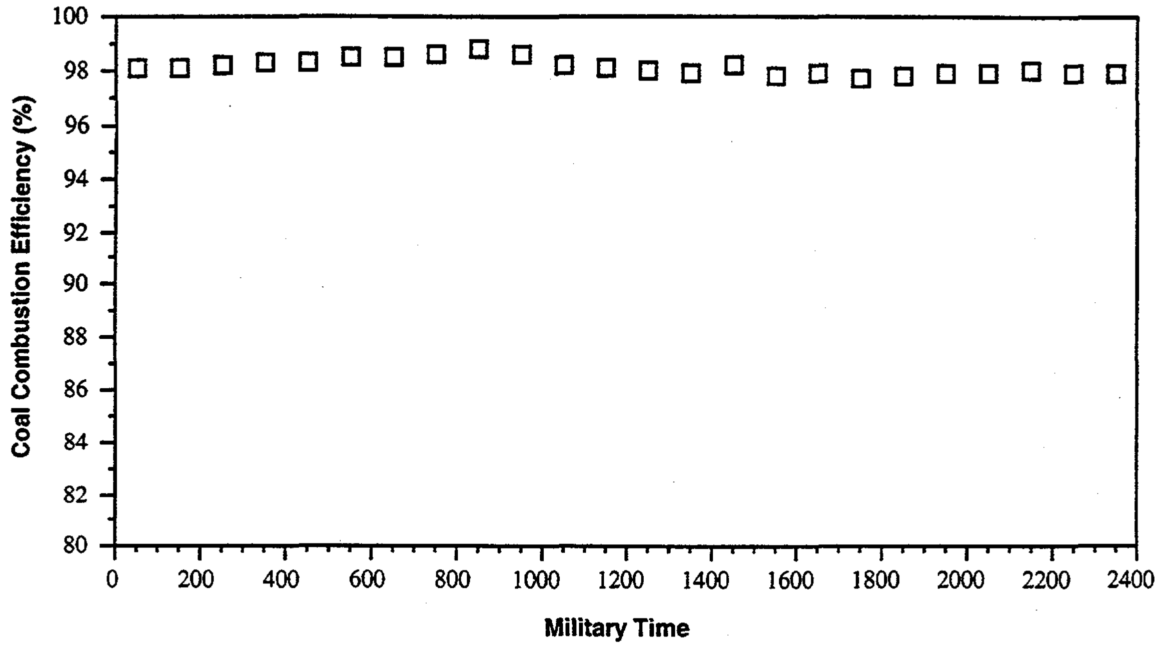


(a)

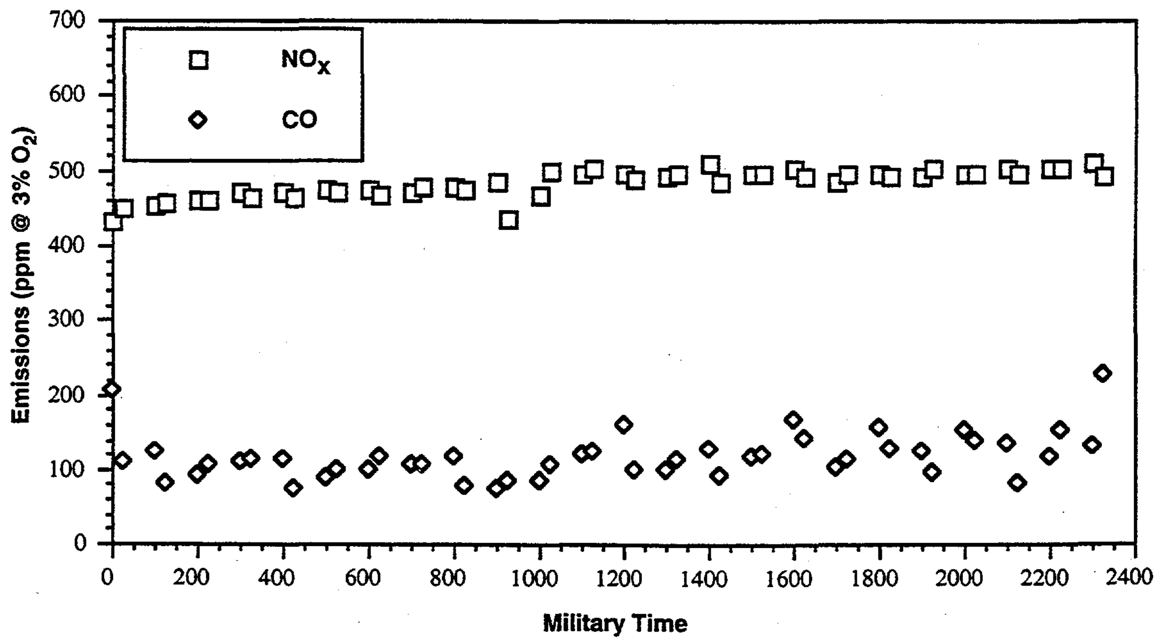


(b)

Figure D-52. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/14/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 375 TO 400 ACFM MILL AIR FLOW

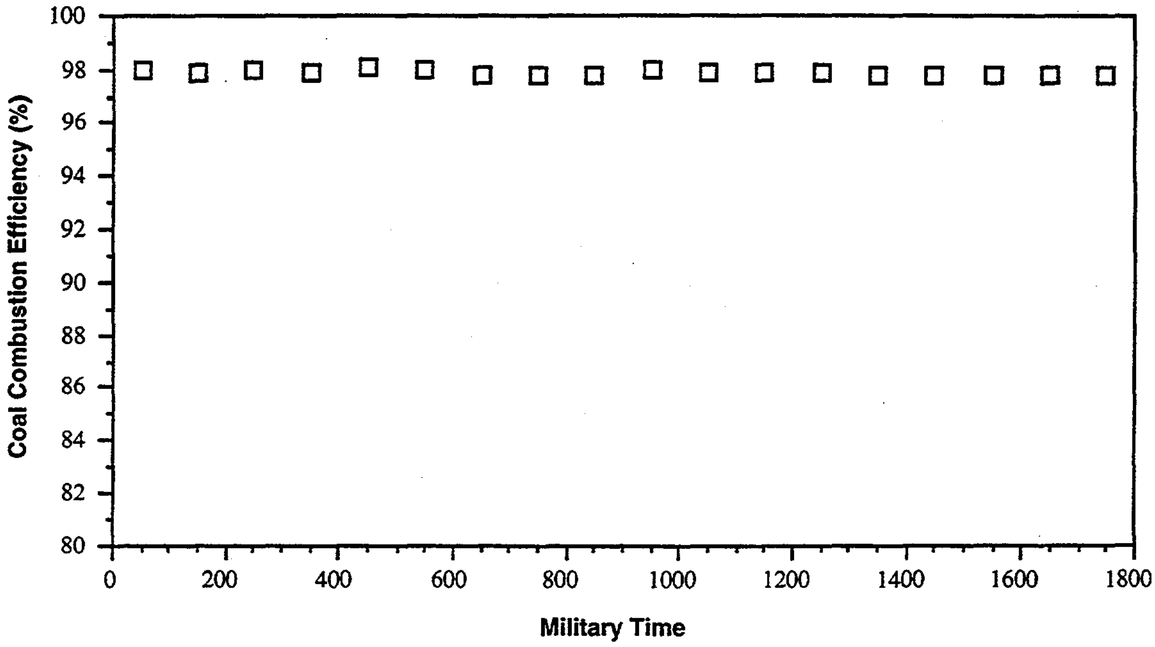


(a)

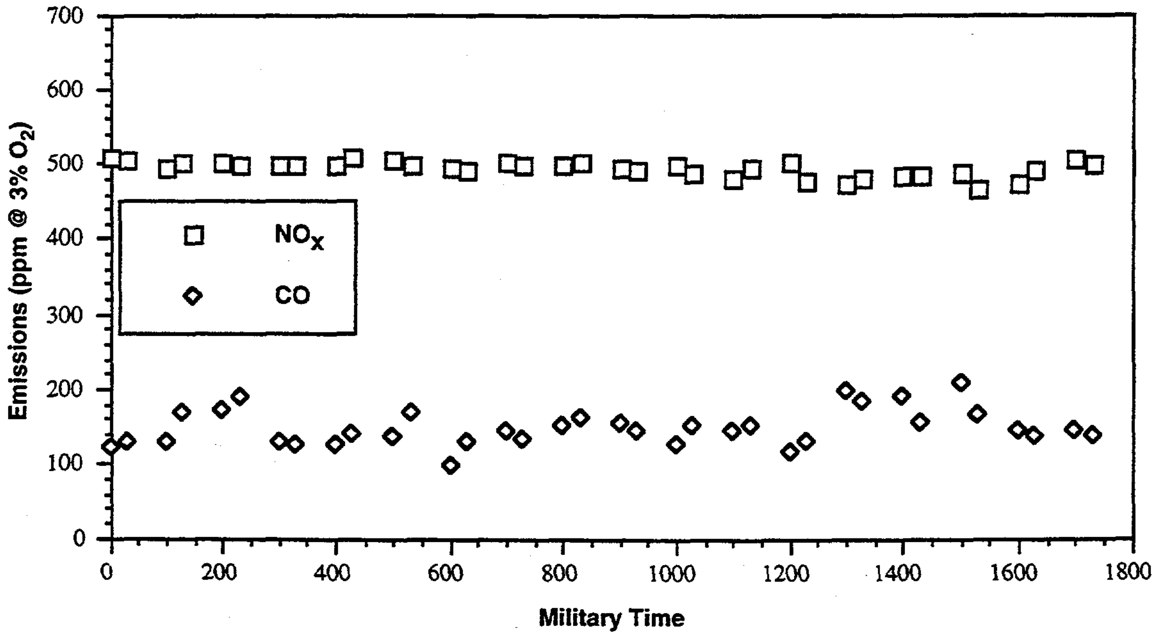


(b)

Figure D-53. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/15/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 375 TO 400 ACFM MILL AIR FLOW



(a)



(b)

Figure D-54. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 01/16/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND 380 TO 405 ACFM MILL AIR FLOW

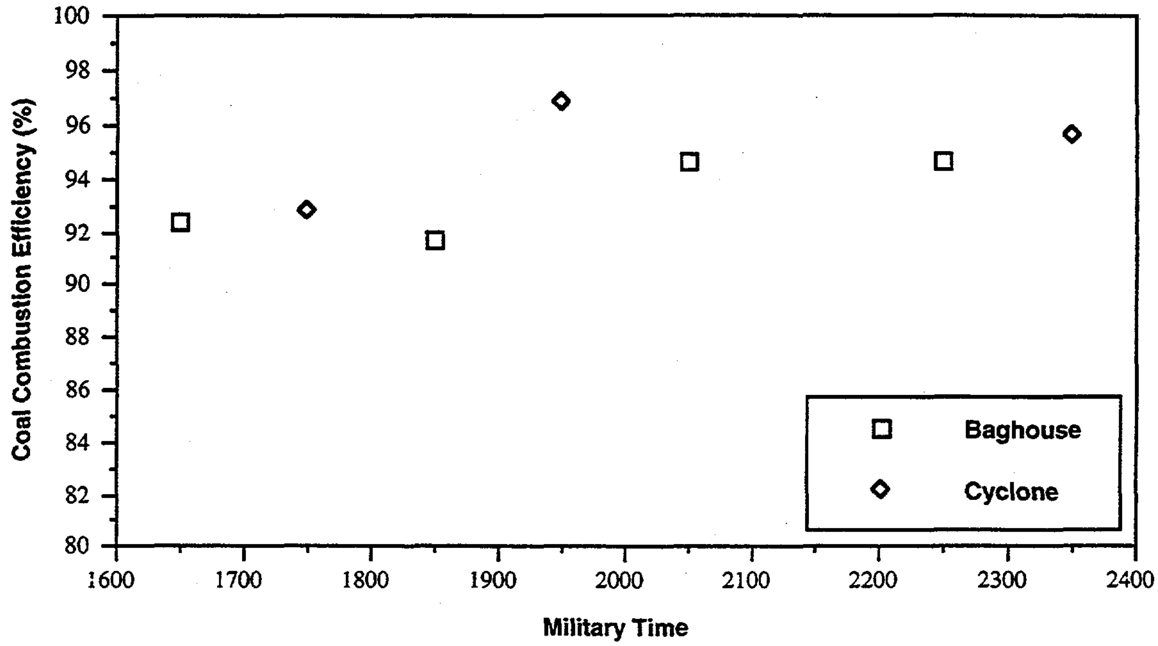


Figure D-55. COAL COMBUSTION EFFICIENCY AS A FUNCTION OF TIME FOR THE TESTING ON 01/22/96 WITH DAMPER SETTINGS OF 100/100/50/0

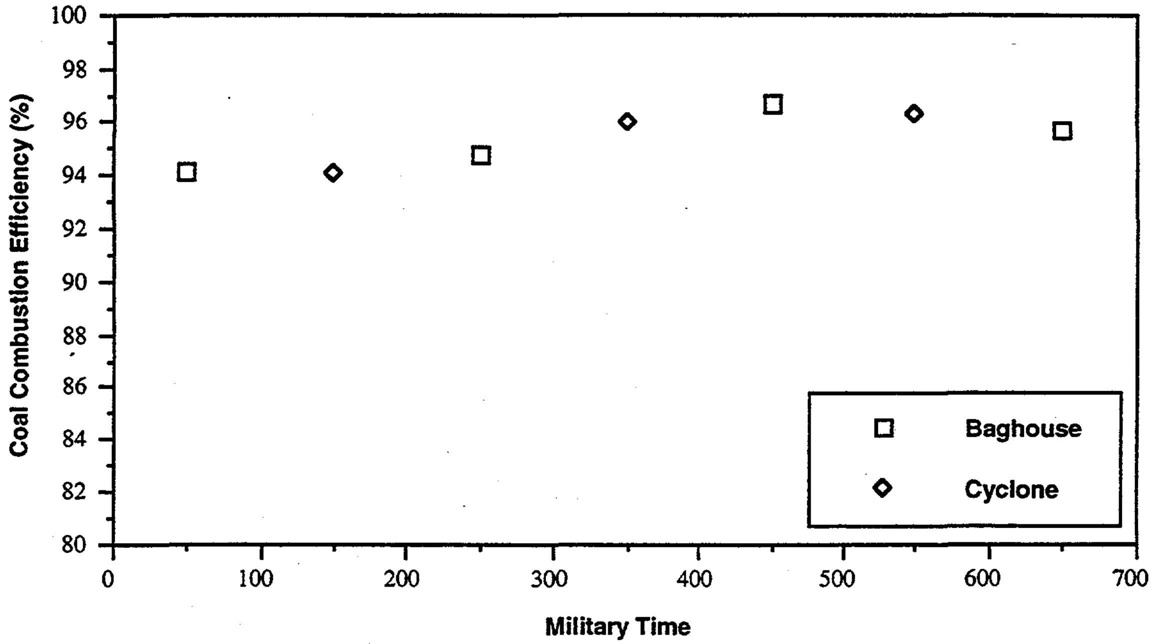
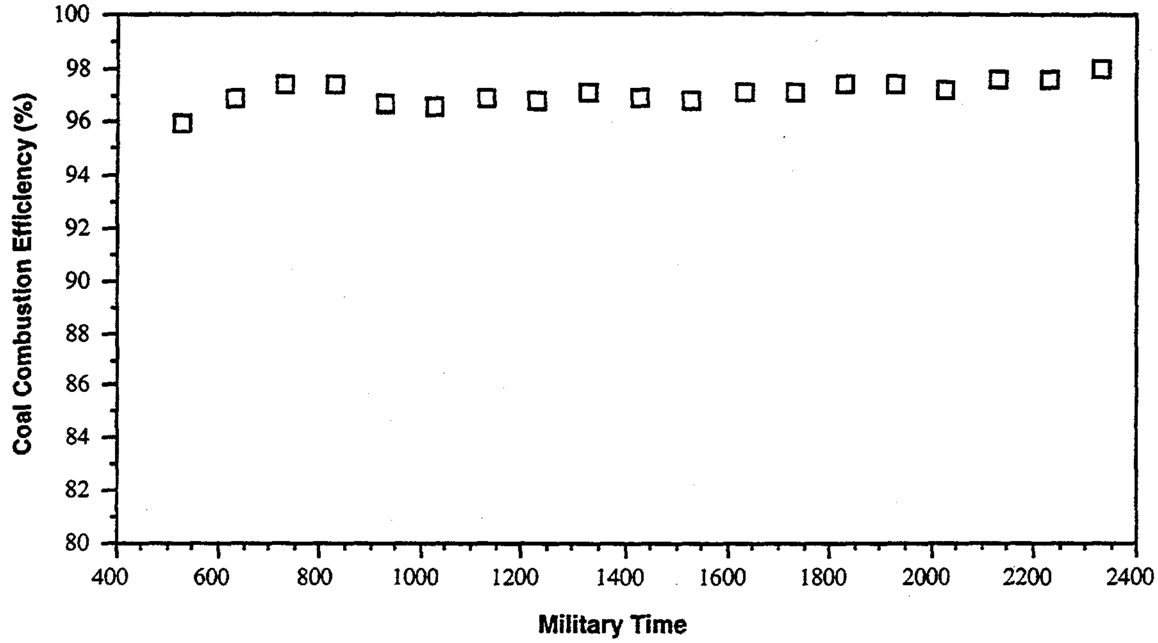
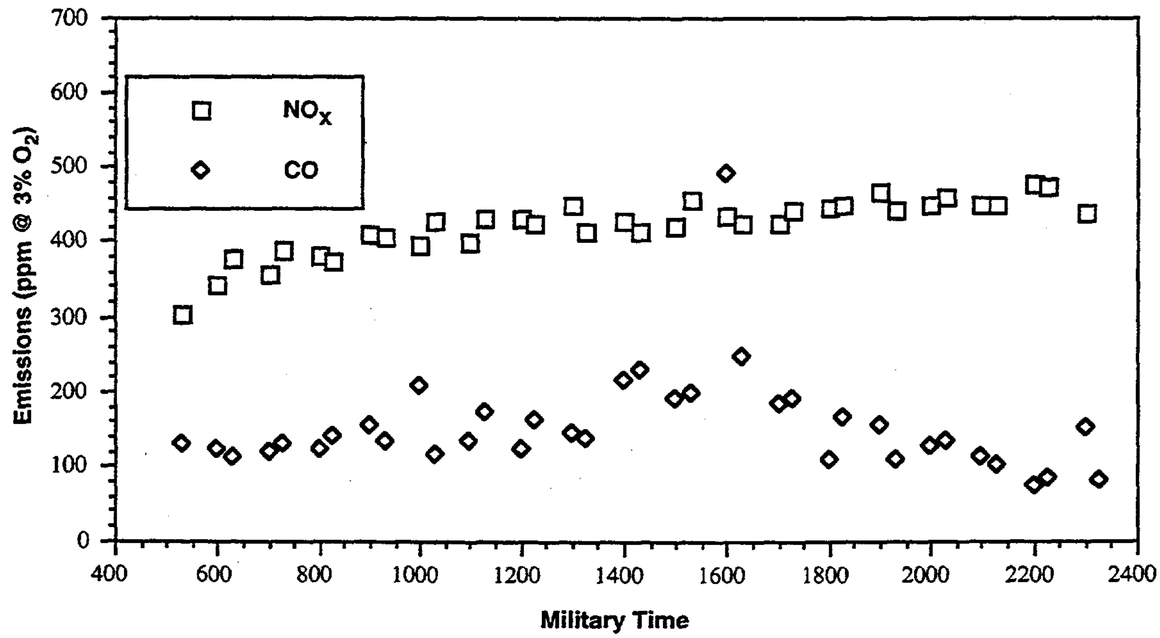


Figure D-56. COAL COMBUSTION EFFICIENCY AS A FUNCTION OF TIME FOR THE TESTING ON 01/23/96 WITH DAMPER SETTINGS OF 100/100/50/0



(a)



(b)

Figure D-57. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 02/12/96 WITH DAMPER SETTINGS OF 100/100/50/0, 375 TO 405 ACFM MILL AIR FLOW, AND A FIRING RATE OF 15.2 MM Btu/h

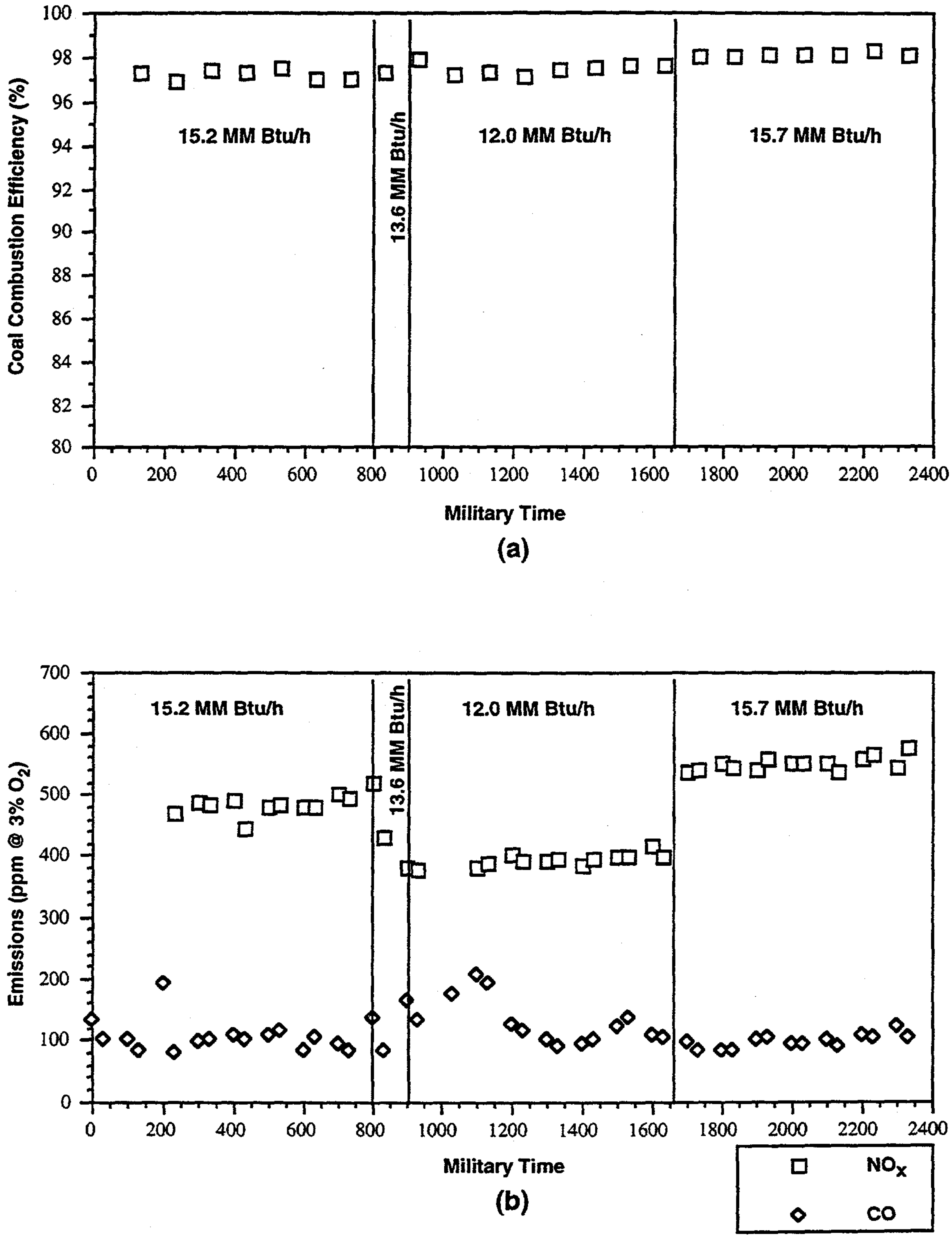


Figure D-58. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 02/13/96 WITH DAMPER SETTINGS OF 100/100/50/0, 365 TO 390 ACFM MILL AIR FLOW AND FIRING RATES OF 15.2, 13.6, 12.0, AND 15.7 MM Btu/h

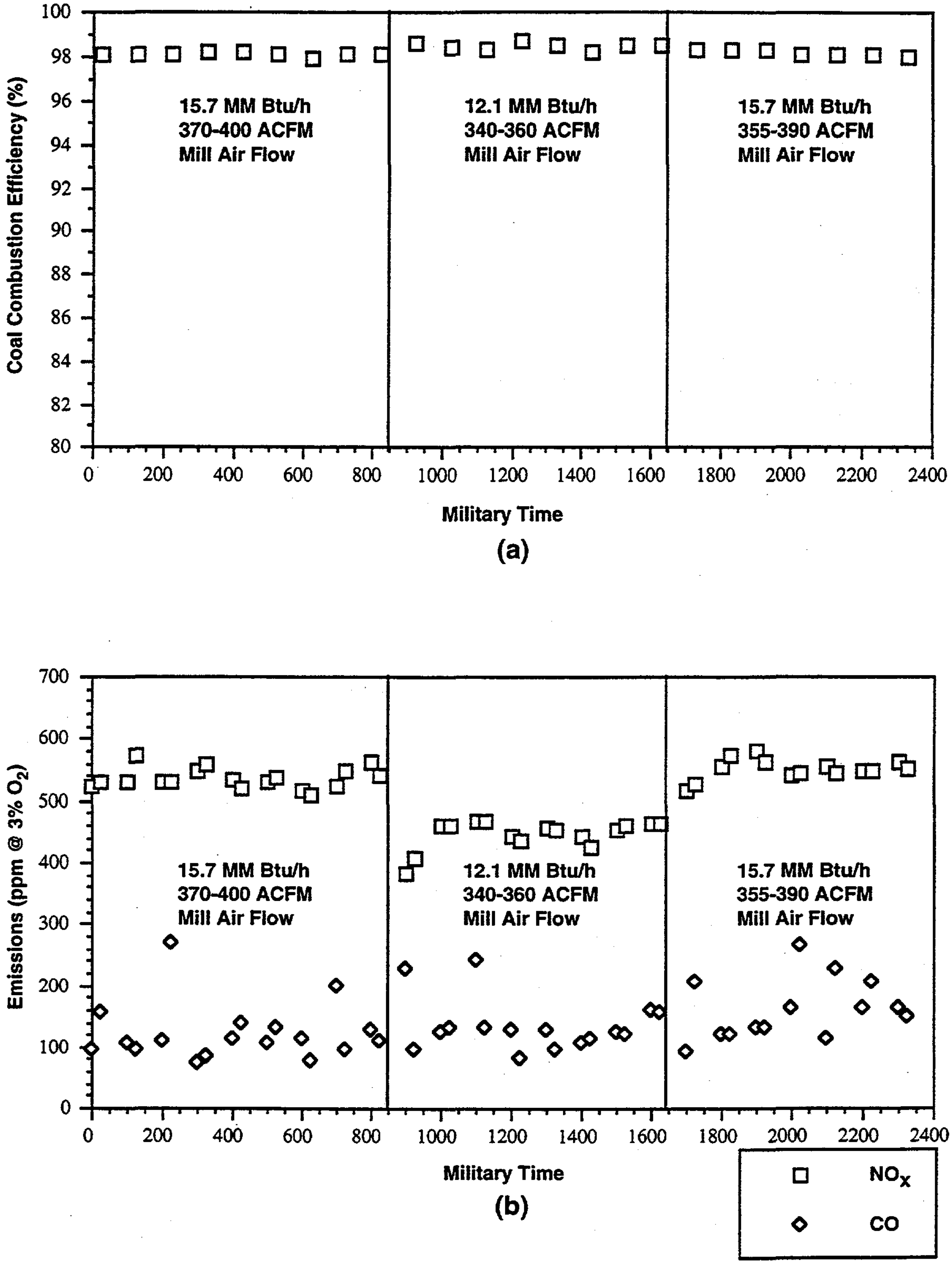
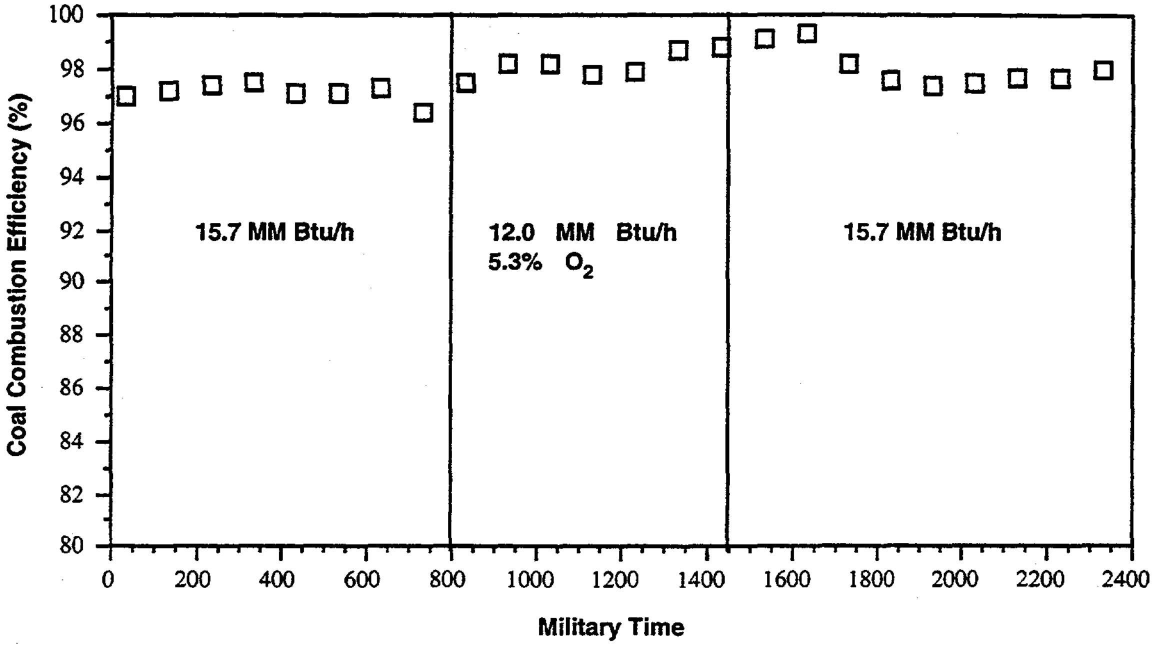
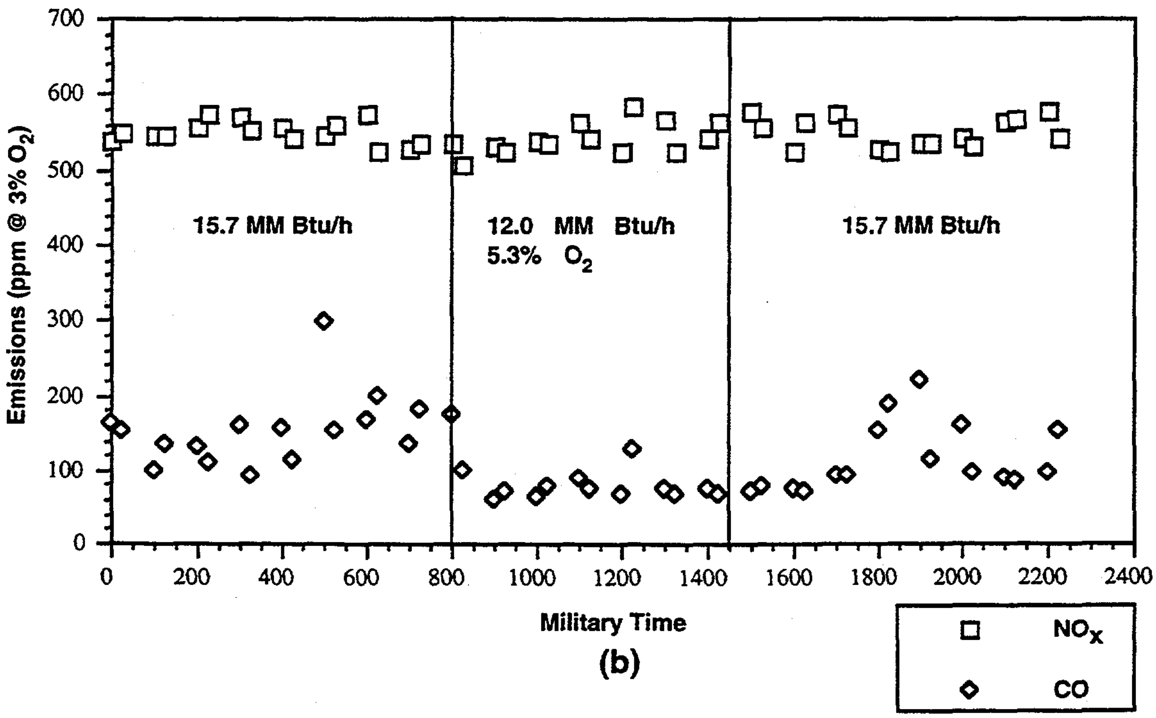


Figure D-59. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 02/14/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND FIRING RATES OF 15.7 AND 12.1 MM Btu/h



(a)



(b)

Figure D-60. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 02/15/96 WITH DAMPER SETTINGS OF 100/100/50/0, 350 TO 390 ACFM MILL AIR FLOW, AND FIRING RATES OF 12.0 AND ~15.6 MM Btu/h

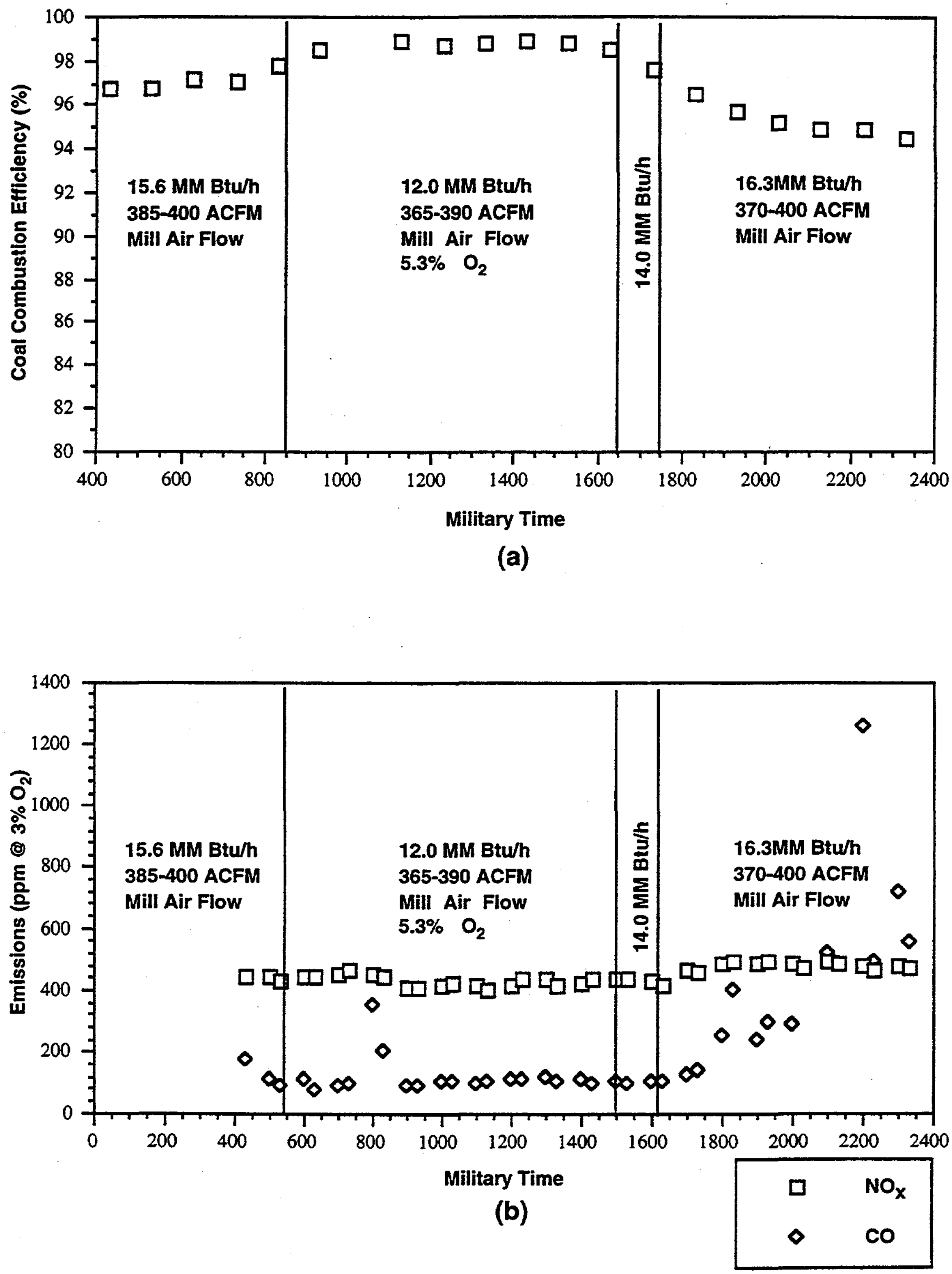


Figure D-61. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 02/16/96 WITH DAMPER SETTINGS OF 100/100/50/0 AND FIRING RATES OF 12.0, 14.0, 15.6, AND 16.3 MM Btu/h

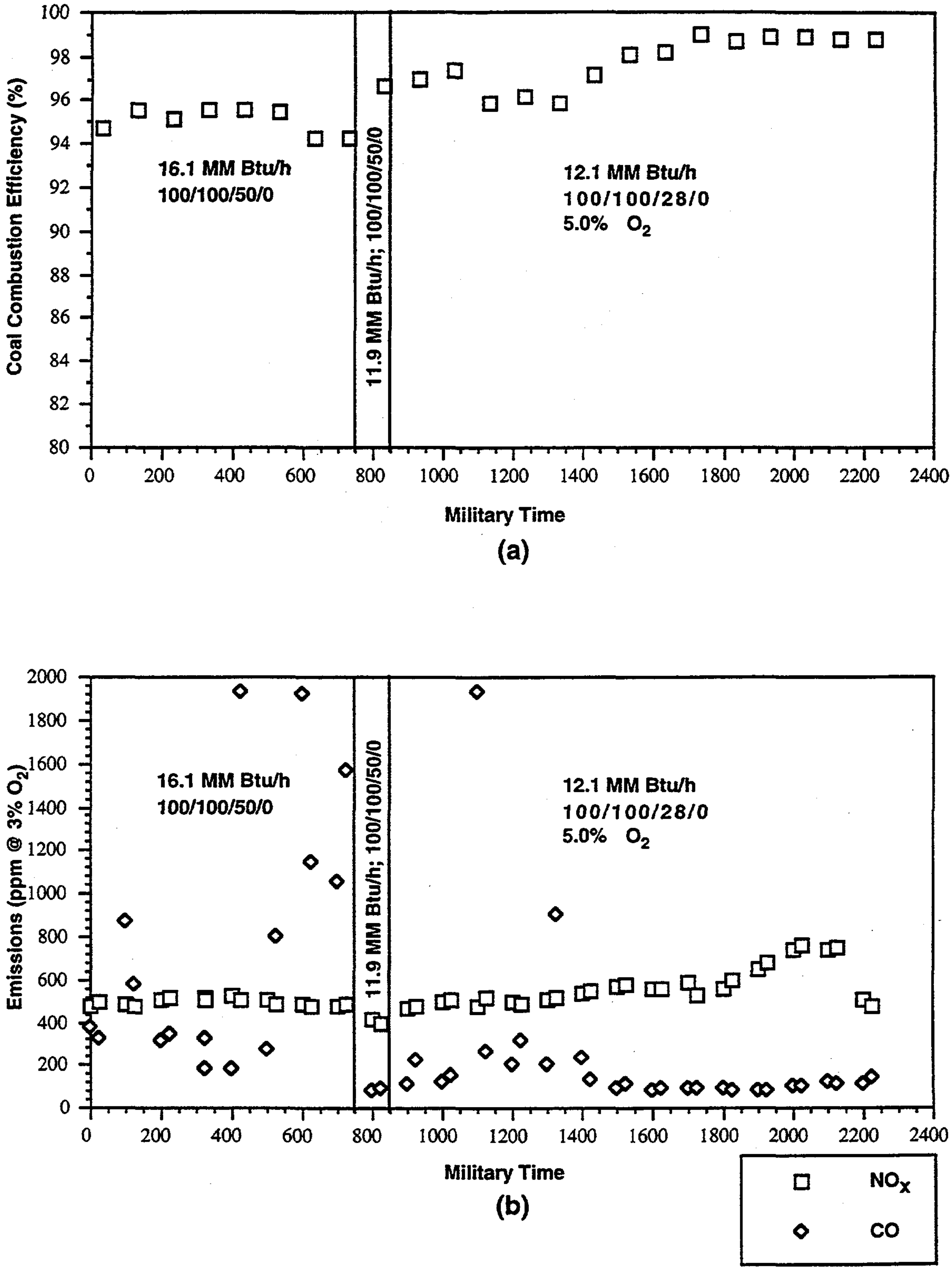
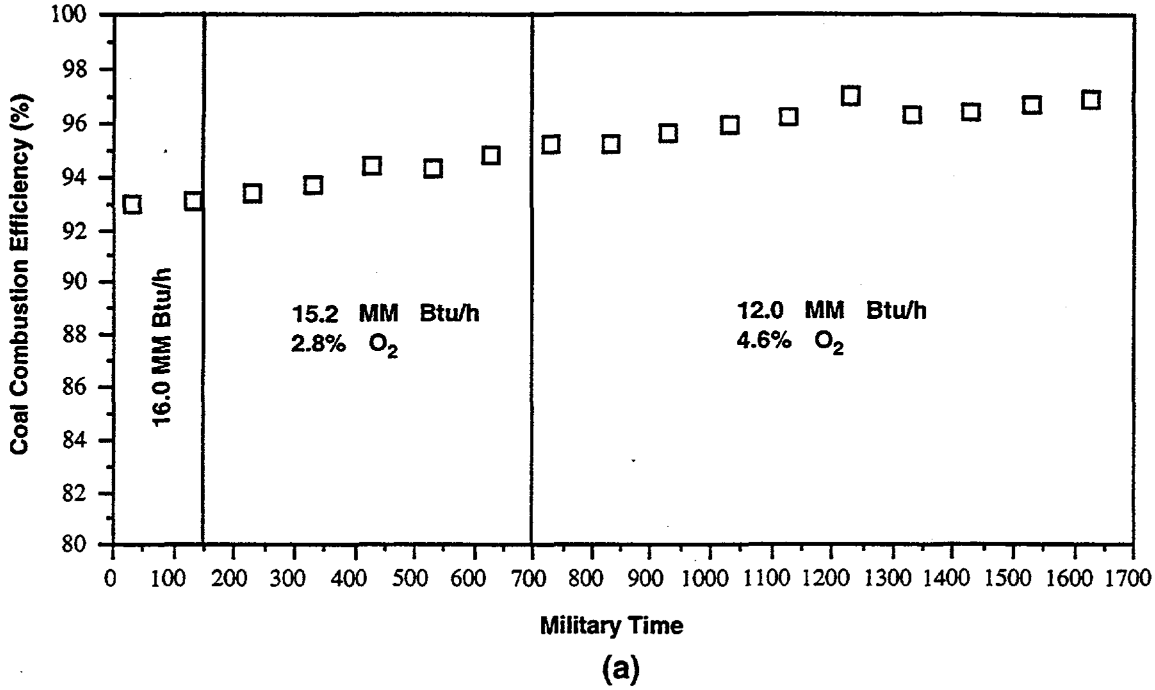


Figure D-62. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 02/17/96 WITH 370 TO 400 ACFM MILL AIR FLOW AND FIRING RATES OF ~12.0 AND 16.1 MM Btu/h



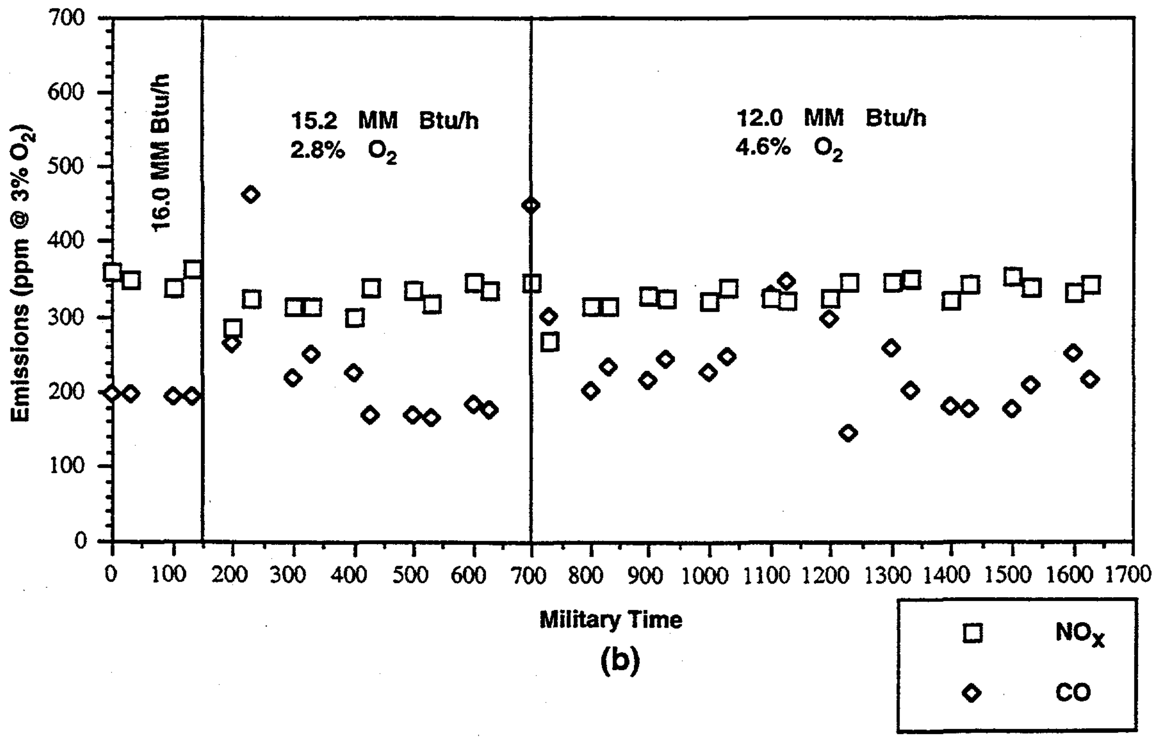


Figure D-63. COAL COMBUSTION EFFICIENCY (a) AND EMISSIONS (b) AS A FUNCTION OF TIME FOR THE TESTING ON 02/19/96 WITH DAMPER SETTINGS OF 100/100/28/0, 350 TO 400 ACFM MILL AIR FLOW, AND FIRING RATES OF 12.0, 15.2, AND 16.0 MM Btu/h

Appendix E. Parametric/Optimization Test Matrix for Coal Firing

PARAMETRIC/OPTIMIZATION TEST MATRIX

Test No.	Primary Damper (% Open)	Secondary Damper (% Open)	Tertiary Damper (% Open)	Radial Scoop (% Open)
(1) The effect of closing primary damper on combustion performance and flame characteristics will be determined.				
1	100%	100%	50%	0%
2	100%	100%	50%	100%
3	100%	100%	50%	25%
4	100%	100%	50%	50%
5	50%	100%	50%	0%
6	50%	100%	50%	100%
7	50%	100%	50%	25%
8	50%	100%	50%	50%
9	0%	100%	50%	0%
10	0%	100%	50%	100%
11	0%	100%	50%	25%
12	0%	100%	50%	50%
(2) The effect of secondary damper position on combustion performance and flame characteristics will be determined.				
13	100%	100%	50%	0%
14	100%	100%	50%	100%
15	100%	100%	50%	25%
16	100%	100%	50%	50%
17	100%	50%	50%	0%
18	100%	50%	50%	100%
19	100%	50%	50%	25%
20	100%	50%	50%	50%
21	100%	0%	50%	0%
22	100%	0%	50%	100%
23	100%	0%	50%	25%
24	100%	0%	50%	50%
(3) The effect of reducing tertiary air on combustion performance and flame characteristics will be determined.				
25	100%	0%	100%	0%
26	100%	0%	100%	100%
27	100%	0%	100%	25%
28	100%	0%	100%	50%
29	100%	0%	75%	0%
30	100%	0%	75%	100%
31	100%	0%	75%	25%
32	100%	0%	75%	50%

33	100%	0%	25%	0%
34	100%	0%	25%	100%
35	100%	0%	25%	25%
36	100%	0%	25%	50%
37	100%	0%	0%	0%
38	100%	0%	0%	100%
39	100%	0%	0%	25%
40	100%	0%	0%	50%

(4) At optimum primary, secondary, and tertiary air damper settings determined from testing items 1 through 3, the effect of gas and coal gun positions on combustion performance and flame characteristics will be determined.

(5) The effect of mill air flow (300, 360, and 400 acfm), at optimum conditions for burner settings and gun positions, on combustion performance and flame characteristics will be determined.

(6) The effect of excess air (3-3.5, 3.5-4.0, and 4.0-4.5% O_2) on combustion performance and flame characteristics will be determined.

(7) The effect of turndown ratio, at optimal conditions, on combustion performance and flame characteristics will be determined.

Ash deposition and accumulation during continuous boiler operation will also be investigated. Portions of the matrix testing will be conducted during continuous boiler operation.

Appendix F. Boiler Operator Flame Observations

Operator Flame Observations
10/12/95

10:45	Port #1	30-35° angle, stable on root
	Port #2	Flame 5-5 1/2 feet long
	Port #3	
	Port #4	See across back, flame licking tubes generating eddies
	Port #5	No flame hitting right side wall
	Port #6	Bright outer flame gray center
	Port #7	See generating tubes, sometimes see front wall
11:15	Port #1	30-35° angle, more stable, mesh
	Port #4	See across back, flame, licking generating tubes
	Port #6	Bright outer flame, more defined, halo, gray center
11:45		Flames seems about same in all ports
12:15		Flames seems about same in all ports
13:00		Flame same shape, seems to be a little larger of angle
13:30		Flame the same as 13:00
14:00	Port #1	Flame 20° angle, gray stable root, more direct, lighter on bottom
	Port #2	End of root, horizontal flow
	Port #3	10°, slightly gray, horizontal flow
	Port #4	gray flame, swirl dancing off end wall
	Port #5	Pipes observed, side puffs of flame at wall next to port #4
	Port #6	Puffs of gray slightly pushing into port #6, swirling action
	Port #7	Puffs of gray slightly dancing into port, swirling action also watertube partial visible
14:30	Port #1	Same as 14:00 observation
	Port #2	Same
	Port #3	Same
	Port #4	Same
	Port #5	Same
	Port #6	Same type flame, particles of white coal landing in port
	Port #7	Same
15:00	Port #1	All ports about the same
	Port #2	
	Port #3	10° downward angle
	Port #4	
	Port #5	
	Port #6	Swirl with slightly sucking back action toward burner
	Port #7	
15:30	Port #1	Same as before
	Port #2	Same as before
	Port #3	Same as before
	Port #4	Same as before
	Port #5	Same as before
	Port #6	Same, but small deposit of ash growing on port opening
	Port #7	Same as before
16:00		All ports, same as 15:30 observation
16:30		All ports-no change
17:00		All ports-no change

Operator Flame Observations
10/13/95

9:15		Started test
	Port #1	Angle 35° tight at base but not as defined, a little bushy
	Port #2	Flame length 6 1/2-7 feet
	Port #3	
	Port #4	Flame close, but not against back wall, can see generator tubes
	Port #5	Flame not touching side tubes
	Port #6	Halo ring-bright, dark gray center
	Port #7	Can not see front wall, flame into generator tubes
9:00		Flame about the same
10:00		Flame about the same
10:25		Flame angle same, tight at base, flame about the same length , just licking back wall you can see the generating tube. Halo ring, gray within center
12:00	Port #1	Tight with gray center about 25° slant toward floor
	Port #6	Re-circulation back toward center from outside, gray tint, rest of ports about the same
		Finished with the Test at 12:15
1:20		Blowdown
1:35		Flame Observations
	Port #1	Angle 25-30°, just streaks
	Port #2	
	Port #3	Long flame 8 feet
	Port #4	Can not see across back all the time, flame touching back wall at time
	Port #5	Flame just licking side wall
	Port #6	Bright hole, bushy center
	Port #7	Cannot see front of boiler all the time, just at times
14:25		Flame same as 1:35
14:55		Flame same except Port #6 bright and turbulent cannot see halo
15:50		Flame same as 14:55
16:35		Flame same as 15:50

Operator Flame Observations
10/16/95
Test No. 5

2:00	Port #1	30-35° downward slope, gray center, yellow bottom direct stream
	Port #2	Gray turbulent action returning toward burner, can see tubes from far side
	Port #3	Gray & yellowwith fast turbulent action
	Port #4	Bright colored flames floating upward, end and opposite tubes visible
	Port #5	Bright wisps of flame striking wall on port side of firebox approximately 4 feet from front wall
	Port #6	Bright, swirling core with darker gray returning inward from lower right side
	Port #7	Can see front wall, bright flame projecting and touching wall on exit side approximately 4 feet from front wall
2:30		All port observations the same as above
3:00	Port #1	Same
	Port #2	Same
	Port #3	Same
	Port #4	Same
	Port #5	Same
	Port #6	Same
	Port #7	Flame approximately 5-6 feet from front wall
3:30	Port #1	About the same
	Port #2	Can see more flame and turbulence
	Port #3	About the same
	Port #4	Flame more dense, can't see opposite wall tubes as well
	Port #5	Flame touching wall approximately 5-6 feet from burner
	Port #6	Can't see as much of bright core, flame seems longer-Port #7 about same
4:00		Ports no changes
4:30		Sight ports-no apparent change
5:00		No change on ports
5:30		No apparent change
6:00		No change

Test No. 6

7:00	Port #1	Bright, steady, flame approximately 20° downward, light gray core
	Port #2	Horizontal and steady
	Port #3	Bright on bottom, light, horizontal flame (steady)
	Port #4	Flame lightly hitting wall on back end, end tubes visible, touching side wall approximately 6 feet from front end
	Port #5	Flame lightly hitting sidewall with some speed
	Port #6	Light gray, steady flame with some turbulence, no visible core
	Port #7	Front and sidewall tubes visible-puffs of flame heading toward exit
9:30		Appears the same in all ports
11:00		Test #6 Complete

11:35		Flame observation
	Port #1	35° Bushy on top
	Port #2	Full of flame
	Port #3	1 foot off back wall convective pass barely visible
	Port #4	Wide flame on wall
	Port #5	Bushy yellow flame, no center
	Port #6	Same as #4
14:00	Port #3	Flame closer to back wall
	Port #5	Slight ash accumulation in site port
15:30		End of test
16:30		Flame observation
	Port #1	Flame at 20° angle
	Port #3	Can see tubes some times
	Port #4	Can see wall most times
	Port #5	Can see slight halo
	Port #6	Can see wall some times
18:05		Blowdown
	Port #1	Flame angle approximately 20-25°, strong at base somewhat bushy
	Port #4	Can see across back. flame sometimes touching back wall
	Port #5	Can see side wall tubes
	Port #6	Can see only slight halo
	Port #7	Can see front wall at times, slag building up around ports-limiting view
21:15		Flame observation
	Port #1	Flame is too wide to see angle
	Port #4	Can see tubes all the time
	Port #5	Can see wall most of the time
	Port #6	Darker flame center with bright halo
	Port #7	Can see wall most of the time
23:30		Flame observation
	Port #1	Flame angle 30-35°
	Port #4	Flame length shorter, can see back of boiler all the time, 6 foot flame
	Port #5	Flame licking side wall, can see front all the time
	Port #6	Bright halo, dark gray center
	Port #7	Can see front wall most of the time
00:30	Port #1	Same
	Port #4	Can see across to tubes on other side, ash building on 2nd wall tubes and peeling
	Port #5	Can see front wall-flame licking sidewall approximately 5-6 feet out from burner-ash deposits on tubes
	Port #6	Light gray turbulent flame - ash growing on end wall and around ports
	Port #7	Bright flame licking sides-can see front wall and side tubes-ash building on wall and around sight port

Operator Flame Observations

10/17/95

2:00	Port #1	15° angle flame-light gray center, bright on outer area
	Port #2	Horizontal flame, light in color, can see opposite tubes underneath flame
	Port #3	5° slant on flame, light gray in center
	Port #4	Flame following upward on end wall (bright yellow), can see partial tubes on opposite side
	Port #5	Yellow flame touching wall approximately 6-6 1/2 feet from front wall
	Port #6	Yellow light gray flame, no distinct core, small particles of coal protruding into port
	Port #7	Wisps of yellow flame heading toward outlet, ash buildup on all sides
3:00		All ports approximately same
4:00		No change other than more ash growth
5:00		Not much change in flame, flame a hair lower looking through Port #2 Can not see opposite sidewall as well
6:00		Same other than more ash buildup around end ports
6:30	Port #1	Flame approximately 20° downward angle, light gray center, yellow below forceful flow
	Port #2	5° downward flow, yellow/bright color, can see partial tubes on opposite wall
	Port #3	Forceful/even/downward 10° flow, light in color
	Port #4	Flame glancing upward off end wall-yellow/light gray color-can see partial tubes on opposite wall
	Port #5	Plums of yellow flame lightly touching wall approximately 6-7 feet from front wall
	Port #6	Slightly turbulent, yellow/gray flame
	Port #7	Thin/yellow flame exiting firebox-can see front wall
7:30	Port #6	Showing slight re-circ actions, all other ports look the same All other ports look the same
8:00		Radial inlets are not 25% open as per 12-8 shift, they are 100% on 2 and
75		75% on 1, we will finish test then run 25% open
10:30		Test #11A Complete
11:15		Flame observation
	Port #1	40° angle, bushy, not much visible recirc
	Port #2	Full of Flame
	Port #3	6-18 inches of back wall
	Port #4	Ash covering tubes, flame tight, not touching wall
	Port #5	Full flame, no center
	Port #6	Flame not touching wall, ash, or tubes
15:00		Test #11B
16:10	Port #1	25-30° flame angle
	Port #2	Flame faint, do not see across at angled flame, about 5 feet long
	Port #3	Can see tubes almost all time, building up ash in convective pass
	Port #4	Can clearly see wall ash on tubes
	Port #5	Dark center, short flame
	Port #6	Mostly flame
17:35	Port #2	Flame reaches to center of site port
	Port #6	Only turbulent flame visible

Test No. 15

00:15	Port	#1	40° downward flame-light gray center, yellow on lower edge
	Port	#2	Gray and yellow mix, very turbulent
	Port	#3	Yellow core with gray puffs shooting toward wall
	Port	#4	Yellow/gray flame-mostly heading to exit, flame licking end wall
	Port	#5	Intermittent yellow/gray flame licking side wall 4-6 feet back from front
	Port	#6	Intermittent yellow core with gray/turbulent return into core
	Port	#7	Steady light gray flame exiting-no visible tubes showing
04:00			Flame appears to be the same-more buildup on end sight ports

Operator Flame Observations

10/18/95

4:30	Port #1	35° downward flame-light gray core yellow on lower side
	Port #2	Steady horizontal light gray & yellow flame
	Port #3	Yellowish/gray core-steady speed-no turbulence
	Port #4	Yellow/gray plume of flame existing on far side
	Port #5	Wisps of flame occasionally touching wall, approximately 6 feet from front-light in color-mostly gaseous
	Port #6	Grayish/yellow, somewhat turbulent action
	Port #7	Solid light gray/yellow flame angling upward toward exit
8:30		Test complete
10:45		Flame observation
	Port #1	45° angle recirc on top of flame
	Port #2	4 foot flame on top
	Port #3	Bright and clear, flame off wall
	Port #4	Not much flame noticeable
	Port #5	Bright, bushy flame, black center
	Port #6	Wide flame against covective pass
13:30	Port #1	Bright, bushy, a lot of recirc on top
	Port #2	5 foot flame, recirc on top, longer brighter flame on bottom
	Port #3	Bright and clear, no flame on wall
	Port #4	Wisp of flame on wall, slight ash buildup on tubes
	Port #5	Not as bright but dark in center
	Port #6	No flame on tubes, bright, open radial, wide then close, lost short flame
14:30		End of Test 17
15:10		Flame observation
	Port #1	40° angle, recirc on top
	Port #2	5-6 foot flame recirc on top
	Port #3	Wispy on wall but bright flame 2 foot back, can only see convective pass tubes on spurts
	Port #4	Wisps against wall, not much flame in view
	Port #5	We lost black center, but bright & bushy
	Port #1	30° angle, tight at base
	Port #3	Can see across back entire time, shorter flame, 6 feet
	Port #4	Can see side wall all the time
	Port #5	Bright outer halo, gray center
	Port #6	Can see front wall of boiler
2:15		Flame observation
	Port #1	30-35° flame angle
	Port #3	Flame reaches to port
	Port #4	Very defined flame, reaches to center of site port
	Port #5	Gray center bright halo
	Port #6	Can barely see edge of flame very defined
22:30		Flame observation
	Port #1	30-35° angle, tight at base
	Port #3	Flame reaches to port, licks back wall now and then
	Port #4	Flame almost against side wall but not touching
	Port #5	Bright halo, dark gray center
	Port #6	Can see front wall at times, flame sometimes in way
01:00		Same as before

Operator Flame Observations

10/19/95

Test No. 21

02:00	Port #1	35-40° Flame, bright with a little gray, well mixed
	Port #2	Can see periodically across to tubes on far wall, bright licks of flame ending approximately 4 feet from front
	Port #3	Bright, plain looking flame, some flutter
	Port #4	Glowing with some puffs of flame headed toward exit-can see tubes
	Port #5	Plums of yellow flame touching wall approximately 4 feet from front end-can see front wall
	Port #6	Turbulent mixture of flame-can see bright core periodically
	Port #7	Bright/light gray wisps of flame not touching sidewall-can see front wall
03:50	Port #2	Bright yellow flame-can barely see opposite tubes
	Port #5	Growing shut slowly with ash
	Port #6	Growing shut slowly with ash
	Port #7	Growing shut slowly with ash
06:00		More growth on end ports
		End of Test #21
9:40		Flame observation
	Port #1	Short 45° angle, a lot of recirc on top
	Port #2	4 foot flame recirc on top
	Port #3	Bright and clear no flame on wall
	Port #4	Wisps against wall
	Port #5	Yellow flame with dark center
	Port #6	No flame on wall
13:00		End of test
13:45		Flame observation
	Port #1	45°, full of bright flame
	Port #2	Recirc up on top, 6 foot long
	Port #3	Wispy tough to see convective tubes
	Port #4	Flames against wall
	Port #5	Full of flame
	Port #6	Barely see wisps
17:20	Port #4	Flame just off wall
	Port #5	Gray center, rest of flame is evenly bright
18:40		Flame observation
	Port #1	40° angle, bushy flame with defined veins
	Port #2	Bushy and bright
	Port #3	Can see just the end of flame, occasionally flares to wall
	Port #4	Flame is near but not touching wall
	Port #5	Bright and bushy no defined regions
	Port #6	Cannot see flame most of the time
22:20		Flame is the same except #6 is touching the wall
23:13		Flame observation
	Port #1	Angle approximately 30-35°, bushy flame
	Port #3	Can see across the back of the boiler, flame dancing almost on back wall but right in front
	Port #4	Flame not on side wall, can see front of boiler, limited view in ports due to slag.
	Port #5	Can not see much and bright bushy flame
	Port #6	Can not see much flame into convective pass
03:00		Not much change-ports on end wall growing shut

Operator Flame Observations
10/20/95

08:30	Port #1	40° angle, bright flame, recirc on top
	Port #2	6 foot flame, recirc on top
	Port #3	Bright and clear
	Port #4	Flame against wall
	Port #5	Full of bright flame
	Port #6	Not much flame
01:00		End of test
04:00	Port #1	30°-35° angle-yellow/light gray, tight, streaking flame
	Port #2	Light colored, close knit flame, dense in appearance
	Port #3	Forceful gray/yellow billowing flame
	Port #4	Thin gas vapors exit into convective pass, can see tubes on opposite side
	Port #5	Yellow ends of flame licking sidewall about halfway back from front
	Port #6	Dense yellow/gray flame
	Port #7	Thin gaseous flame-can see front wall
08:00		End of test

Operator Flame Observations

10/24/95

09:32	Port #1	~30° angle, flame is bright toward front
	Port #2	Swirling bright and dark flame
	Port #3	End of flame barely visible
	Port #4	Can not see flame
	Port #5	Dark center, narrow, bright halo
	Port #6	Flame is steady about one foot from wall
15:20	Port #1	Flame about 25-30° angle, tight at base
	Port #3	Shorter flame, 6-6.5 feet, can barely see flame in site port, can see across the entire back wall
	Port #4	Flame just licking side wall now and then, can see front wall
	Port #5	Bright halo, dark gray center
	Port #6	Can see front wall all the time
19:05	Port #1	25-30° angle, tight at base
	Port #3	Same as before, can see across back
	Port #4	Same as before, flame licking side walls
	Port #5	Bright halo, dark gray center
	Port #6	Same, can see front wall at times

Operator Flame Observations
10/25/95

0830?	Port #1	35° angle, light gray center, yellow edge, forceful streaking action
	Port #2	End of flame, yellow/wispy end, can see opposite side
	Port #3	Mixture of yellow/gray turbulent flame
	Port #4	Streaks of yellow/gray, flame headed into convective pass, brushing far edge of end wall
	Port #5	Bright yellow flame, glancing off side wall at midway point
	Port #6	Dark/recirculating core with bright outer ring, turbulent
	Port #7	Puffs of bright yellow flameshooting directly out toward wall
13:30?		Flame observations same as before
14:45	Port #1	25-30° angle, tight at base
	Port #3	Flame length 6-7 feet, not touching back wall, can see it sucked into convective pass
	Port #4	Flame not at side wall, just licking it, can see front wall most of time
	Port #5	Bright halo ring, light gray center, overall very bright
	Port #6	Can see front wall
19:30?		Flame observations same as before

Operator Flame Observations
10/30/95

06:35	Port #1	45° angle, bright at front, darker at back
	Port #2	Bushy, turbulent flame
	Port #3	Very gray, sometimes can see end of flame
	Port #4	Clear, sometimes see edge of flame
	Port #5	Dark center, bright halo, very even
19:00	Port #1	Bush, bright, 45° angle
	Port #2	4 foot flame, recirc. on top
	Port #3	Bright and clear, no flame visible
	Port #4	Wisps against tubes
	Port #5	Big black center, bright flame around

Operator Flame Observations

10/31/95

15:45	Port #1	Bright, bushy, 45° angle
	Port #2	4 foot flame, bright, recirc. on top
	Port #3	Bright and clear, occasional wisps against back wall
	Port #4	Bright, wide flame, against wall
	Port #5	Bright yellow on outside, gray in middle, not as dark as yesterday at this time

Operator Flame Observations

11/13/95

05:15	Port #1	40° angle, orange flame
	Port #2	4 feet, recirc. on top
	Port #3	Barely see tubes
	Port #4	Wisps against wall
	Port #5	Dark center
	Port #6	Wisps against wall
13:30	Port #1	40-45°, dark center, bright lower edge
	Port #2	Light/dark recirc. flame with turbulance
	Port #3	Recirc. dark/light mix
	Port #4	Lazy gray/orange flame, some recirc.
	Port #5	Gray/orange flame touching sidewall at approximately 5 ft.
	Port #6	Dark/orange mix with recirc. motion
	Port #7	Dull orange puffs of flame shooting and touching sidewall, but can see sidewall tubes

Operator Flame Observations

11/16/95

04:00	Port #1	Bushy and bright, 45° angle
	Port #2	Short, turbulent
	Port #3	Bright and clear
	Port #4	Wisps against wall
	Port #5	Bright flame, dark center\
	Port #6	Against wall

Operator Flame Observations
11/22/95

17:15	Port #1	45° angle, bright
	Port #2	4 ft, recirc. on top
	Port #3	Bright and clear
	Port #4	You can barely see flame
	Port #5	Dark center, bright around
	Port #6	Wisps against wall

Operator Flame Observations
12/13/95

16:15	Port #1	40° angle
	Port #2	4 ft flame
	Port #3	Wisps in convective section
	Port #4	Wisps against wall
	Port #5	Bushy flame
	Port #6	Not much flame in sight

Operator Flame Observations

12/14/95

0500 to 0930

Port #1	Flame at 40° angle, bright and bushy
Port #2	Full flame, bright and bushy
Port #3	Cannot see end of flame
Port #4	Flame about 16" from wall
Port #5	Center of flame very turbulent, bright then dark
Port #6	Flame about 22" from wall

Operator Flame Observations
12/15/95

0000 to 0430

Port #1	45° downward angle, streaking, uniform
Port #2	Bright, solid appearance, slightly slanted down
Port #3	Bright, uniform flame, tight texture
Port #4	Thin, wispy flame with slight rise, can see tubes on far side
Port #5	Can see sidewall and front, thin wisps of flame almost touching side wall
Port #6	Yellow and dark core with recirculation action
Port #7	Plumes of yellow/gray flame directed toward convective pass, can see front and sidewall

1623

Port #1	45° angle, full of flame, bright
Port #2	Full of flame, turbulent on top
Port #3	Wisps of flame against back wall
Port #4	Bright yellow flame against wall
Port #5	Bushy yellow flame
Port #6	Wisps against generating bank

Operator Flame Observations

12/16/95

0109		
	Port #1	Flame bright and at 45° angle (yellow full flame)
	Port #2	Flame full
	Port #3	Flame full - turbulent swirl
	Port #4	Flame sometimes against back wall (yellow flame)
	Port #5	Bright flame hitting side wall
	Port #6	Full turbulent flame - flame looks like it sometimes goes back to burner
	Port #7	Yellow flame - can see convective pass, can see very little of the side wall, flame in this port is being taken into the convective pass
0938		
	Port #4	Flame shorter by about 1 foot from back wall. Can easily see convective pass
1123		
	Port #4	Flame on back wall (bouncing from wall to front again)
1230		
	Port #1	Flame has bright and dark channels about 3" wide
	Port #2	No channels visible
	Port #3	Flame is about 14" from back wall
	Port #5	Flame is 6" from side
	Port #7	Flame is 18" from side
1430		Flame is to the back wall for 5-10 second intervals then it is 6" of the wall for 5-10 seconds
2100		Flame off back wall 18" Port #1 uniformly bright

Operator Flame Observations
12/17/95

0105		
	Port #1	45° flame, bright, turbulent, full
	Port #2	Bushy full flame
	Port #3	Bright, full, pulsating flame
	Port #4	Bright yellow flame, on again off again flame on back wall
	Port #5	Flame's edge hugging side wall
	Port #6	Bright, turbulent swirl, pulsating flame
	Port #7	Bright yellow flame, edge of flame occasionally touching wall along convective pass
1805		Flame about 14" off back wall, occasionally extending to back wall
2230		Flame about 1-1.5 feet off back wall, sometimes licking back wall. Can see front wall of boiler from left near site port. Flame being sucked into convective pass.

Operator Flame Observations

12/18/95

0105		
	Port #1	Full flame, bright, sometimes flame gets dark, flame around 45° downward
	Port #2	Full, bright flame
	Port #3	Bright, full, downward flame
	Port #4	Bright yellow flame, sometimes on back wall, also being drawn into convective pass
	Port #5	See edge of flame touching side wall, pulsating flame
	Port #6	Full, bright yellow-orange flame, turbulent swirl, flame sometimes being taken back towards burner
	Port #7	Very little flame seen here, edge of flame pulsating in and out of convective pass
0827		
	Port #1	Flame going dark then getting brighter (constantly)
1940	Port #1	Full of bright yellow flame
	Port #2	Full of bright yellow flame
	Port #3	Full of bright yellow flame
	Port #4	Full of bright yellow flame
	Port #5	Full of bright yellow flame
	Port #6	Full of bright yellow flame

Operator Flame Observations
12/19/95

0300	Port #1	Flame is getting dark at times

Operator Flame Observations

01/09/96

0900?	Port #1	25-30° angle of flame, gray/yellow with texture
	Port #2	End of recirculating flame, light gray/yellow flame, flame draws back toward burner, can see tubes on far side
	Port #3	Turbulent gray/yellow flame
	Port #4	Gray, consistent flame just barely touching endwall, can see tubes on far side but not too clearly
	Port #5	Yellow flame brushing sidewall
	Port #6	Darker gray/yellow recirculating flame with turbulence
	Port #7	Bright puffs of flame shooting out to sidewall from darker core, can see sidewall and front wall
2215	Port #1	Bright and full of flame, slight recirculation on top
	Port #2	Bright 4' flame
	Port #3	Bright and clear, occassional wisp of flame against wall
	Port #4	Bright wisps of flame against sidewall
	Port #5	Bushy bright flame with dark bottom
	Port #6	Bright wisps of flame, nothing touching convective section

Operator Flame Observations
01/10/96

0505	Port #1	Bright bushy flame
	Port #2	Bright bushy flame
	Port #3	Can occasionally see wisps of flame
	Port #4	Can occasionally see wisps of flame
	Port #5	Very bright outer ring, very dark center
	Port #6	Bright bushy flame 0-6" from wall
~1030	Port #1	30° angle. gray/yellow tight-knit flame
	Port #2	Turbulent, gray/yellow recirculating flame, withdraws to expose tubes on far wall
	Port #3	Smooth texture, mostly yellow and turbulent
	Port #4	Floating flame, barely touching endwall, can see convective pass
	Port #5	Wisps of yellow flame contacting sidewall approximately half way back
	Port #6	Turbulent core, mostly dark with yellow halo, recirculating
	Port #7	Can see dark edge of core with bright yellow flame shooting sideways and touching tubes, can see front wall
2315	Port #1	Full flame, backdraft on top
	Port #2	Full, 4' flame
	Port #3	Fluctuating flame, able to see convective pass
	Port #4	Fluctuating flame, sometimes full
	Port #5	Full flame, swirling clockwise
	Port #6	Fluctuating flame, pulling toward convective pass

Operator Flame Observations
01/11/96

0600	Port #1	Full, bright flame
	Port #2	Full, bright flame extends past view of site port
	Port #3	Clear
	Port #4	Flame is 18" from wall
	Port #5	Turbulent flame, darker in center but not defined
	Port #6	Flame is bright and bushy 24" from wall
~1030	Port #1	25° angle on flame-light in color with tight texture
	Port #2	Dense, light gray flame, can see far tubes periodically
	Port #3	Smooth texture, light dense flame
	Port #4	Very light wisps of flame, short of endwall, can see convective pass
	Port #5	Light wisps of flame, barely touching sidewall, approximately halfway from front wall
	Port #6	Light gray, somewhat turbulent, recirculating flame
	Port #7	Yellow wisps of flame, occasionally touching sidewall, can see tubes and front wall
2230	Port #1	Full flame, top swirling
	Port #2	Full 4' flame, see swirling on top
	Port #3	Pulsing flame, can see convective pass
	Port #4	Flame pulsing into side, can see front wall
	Port #5	Full flame with flip flop swirling
	Port #6	Flame pulsing and reaching for convective pass, able to see front wall

Operator Flame Observations
01/12/96

0600	Port #1	Bright and bushy
	Port #2	Bright and bushy, cannot see end of flame
	Port #3	Clear
	Port #4	Bright flame 6-12" from wall
	Port #5	Turbulent bushy flame
	Port #6	Bright flame 12" from wall
~0900	Port #1	Flame is light and grainy, 20° slope, close knit
	Port #2	Dense and light in appearance, no recirculation
	Port #3	Light and dense also, smooth action
	Port #4	Wisps of bright yellow flame intermittently touching end wall and heading into convective pass
	Port #5	Bright steady flame touching side wall
	Port #6	Light gray recirculating flame, no dark core
	Port #7	Wisps of bright flame shooting toward sidewall, can see tubes and front wall

Operator Flame Observations
01/13/96

0730	Port #1	Bright and bushy
	Port #2	Bright, view is almost cut off
	Port #3	Flame is 0-6" from wall at top, 6-18" from wall at bottom
	Port #4	6" from wall
	Port #5	Dark center, not well defined
	Port #6	Flame is 18" from wall
1645	Port #1	Full flame with some back swirl
	Port #2	Full flame, some deposition on walls
	Port #3	Full flame, some fluctuating, can see convective pass when flame fluctuates
	Port #4	Full flame with some fluctuating
	Port #5	Full flame
	Port #6	Full flame
2135	Port #1	Full flame with swirl
	Port #2	Full flame
	Port #3	Full flame with periodic fluctuating exposing convective pass
	Port #4	Sometimes full flame, can see front wall
	Port #5	Flashing from bright to full flame
	Port #6	Bright flame extending into convective pass

Operator Flame Observations
01/14/96

0335	Port #1	Bright and bushy
	Port #3	Bushy, reddish-orange, 6-12" from wall
	Port #5	Orange/gray flame
1940	Port #1	Full flame with swirl
	Port #2	Full flame with swirl
	Port #3	Full flame, sometimes hitting back wall
	Port #4	Semi-bright flame, able to see front wall
	Port #5	Full flame, swirling
	Port #6	Bright flame extending to convective pass

Operator Flame Observations

01/15/96

~0900	Port #1	35° angle, flame light with close/tight texture
	Port #2	Light flame, dense swirling action, cannot see across
	Port #3	Light with some gray, dense recirculating action
	Port #4	Puffs of yellow flame, upward direction, can see convective pass
	Port #5	Puffs of bright flame touching side wall 3/4 of way on wall
	Port #6	Bright, light gray flame, recirculating, some turbulence, light core
	Port #7	Steady, light flame shooting outward to wall, can see tubes and front wall
2015	Port #1	Full flame with swirl
	Port #2	Full flame with back swirl
	Port #3	Able to see convective pass
	Port #4	Flame sometimes reaches side wall, able to see front wall
	Port #5	Full flame with clockwise swirl
	Port #6	Bright flame reaching towards convective pass

Operator Flame Observations

01/16/96

0400	Port #1	Bright, bushy flame
	Port #3	Flame 6" from wall
~1000	Port #1	Bright 25° downward flame, dense texture
	Port #2	Dense, bright recirculating flame toward burner, can not see across
	Port #3	Dense, bright recirculating flame
	Port #4	Yellow puffs of bright flame entering convective pass
	Port #5	Occasional puffs of bright flame striking side wall halfway
	Port #6	Light gray/yellow recirculating flame, dense texture, no distinct core
	Port #7	Steady yellow horizontal flame shooting into convective pass, can see tubes on side wall

Operator Flame Observations
01/22/96

1715	Port #1	25° angle, recirculating, very narrow tight flame
	Port #2	4.5 foot flame, dark orange
	Port #3	Wisps of dark orange flame
	Port #4	Wisps against wall
	Port #5	Black center
	Port #6	Wisps against wall

Operator Flame Observations
01/23/96

0040	Port #1	Dark center, light outer core, 25°, grainy texture
	Port #2	Fairly dark, turbulent and recirculating flame
	Port #3	Light to dark turbulent flame, dense texture
	Port #4	Dull orange flame with wisps of yellow entering convective pass
	Port #5	Steady, dull orange flame dragging side wall 2/3 of way back
	Port #6	Dark, recirculating core, turbulent with lighter edges
	Port #7	Brighter orange flame shooting outward toward convective pass

Operator Flame Observations
02/12/96

0640	Port #1	Bright flame, able to observe bottom flame profile
	Port #2	Medium to bright, 4' flame
	Port #3	Pulsing medium to bright flame
	Port #4	Able to see side walls
	Port #5	Full flame, can see clockwise swirl
	Port #6	Bright flame headed out convective pass
1100	Port #1	Dense, light gray core
	Port #2	Recirculating gray/orange flame, mildly turbulent
	Port #3	Steady, bright core prior to gray/orange flame
	Port #4	Intermittent plumes of yellow flame entering convective pass
	Port #5	Puffs of yellow flame touching side wall at 4-5' back
	Port #6	Intermittent gray/yellow recirculating core, some turbulence
	Port #7	Bright yellow flame entering convective pass

Operator Flame Observations

02/13/96

0420	Port #1	Full flame with swirling pattern, able to see bottom of flame
	Port #2	Full 4' flame
	Port #3	Pulsating medium to full flame
	Port #4	Light, medium flame
	Port #5	Full flame with swirling pattern
	Port #6	Full flame
1100	Port #1	Bright with light gray core
	Port #2	Gray, light, some what turbulent
	Port #3	Bright steady flame
	Port #4	Steady, yellow flame, lightly touching end wall
	Port #5	Occasional puffs of yellow flame touching side wall approximately half way back
	Port #6	Slightly darker, recirculating flame
	Port #7	Steady, yellow flame entering convective pass

Operator Flame Observations

02/14/96

0415	Port #1	Full flame, able to see bottom of flame profile, swirling
	Port #2	Full 4' flame
	Port #3	Light to full flame, pulsing
	Port #4	Light flame
	Port #5	Full flame with swirl
	Port #6	Medium to full flame, pulsing
1100	Port #1	Bright, tight texture, 20° slope
	Port #2	Light to gray, recirculating action, somewhat turbulent
	Port #3	Steady, very bright uniform flame
	Port #4	Wisps of yellow flame intermittently skirting end wall
	Port #5	Occasional puffs of yellow flame approximately 8-10" off side wall
	Port #6	Bright core with darker perimeter (steady)
	Port #7	Bright, yellow, steady flame entering convective pass
1610	Port #1	Bright, bushy flame
	Port #2	Bright, bushy flame
	Port #3	Flame is 6-12" from back wall
	Port #4	Not visible
	Port #5	Well defined halo and dark center
	Port #6	Flame 6" from wall
2010	Port #1	Bright, bushy flame
	Port #2	Bright, bushy flame
	Port #3	Flame is 12" from back wall
	Port #4	Flame is 18" from back wall
	Port #5	Well defined halo and dark center
	Port #6	Flame 6" from wall

Operator Flame Observations
02/15/96

0415	Port #1	Full flame, able to see bottom profile of flame
	Port #2	Full 4' flame
	Port #3	Medium to full flame, pulsing
	Port #4	Light flame
	Port #5	Full flame with swirl
	Port #6	Full flame
1135	Port #1	40° downward angle, grainy texture, bright yellow
	Port #2	Short, recirculating flame, low tip, can see over the top to side wall
	Port #3	Churning and turbulent, recirculating action, fairly bright
	Port #4	Wisps of yellow flame entering convective pass
	Port #5	Wisps of yellow flame flicking toward side wall, 8-10" away
	Port #6	Bright top, darker core with turbulent action, can see outline of burner at top
	Port #7	Plumes of gray/yellow shooting out with some hesitation toward convective pass
1735	Port #1	Bright, bushy
	Port #3	18" from wall
	Port #5	Flame is low, can see only bright top and sometimes darker center
	Port #6	Flame looks gray and fuzzy

Operator Flame Observations
02/16/96

0420	Port #1	Full flame with swirl
	Port #2	Full flame
	Port #3	Medium flameg
	Port #4	Low flame
	Port #5	Full flame with swirl
	Port #6	Full flame
1135	Port #1	Steady downward angle 40°, gray/yellow, tight ripples
	Port #2	Bright, yellow/gray, recirculating action, can see across to far wall intermitently
	Port #3	Turbulent graty/yellow pulsing action
	Port #4	Puffs of bright yellow flame shooting upward and out to convective pass
	Port #5	Bright yellow licks of flame at halfway back, 8-10" away from wall
	Port #6	Dark, turbulent/recirculating action, outer flame bright yellow and spinning to right
	Port #7	Pulsating yellow flame shooting out and into convective pass
1910	Port #1	Bright, bushy, full flame
	Port #3	Flame 10" from wall
	Port #5	Bright halo, darker center, seems forced down

Operator Flame Observations
02/17/96

0415	Port #1	Full flame with swirl
	Port #2	Full 4 ft flame
	Port #3	Medium flame
	Port #4	Medium flame
	Port #5	Full flame with swirl
	Port #6	Full flame
1710	Port #1	Flame is a bit gray and fuzzy
	Port #2	Flame is to about center of port, long on bottom
	Port #3	Cannot see flame
	Port #4	Cannot see flame
	Port #5	Bright halo, dark center, seems to be pushed down
	Port #6	Flame is 6" from wall

Operator Flame Observations
02/19/96

0335	Port #1	Full flame, easily see bottom flame profile
	Port #2	Full 4' flame
	Port #3	Medium/full flame
	Port #4	Medium flame
	Port #5	Full flame
	Port #6	Full flame
0930	Port #1	Steady, tight textured 15° flame, light gray core
	Port #2	Gray/yellow agitating action
	Port #3	Dense, gray/yellow steady flame
	Port #4	Puffs of yellow flame entering convective pass
	Port #5	Intermittent licks of flame visible approximately 10" from wall
	Port #6	Recirculating flame with gray core, yellow perimeter
	Port #7	Puffs of yellow flame shooting into convective pass

Appendix G. Summary of Deposition in the Demonstration Boiler for Testing Conducted During November and December 1994

Summary of Ash Deposition in the Demonstration Boiler for Testing Conducted in November and December 1994

The demonstration boiler was operated on a 2-shift/day and a continuous (24 hour) basis during November and December 1994 to evaluate the effect of ash deposition on boiler performance. Table G-1 is a summary of the results of the November and December testing. Listed in Table G-1 is the date of operation, the quantity of coal that was consumed on the date of operation, cumulative coal usage on the date of operation, cumulative coal usage since the last time the boiler was shut down and the was ash removed from the system, boiler outlet pressure, ID fan amperage, convective pass temperature (at the location where erosion measurements are made), boiler outlet temperature, steam production, and comments.

The boiler was operated at two firing rates -- approximately 16 and 13 million Btu/h. Prior to testing in November, the boiler was cleaned on 11/04/94 and ash was removed from the furnace, the entrance to the convective pass, and the breaching (interconnection between the boiler and the heat-pipe heat exchanger). Tests conducted on 11/16/94, 11/17/94, and 11/18/94 were performed while operating the boiler on two shifts per day and at 14.9 to 16.0 million Btu/h. The test conducted from 11/21/94 to 11/22/94 was performed while operating the boiler 24-hours/day at a firing rate of 15.7 million Btu/h. The 15.7 firing rate increased from 15.7 (for two twelve hour periods) to 16.4 MM Btu/h (for one twelve hour period) because the feed rate was held constant but the heating value of the coal increased.

The boiler was cleaned on 11/23/94 and ash was removed from the furnace, entrance to the convective pass, and the breaching. Tests were then conducted on 11/28/94, 11/30/94, 12/01/94, and 12/02/94 while operating the boiler on two shifts per day and at 12.7 to 12.8 million Btu/h. A test was conducted from 12/05/94 to 12/07/94 while continuously operating the boiler and firing at a rate of 12.7 million Btu/h.

Figures G-1 through G-6 are plots of sootblowing frequency, boiler outlet pressure, ID fan amperage, convective pass temperature, boiler outlet temperature, and steam production as a function of cumulative coal usage when firing the boiler at 16 million Btu/h, respectively. (Note that in Figure G-1 there were not any sootblowing events on 11/07/94 but that the date was included in the legend so that the symbols are consistent between the figures.) The data for Figure G-1 were obtained from the circular charts, the data for Figures G-2 to G-6 were obtained from the operators' data sheets which were manually recorded every 30 minutes. The minimum pressure indicated on the boiler outlet pressure gauge is -2.0" W.C. (water column). When the gauge went off

Table G-1. Summary of the Deposition Testing Conducted in November and December 1994

Date	Total Coal Consumed on this Date (lb)	Time	Cumulative Coal Usage on this Date (lb)	Cumulative Coal Usage since Boiler Cleaning; (lb)	Boiler Outlet Pressure ("W.C.)	ID Fan Amp Draw	Convective Pass Probe Temperature (K)	Convective Pass Probe Temperature (F)	Boiler Outlet Temperature (F)	Steam Production (lb/h)	Comments	
11/4/94	Boiler cleaned											
11/7/94	2,652	1230	1,532	1,532	-0.6	31.4	Not Measured	NM	555	12,300		2 shifts
		1300	2,092	2,092	-0.7	31.1	NM	NM	565	12,400		
		1330	2,652	2,652	-0.7	31.2	NM	NM	573	11,400		
11/16/94	4,570	1600	3,425	6,077	-0.5	28.0	NM	NM	560	13,400		2 shifts
		1630	3,998	6,650	-0.5	28.5	NM	NM	590	10,300	Blowdown at 1640	
		1700	4,570	7,222	-0.5	28.4	NM	NM	560	10,210		
11/17/94	5,339	1430	1,323	8,550	-0.8	29.5	NM	NM	579	10,600		2 shifts
		1500	1,897	9,123	-0.9	29.5	NM	NM	588	13,900		
		1530	2,470	9,696	-0.8	29.8	NM	NM	593	13,700		
		1600	3,044	10,269	-0.7	29.6	NM	NM	601	12,700		
		1630	3,617	10,842	-0.6	29.7	NM	NM	572	13,900	Blowdown at 1620	
		1700	4,192	11,415	-0.7	29.6	NM	NM	587	11,500		
		1730	4,765	11,988	-0.6	29.6	NM	NM	598	13,300		
		1800	5,339	12,561	-0.6	29.6	NM	NM	614	14,000		
11/18/94	10,710	1145	2,680	15,249	-0.8	29.7	NM	NM	589	10,900		2 shifts
		1215	3,253	15,822	-0.7	28.0	NM	NM	571	8,315		
		1245	3,827	16,395	-0.7	29.1	NM	NM	612	12,600		
		1315	4,400	16,968	-0.8	29.3	NM	NM	573	11,700	Blowdown at 1300	
		1345	4,974	17,541	-0.8	29.4	NM	NM	587	13,900		
		1415	5,548	18,114	-0.8	29.4	NM	NM	598	10,300		
		1445	6,121	18,687	-0.6	29.4	NM	NM	580	10,700	Blowdown at 1420	
		1515	6,695	19,260	-0.6	29.3	NM	NM	593	13,700		
		1545	7,268	19,833	-0.6	29.5	NM	NM	580	12,900	Blowdown at 1525	
		1615	7,842	20,406	-0.4	29.4	NM	NM	594	13,200		
		1645	8,416	20,979	-0.7	29.6	NM	NM	584	9,500	Blowdown at 1630	
		1715	8,989	21,552	-0.8	29.5	NM	NM	592	11,800		
		1745	9,563	22,125	-0.9	29.2	NM	NM	611	11,300		
		1815	10,136	22,698	-0.9	29.0	NM	NM	591	13,900	Blowdown at 1800	
		1845	10,710	23,271	-0.8	29.4	NM	NM	607	13,000		
11/21 to	37,945	0200	1,209	24,480	-0.8	30.6	NM	NM	577	10,000		Continuous
11/22/1994 noon		0230	1,783	25,054	-0.8	30.4	NM	NM	588	10,300		operation
		0300	2,357	25,628	-0.8	31.1	NM	NM	612	12,800		
		0330	2,931	26,202	-0.8	31.5	NM	NM	596	13,600	Blowdown	
		0400	3,505	26,776	-0.8	31.2	NM	NM	607	11,500		
		0430	4,079	27,350	-0.8	31.5	NM	NM	598	15,300	Blowdown	
		0500	4,653	27,924	-0.8	32.0	NM	NM	616	10,500		
		0530	5,227	28,498	-0.8	31.7	NM	NM	596	12,100	Blowdown	
		0600	5,801	29,072	-1.0	31.0	NM	NM	608	11,700		
		0630	6,375	29,646	-1.0	31.5	NM	NM	603	14,600	Blowdown	
		0700	6,949	30,220	-1.0	31.5	NM	NM	609	12,200		
		0730	7,523	30,794	-1.0	31.0	NM	NM	581	10,900	Blowdown	
		0800	8,097	31,368	-1.0	31.7	NM	NM	608	12,800		
		0830	8,671	31,942	-1.0	31.3	NM	NM	591	10,400	Blowdown	
		0900	9,245	32,516	-1.0	31.2	NM	NM	583	13,000	Blowdown	
		0930	9,819	33,090	-1.0	30.7	NM	NM	593	12,400		
		1000	10,393	33,664	-0.8	30.2	NM	NM	599	12,800		
		1030	10,967	34,238	-0.8	30.0	NM	NM	585	11,000	Blowdown	
		1100	11,541	34,812	-1.0	30.5	NM	NM	615	13,400		
		1130	12,115	35,386	-1.0	30.8	NM	NM	596	13,500	Blowdown	
		1200	12,689	35,960	-1.0	30.6	NM	NM	607	12,600		
		1230	13,263	36,534	-0.8	30.6	961	1,270	617	12,400		
		1300	13,837	37,108	-1.0	30.6	931	1,216	598	13,300	Blowdown	
		1330	14,411	37,682	-0.8	30.5	976	1,297	613	14,200		
		1400	14,985	38,256	-1.0	30.3	932	1,218	599	12,100	Blowdown	
		1430	15,559	38,830	-1.0	30.3	966	1,279	615	13,600		
		1500	16,133	39,404	-1.0	30.6	947	1,245	601	13,800	Blowdown	
		1530	16,707	39,978	-1.0	30.5	955	1,259	612	12,800		
		1600	17,281	40,552	-1.0	30.3	942	1,236	594	13,400	Blowdown	
		1630	17,855	41,126	-1.0	30.6	987	1,317	611			
		1700	18,429	41,700	-1.0	30.4	930	1,214	596	12,200	Blowdown	
		1730	19,003	42,274	-1.0	30.1	964	1,276	606	14,100		
		1800	19,577	42,848	-1.0	30.3	964	1,276	611	13,700		
		1830	20,151	43,422	-1.0	30.8	991	1,324	606	15,600	Blowdown	
		1900	20,725	43,996	-1.0	30.7	973	1,292	606	14,600	Blowdown	
		1930	21,299	44,570	-0.8	30.6	958	1,265	600	13,800		
		2000	21,873	45,144	-0.8	30.4	963	1,274	610	13,700		
		2030	22,447	45,718	-1.0	31.3	1002	1,344	620	15,000		
		2100	23,021	46,292	-1.0	30.2	978	1,301	597	14,200	Blowdown	
		2130	23,595	46,866	-1.0	30.2	963	1,274	589	15,200	Blowdown	
		2200	24,169	47,440	-1.2	31.0	961	1,270	603	15,300		
		2230	24,743	48,014	-1.1	31.0	962	1,272	596	14,900	Blowdown	
		2300	25,317	48,588	-1.2	30.7	964	1,276	610	14,800		
		2330	25,891	49,162	-1.2	31.0	1024	1,384	620	15,100		
11/22/94		0000	26,465	49,736	-1.2	31.5	1003	1,346	613	15,100	Blowdown	
		0030	27,039	50,310	-1.1	31.7	992	1,326	619	13,900		
		0100	27,613	50,884	-1.3	31.4	1013	1,364	623	15,400		
		0130	28,187	51,458	-1.2	31.5	885	1,133	617	15,200	Blowdown	
		0200	28,761	52,032	-1.3	31.6	986	1,315	621	13,900		
	Total Coal		Cumulative	Cumulative			Convective	Convective				
	Consumed on		Coal Usage on	Coal Usage	Boiler Outlet		Pass Probe	Pass Probe	Boiler Outlet	Steam		

Table G-1. Summary of the Deposition Testing Conducted in November and December 1994

Date	this Date (lb)	Time	this Date (lb)	since Boiler Cleaning; (lb)	Pressure ("W.C.)	ID Fan Amp Draw	Temperature (K)	Temperature (F)	Temperature (F)	Production (lb/h)	Comments	
		0230	29,335	52,606	-1.2	31.5	995	1,331	622	14,000		
		0300	29,909	53,180	-1.3	31.7	968	1,283	611	14,200	Blowdown	
		0330	30,483	53,754	-1.8	31.6	924	1,204	617	14,900		
		0400	31,057	54,328	-1.8	31.7	908	1,175	612	14,900	Blowdown	
		0430	31,631	54,902	-1.9	31.6	921	1,198	623	14,700		
		0500	32,205	55,476	-2.0	32.0	928	1,211	606	16,200	Blowdown	
		0530	32,779	56,050	-2.0	31.9	900	1,160	617	15,400		
		0600	33,353	56,624	-2.0	32.1	900	1,160	593	14,000	Blowdown	
		0630	33,927	57,198	<-2	32.0	902	1,164	615	16,000		
		0700	34,501	57,772	<-2	32.0	901	1,162	618	14,800		
		0730	35,075	58,346	<-2	32.2	832	1,038	591	15,300	Blowdown	
		0800	35,649	58,920	<-2	32.1	841	1,054	603	15,800		
		0830	36,223	59,494	<-2	32.5	854	1,078	607	14,100		
		0900	36,797	60,068	<-2	32.1	828	1,031	606	13,200		
		0930	37,371	60,642	<-2	32.3	863	1,094	617	15,200		
		1000	37,945	61,216	<-2	32.4	806	991	588	15,300	Blowdown	
11/23/94	Boiler Cleaned											
11/28/94	3,645	0930	2,280	2,280	-0.3	26.7	815	1,007	543	9,100		2 shifts
		1000	2,735	2,735	-0.3	26.6	845	1,061	569	8,600		
		1030	3,190	3,190	-0.3	26.7	868	1,103	595	9,100		
		1100	3,645	3,645	-0.3	26.7	808	995	528	8,800	Blowdown	
11/30/94	4,866	1600	1,226	4,871	-0.3	27.7	889	1,141	579	7,500		2 shifts
		1630	1,681	5,326	-0.5	27.3	905	1,169	594	9,700		
		1700	2,136	5,781	-0.5	27.5	835	1,043	523	9800	Blowdown	
		1730	2,591	6,236	-0.5	27.9	867	1,101	549	7,600		
		1800	3,046	6,691	-0.5	28.5	898	1,157	598	8,900		
		1830	3,501	7,146	-0.6	28.9	883	1,130	562	13,000		
		1900	3,956	7,601	-0.5	29.1	899	1,159	573	13,000		
		1930	4,411	8,056	-0.6	30.3	899	1,159	561	8,200	Blowdown	
		2000	4,866	8,511	-0.6	28.9	909	1,177	576	11,100		
12/1/94	7,162	1230	1,247	9,758	-0.5	27.9	887	1,137	561	8,800		2 shifts
		1300	1,702	10,213	-0.4	28.0	909	1,177	580	9,200		
		1330	2,157	10,668	-0.6	27.9	949	1,249	616	10,300		
		1400	2,612	11,123	-0.6	28.8	894	1,150	562	11,000	Blowdown	
		1430	3,067	11,578	-0.6	29.1	924	1,204	593	11,600		
		1500	3,522	12,033	-0.6	27.8	922	1,200	583	9,700		
		1530	3,977	12,488	-0.5	27.8	901	1,162	561	11,300	Blowdown	
		1600	4,432	12,943	-0.6	27.6	898	1,157	593	9,200		
		1630	4,887	13,398	-0.6	28.2	951	1,252	630	12,000		
		1700	5,342	13,853	-0.7	29.8	933	1,220	630	11,900		
		1730	5,797	14,308	-0.7	29.2	886	1,135	571	12,400	Blowdown	
		1800	6,252	14,763	-0.6	29.0	880	1,124	569	11,300		
		1830	6,707	15,218	-0.5	27.3	901	1,162	582	9,300		
		1900	7,162	15,673	-0.5	27.1	861	1,090	538	7,500	Blowdown	
12/2/94	5,457	1300	2,293	17,966	-0.8	29.7	845	1,061	577	11,400		2 shifts
		1330	2,745	18,418	-0.7	28.7	835	1,043	571	10,700	Blowdown	
		1400	3,197	18,870	-0.6	28.5	892	1,146	585	11,200		
		1800	3,649	19,322	-0.7	29.6	858	1,085	594	12,500		
		1830	4,101	19,774	-0.6	29.1	867	1,101	591	7,600	Blowdown	
		1900	4,553	20,226	-0.5	28.9	894	1,150	597	11,700		
		1930	5,005	20,678	-0.6	28.5	913	1,184	610	7,100		
		2000	5,457	21,130	-0.5	28.9	920	1,196	612	9,700		
12/5 thru	53,476	0630	1,496	22,626	-0.6	28.1	NM	NM	587	10,800		Continuous
12/7/94		0700	1,948	23,078	-0.4	27.6	NM	NM	598	8,600		operation
		0730	2,400	23,530	-0.5	27.8	NM	NM	608	10,400		
		0800	2,852	23,982	-0.6	27.9	NM	NM	560	8,800	Blowdown	
		0830	3,304	24,434	-0.8	29.0	NM	NM	613	10,000		
		0900	3,756	24,886	-0.6	28.9	NM	NM	583	10,300	Blowdown	
		0930	4,208	25,338	-0.8	28.5	NM	NM	595	11,800		
		1000	4,660	25,790	-0.6	28.7	NM	NM	605	11,800		
		1030	5,112	26,242	-0.5	28.8	NM	NM	574	8,700	Blowdown	
		1100	5,564	26,694	-0.6	28.7	NM	NM	589	10,100		
		1130	6,016	27,146	-0.8	28.7	NM	NM	608	8,500		
		1200	6,468	27,598	-0.8	28.4	NM	NM	617	7,700		
		1230	6,920	28,050	-0.8	28.4	NM	NM	575	8,200	Blowdown	
		1300	7,372	28,502	-0.7	28.4	NM	NM	593	13,100		
		1330	7,824	28,954	-0.7	28.5	NM	NM	602	10,700		
		1400	8,276	29,406	-0.7	28.4	NM	NM	611	11,700		
		1430	8,728	29,858	-0.6	28.1	NM	NM	574	9,300	Blowdown	
		1500	9,180	30,310	-0.8	28.7	NM	NM	589	10,500		
		1530	9,632	30,762	-0.8	28.3	NM	NM	599	8,500		
		1600	10,084	31,214	-0.5	28.6	NM	NM	578	9,200	Blowdown	
		1630	10,536	31,666	-0.7	28.6	NM	NM	598	11,600		
		1700	10,988	32,118	-0.7	28.3	NM	NM	606	9,700		
		1730	11,440	32,570	-0.6	28.0	NM	NM	610	10,100		
FD fan belt broke		1800	11,892	33,022	-0.5	28.3	NM	NM	576	10,800	Blowdown	
		2330	12,344	33,474	-0.8	29.3	NM	NM	600	11,900		
		0000	12,796	33,926	-0.7	28.6	NM	NM	598	11,400		
		0030	13,248	34,378	-0.7	28.3	NM	NM	607	11,400		
Date	Total Coal Consumed on this Date (lb)	Time	Cumulative Coal Usage on this Date (lb)	Cumulative Coal Usage since Boiler Cleaning; (lb)	Boiler Outlet Pressure ("W.C.)	ID Fan Amp Draw	Convective Pass Probe Temperature (K)	Convective Pass Probe Temperature (F)	Boiler Outlet Temperature (F)	Steam Production (lb/h)	Comments	

Table G-1. Summary of the Deposition Testing Conducted in November and December 1994

Date	Total Coal Consumed on this Date (lb)	Time	Cumulative Coal Usage on this Date (lb)	Cumulative Coal Usage since Boiler Cleaning; (lb)	Boiler Outlet Pressure ("W.C.)	ID Fan Amp Draw	Convective Pass Probe Temperature (K)	Convective Pass Probe Temperature (F)	Boiler Outlet Temperature (F)	Steam Production (lb/h)	Comments	
		0100	13,700	34,830	-0.6	28.6	NM	NM	614	10,500		
		0130	14,152	35,282	-0.8	28.8	NM	NM	579	10,600	Blowdown	
		0200	14,604	35,734	-0.6	28.7	NM	NM	596	10,600		
		0230	15,056	36,186	-0.8	28.5	NM	NM	603	10,500		
		0300	15,508	36,638	-0.6	28.5	NM	NM	611	10,500		
		0330	15,960	37,090	-0.6	28.7	NM	NM	577	11,100	Blowdown	
		0400	16,412	37,542	-0.6	28.6	NM	NM	599	11,700		
		0430	16,864	37,994	-0.6	28.7	NM	NM	605	10,900		
		0500	17,316	38,446	-0.8	29.0	NM	NM	582	10,400	Blowdown	
		0530	17,768	38,898	-0.8	29.0	NM	NM	598	11,200		
		0600	18,220	39,350	-0.7	29.0	NM	NM	608	11,800		
		0630	18,672	39,802	-0.7	28.9	NM	NM	589	11,300	Blowdown	
		0700	19,124	40,254	-0.7	29.0	NM	NM	597	11,300		
		0730	19,576	40,706	-0.6	28.6	NM	NM	607	12,400		
		0800	20,028	41,158	-0.8	28.9	NM	NM	573	11,500	Blowdown	
		0830	20,480	41,610	-0.8	28.9	NM	NM	587	10,900		
		0900	20,932	42,062	-0.7	28.8	NM	NM	602	11,700		
		0930	21,384	42,514	-0.8	28.6	NM	NM	614	11,600		
		1000	21,836	42,966	-0.8	28.7	NM	NM	585	10,800	Blowdown	
		1030	22,288	43,418	-0.8	28.6	NM	NM	595	10,900		
		1100	22,740	43,870	-0.8	28.4	NM	NM	612	12,500		
		1130	23,192	44,322	-1.0	28.5	NM	NM	593	12,200	Blowdown	
		1200	23,644	44,774	-1.0	28.5	NM	NM	591	10,900		
		1230	24,096	45,226	-0.8	28.3	NM	NM	572	10,900	Blowdown	
		1300	24,548	45,678	-0.8	28.5	NM	NM	603	10,700		
		1330	25,000	46,130	-0.6	28.3	NM	NM	590	11,800	Blowdown	
		1400	25,452	46,582	-0.8	28.3	NM	NM	608	11,500		
		1430	25,904	47,034	-0.6	28.1	NM	NM	585	11,500	Blowdown	
		1500	26,356	47,486	-0.6	28.2	NM	NM	604	12,600		
		1530	26,808	47,938	-0.8	28.4	NM	NM	593	10,800	Blowdown	
		1600	27,260	48,390	-0.8	28.1	NM	NM	610	12,500		
		1630	27,712	48,842	-0.7	28.3	NM	NM	585	11,800	Blowdown	
		1700	28,164	49,294	-0.7	28.5	NM	NM	594	11,200		
		1730	28,616	49,746	-0.7	28.3	NM	NM	609	12,400		
		1800	29,068	50,198	-0.6	28.5	NM	NM	587	11,400	Blowdown	
		1830	29,520	50,650	-0.8	28.7	NM	NM	598	11,700		
		1900	29,972	51,102	-0.7	28.7	NM	NM	614	11,400		
		1930	30,424	51,554	-0.7	28.5	NM	NM	618	11,200		
		2000	30,876	52,006	-0.6	28.7	NM	NM	593	12,200	Blowdown	
		2030	31,328	52,458	-0.7	28.3	NM	NM	594	10,700		
		2100	31,780	52,910	-0.8	28.4	NM	NM	605	11,400		
		2130	32,232	53,362	-0.7	28.2	NM	NM	615	11,600		
		2200	32,684	53,814	-0.8	28.2	NM	NM	588	11,600	Blowdown	
		2230	33,136	54,266	-0.8	28.3	NM	NM	598	11,100		
		2300	33,588	54,718	-0.8	28.3	NM	NM	610	12,200		
		2330	34,040	55,170	-0.7	28.4	NM	NM	612	10,600		
		0000	34,492	55,622	-0.8	28.3	NM	NM	593	12,400	Blowdown	
		0030	34,944	56,074	-1.0	28.3	NM	NM	610	11,300		
		0100	35,396	56,526	-0.9	28.5	NM	NM	583	10,900	Blowdown	
		0130	35,848	56,978	-1.2	28.6	NM	NM	607	12,500		
		0200	36,300	57,430	-1.0	28.6	NM	NM	564	10,100	Blowdown	
		0230	36,752	57,882	-1.0	28.4	NM	NM	598	11,600		
		0300	37,204	58,334	-1.2	28.3	NM	NM	609	11,100		
		0330	37,656	58,786	-1.4	28.2	NM	NM	618	11,200		
		0400	38,108	59,238	-1.4	28.4	NM	NM	595	12,300	Blowdown	
		0430	38,560	59,690	-1.4	28.5	NM	NM	609	12,100		
		0500	39,012	60,142	-1.2	28.6	NM	NM	574	10,500	Blowdown	
		0530	39,464	60,594	-1.5	28.8	NM	NM	597	12,200		
		0600	39,916	61,046	-1.5	28.9	NM	NM	603	11,500		
		0630	40,368	61,498	-1.7	28.8	NM	NM	610	11,800		
		0700	40,820	61,950	-1.8	28.7	NM	NM	581	12,100	Blowdown	
		0730	41,272	62,402	-1.9	28.7	NM	NM	607	12,100		
		0800	41,724	62,854	-1.9	28.6	NM	NM	612	12,500		
		0830	42,176	63,306	-2.0	28.6	NM	NM	587	11,200	Blowdown	
		0900	42,628	63,758	-2.0	28.7	NM	NM	604	13,000		
		0930	43,080	64,210	<-2	28.4	NM	NM	582	12,500	Blowdown	
		1000	43,532	64,662	<-2	28.8	NM	NM	586	11,500		
		1030	43,984	65,114	<-2	28.8	NM	NM	600	11,900		
		1100	44,436	65,566	<-2	28.5	NM	NM	612	12,600		
		1130	44,888	66,018	<-2	28.6	NM	NM	572	11,400	Blowdown	
		1200	45,340	66,470	<-2	28.7	NM	NM	574	11,000		
		1230	45,792	66,922	<-2	28.7	NM	NM	588	12,000		
		1300	46,244	67,374	<-2	28.3	NM	NM	598	12,500		
		1330	46,696	67,826	<-2	28.4	NM	NM	608	12,300		
		1400	47,148	68,278	<-2	28.6	NM	NM	581	11,900	Blowdown	
		1430	47,600	68,730	<-2	28.8	NM	NM	579	10,400		
		1500	48,052	69,182	<-2	28.6	NM	NM	592	11,200		
		1530	48,504	69,634	<-2	28.6	NM	NM	598	10,900		
		1600	48,956	70,086	<-2	29.3	NM	NM	597	11,100		
		1630	49,408	70,538	<-2	28.7	NM	NM	617	11,300		
		1700	49,860	70,990	<-2	28.9	NM	NM	574	11,200	Blowdown	
		1730	50,312	71,442	<-2	28.9	NM	NM	564	10,600		
		1800	50,764	71,894	<-2	28.6	NM	NM	589	12,100		
		1830	51,216	72,346	<-2	28.9	NM	NM	591	10,400		
		1900	51,668	72,798	<-2	28.8	NM	NM	600	11,900		
		1930	52,120	73,250	<-2	28.9	NM	NM	609	11,000		
		2000	52,572	73,702	<-2	29.0	NM	NM	551	11,100	Blowdown	

Table G-1. Summary of the Deposition Testing Conducted in November and December 1994

		2030	53,024	74,154	<-2	29.6	NM	NM	568	11,500		
		2100	53,476	74,606	<-2	29.4	NM	NM	574	10,400		

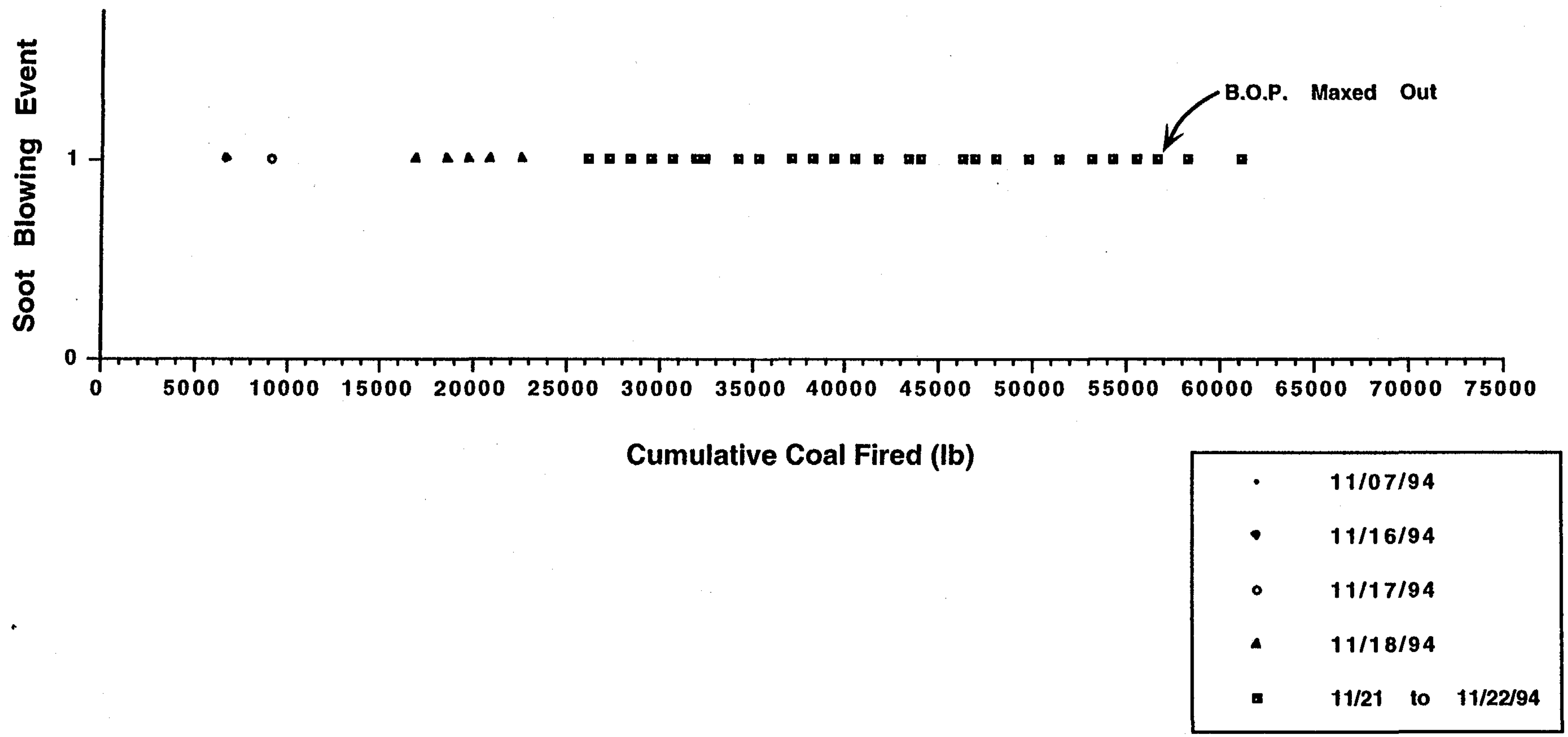


Figure G-1. SOOT BLOWING FREQUENCY AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 16 MM Btu/h

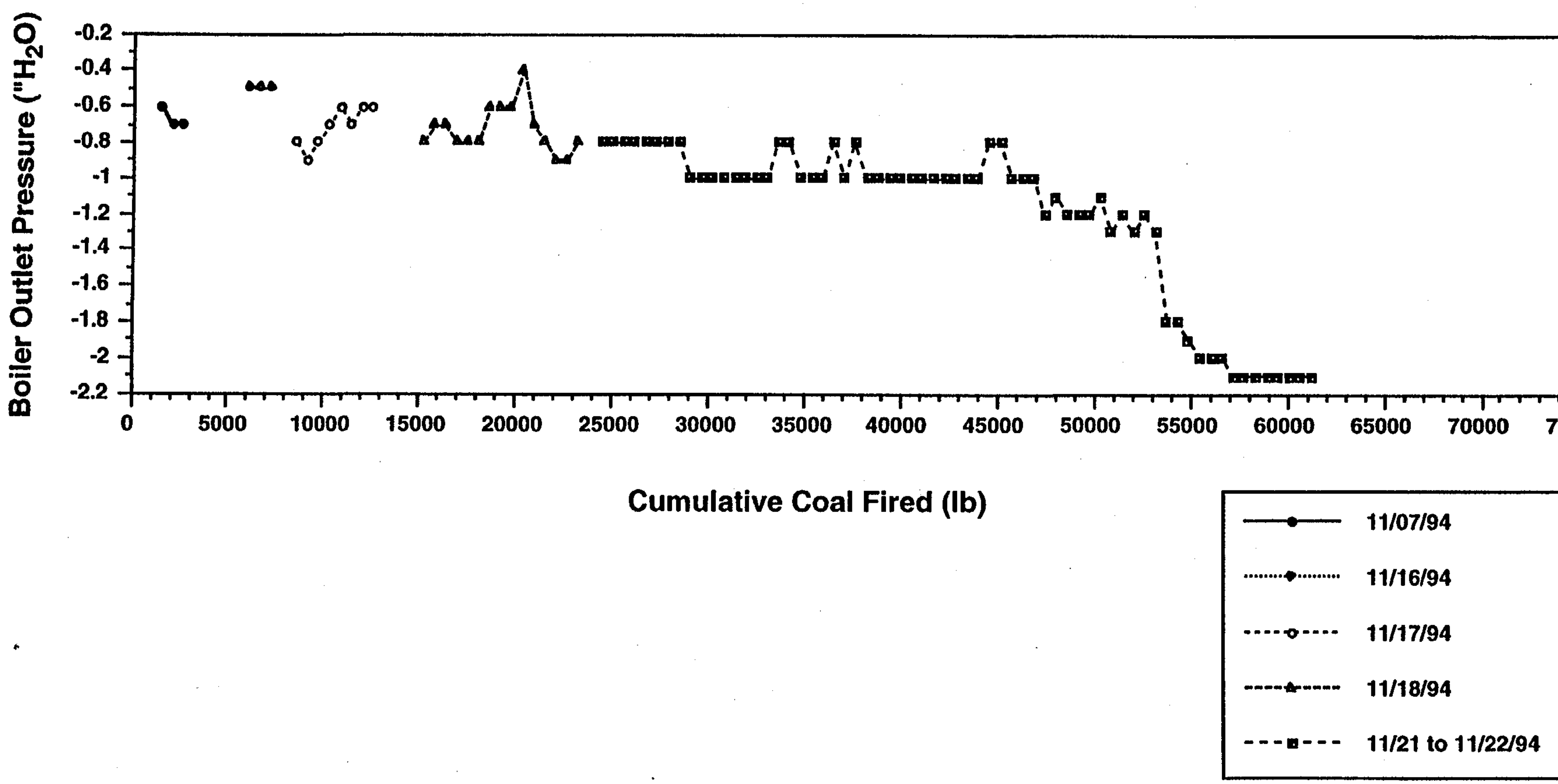


Figure G-2. **BOILER OUTLET PRESSURE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 16 MM Btu/h**

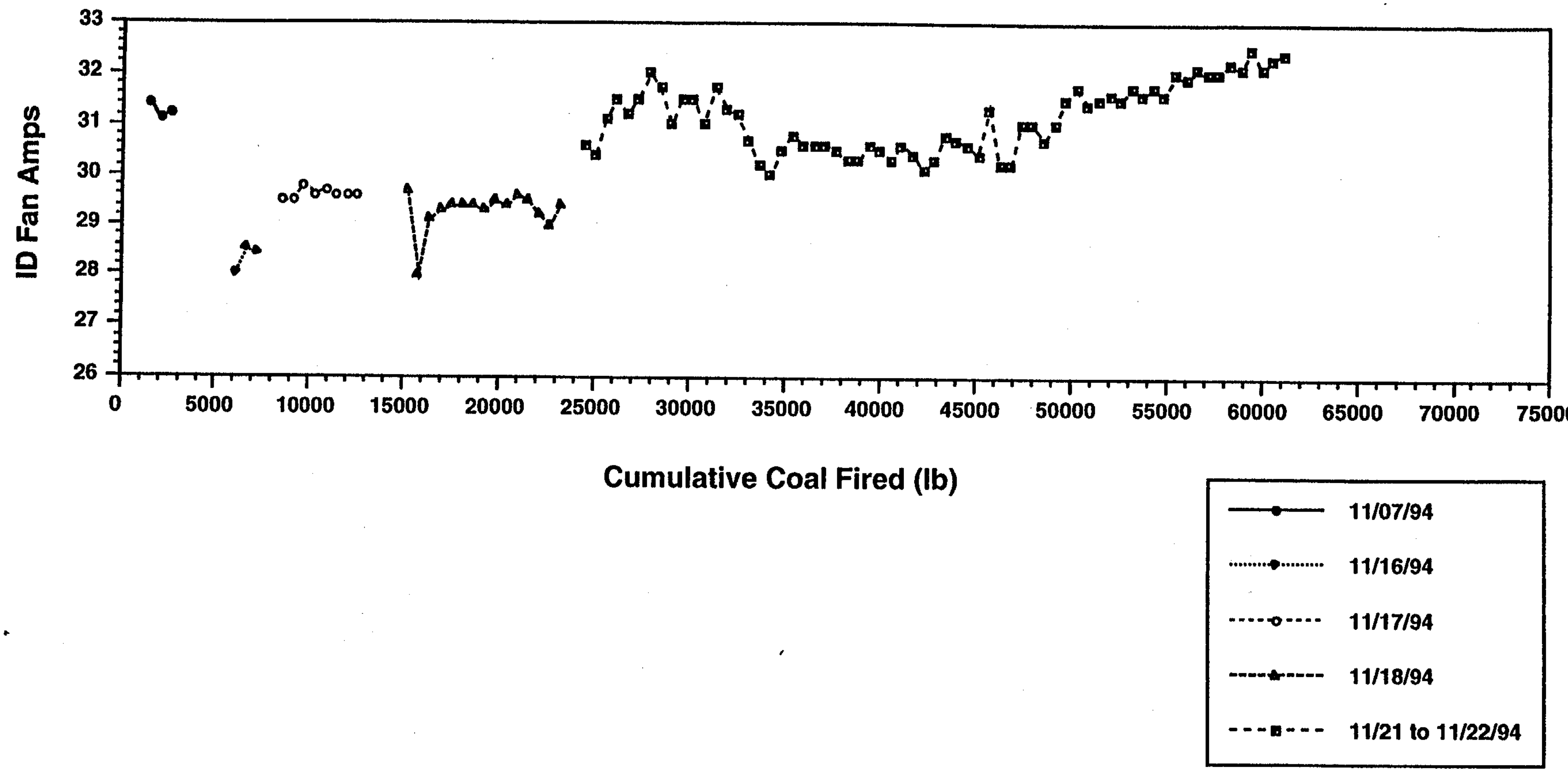


Figure G-3. ID FAN AMPERAGE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 16 MM Btu/h

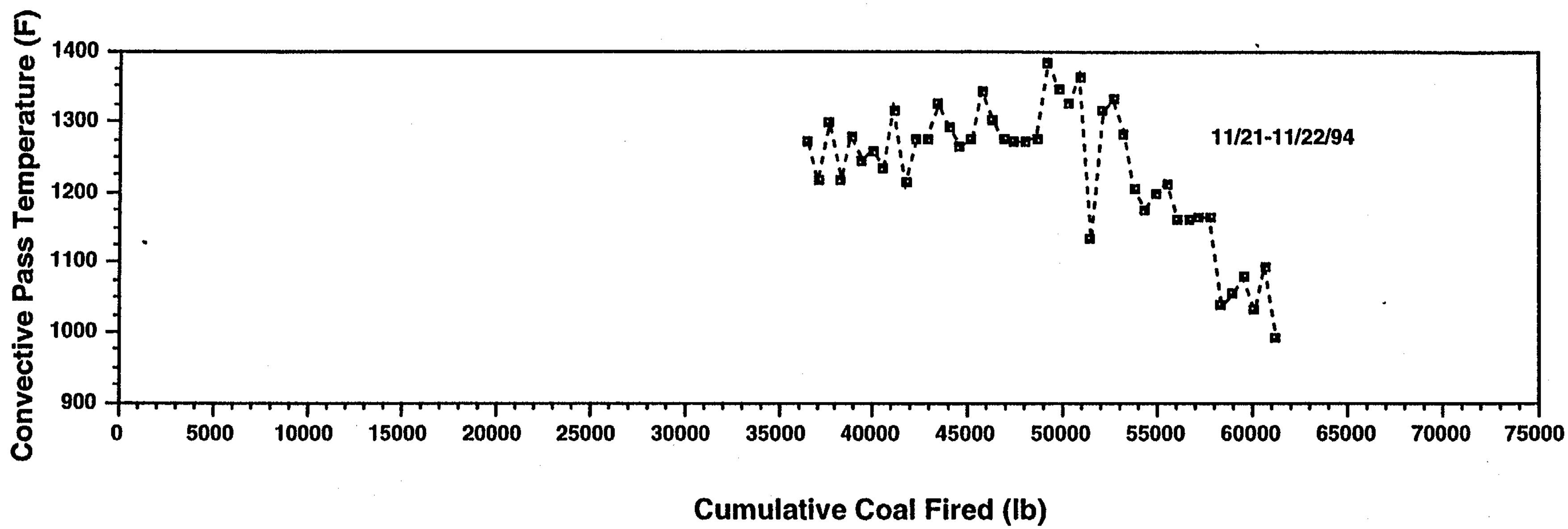


Figure G-4. CONVECTIVE PASS TEMPERATURE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 16 MM Btu/h

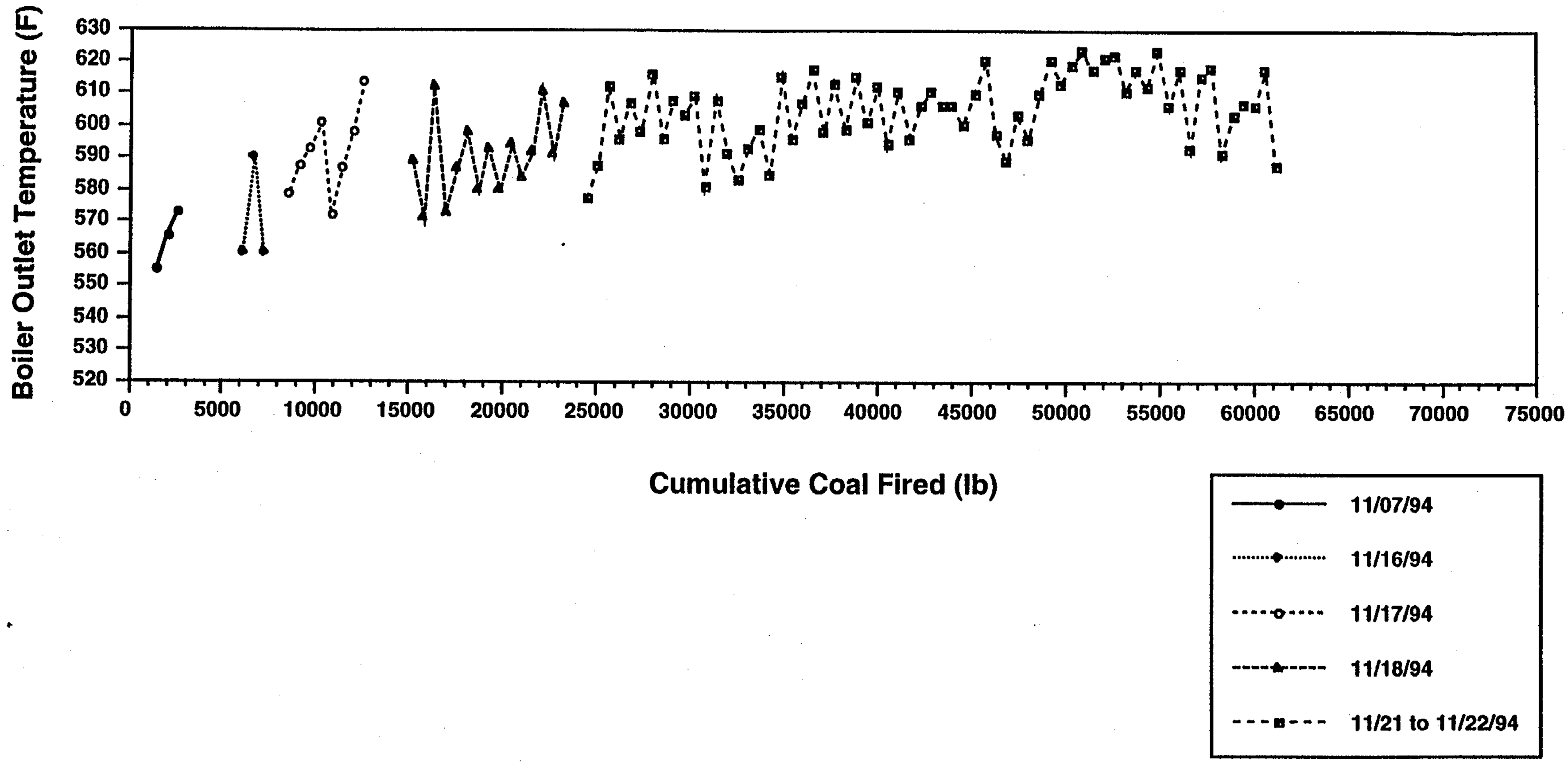


Figure G-5. BOILER OUTLET TEMPERATURE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 16 MM Btu/h

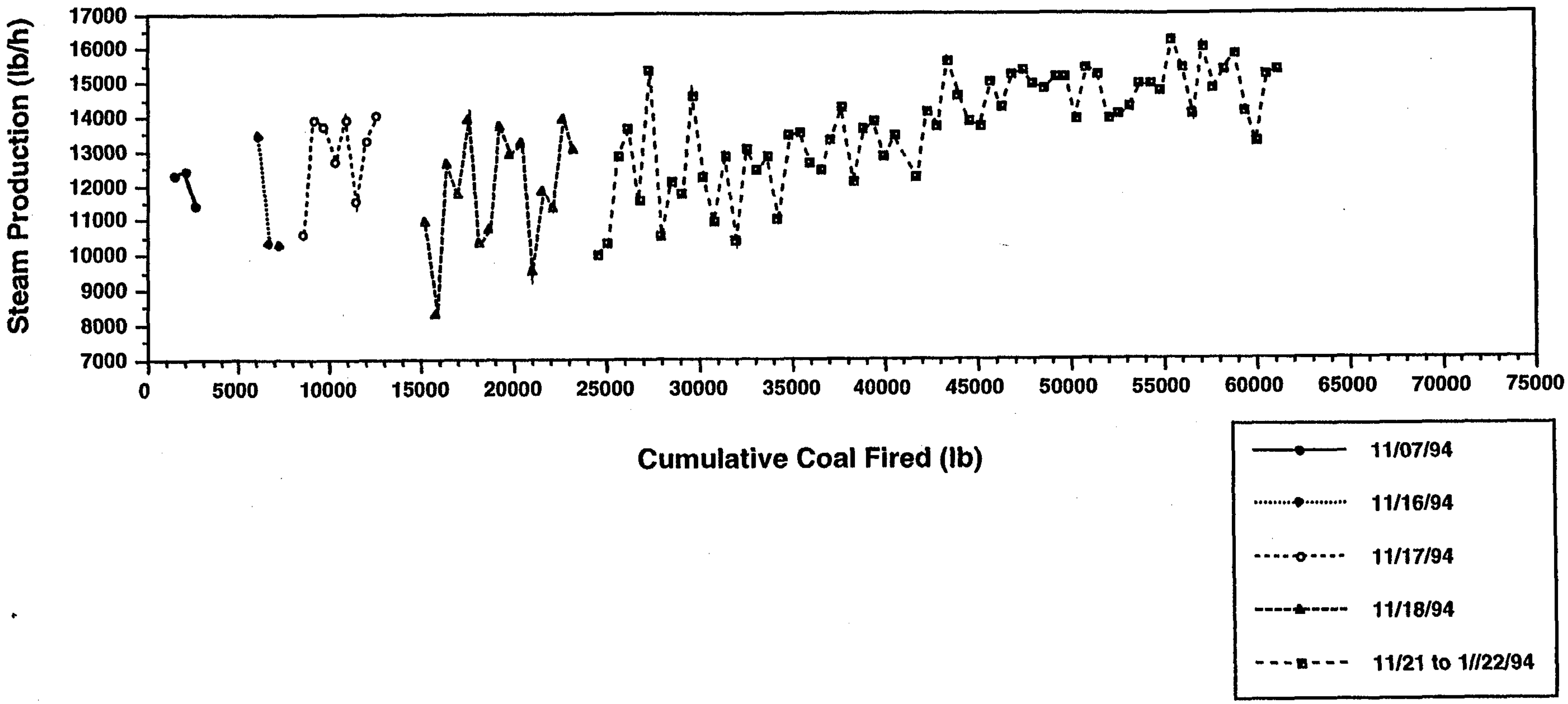


Figure G-6. STEAM PRODUCTION AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 16 MM Btu/h scale (<2.0" W.C.), the data were plotted (in Figure E-2) as -2.2" W.C. (for graphing purposes only). The actual pressure was not measured but was probably still decreasing with time of operation. The erosion probe, which contains a thermocouple, was inserted into the convective pass during the test conducted from 11/21 to 11/22/94 and the temperature was measured. In addition to the manually recorded steam production and boiler outlet temperature data, the data acquisition system logs these data every 30 seconds.

Figures G-7 through G-12 are plots of sootblowing frequency, boiler outlet pressure, ID fan amperage, convective pass temperature, boiler outlet temperature, and steam production as a function of cumulative coal usage when firing the boiler at 13 million Btu/h, respectively. Similar to Figure G-2, the minimum pressure indicated on the boiler outlet pressure gauge is -2.0" W.C. and the data were plotted as -2.2" W.C. (Figure G-8) when the gauge went off scale (<2.0" W.C.). In Figure G-10, the convective pass temperature was not manually recorded during the continuous test (12/05 to 12/07/94). In addition, the data were recorded by the data acquisition system in an unreadable format.

Deposition Summary -- Two Firing Rates

Table G-2 summarizes the results of the tests conducted at the two firing rates. It should be noted that there were not any operational problems observed when operating the boiler on a two-shift per day basis. The tests conducted when operating on a continuous basis were terminated when significant deposition was noted in the entrance to the convective pass (when firing at 16 million Btu/h) and when the rear side panels of the boiler warped and discoloration was noted on the back wall (when firing at 13 million Btu/h). Many of the results in Table G-2 are also contained in the Table G-3 (in the next section summarizing the continuous tests) because most of the system variations occurred during the continuous test. The results are still summarized in Table G-2 because total coal consumption since the last boiler cleanout is used in this analysis.

Table G-2. Deposition Summary -- Two Firing Rates

15.7-16.4 Million Btu/h	12.7 Million Btu/h
• 61,216 lb of coal were consumed at a rate of 1,148 lb/h for 53 h of operation.	• 74,606 lb of coal were consumed at a rate of 904 lb/h for 83 h of operation. (22% more coal was consumed and 57% more operating time was accumulated.)
• The boiler outlet pressure (B.O.P.) maxed out (<-2.2" W.C.) after consuming 57,000 lb of coal.	• The B.O.P. maxed out after consuming 64,000 lb of coal (12% more coal was consumed.).

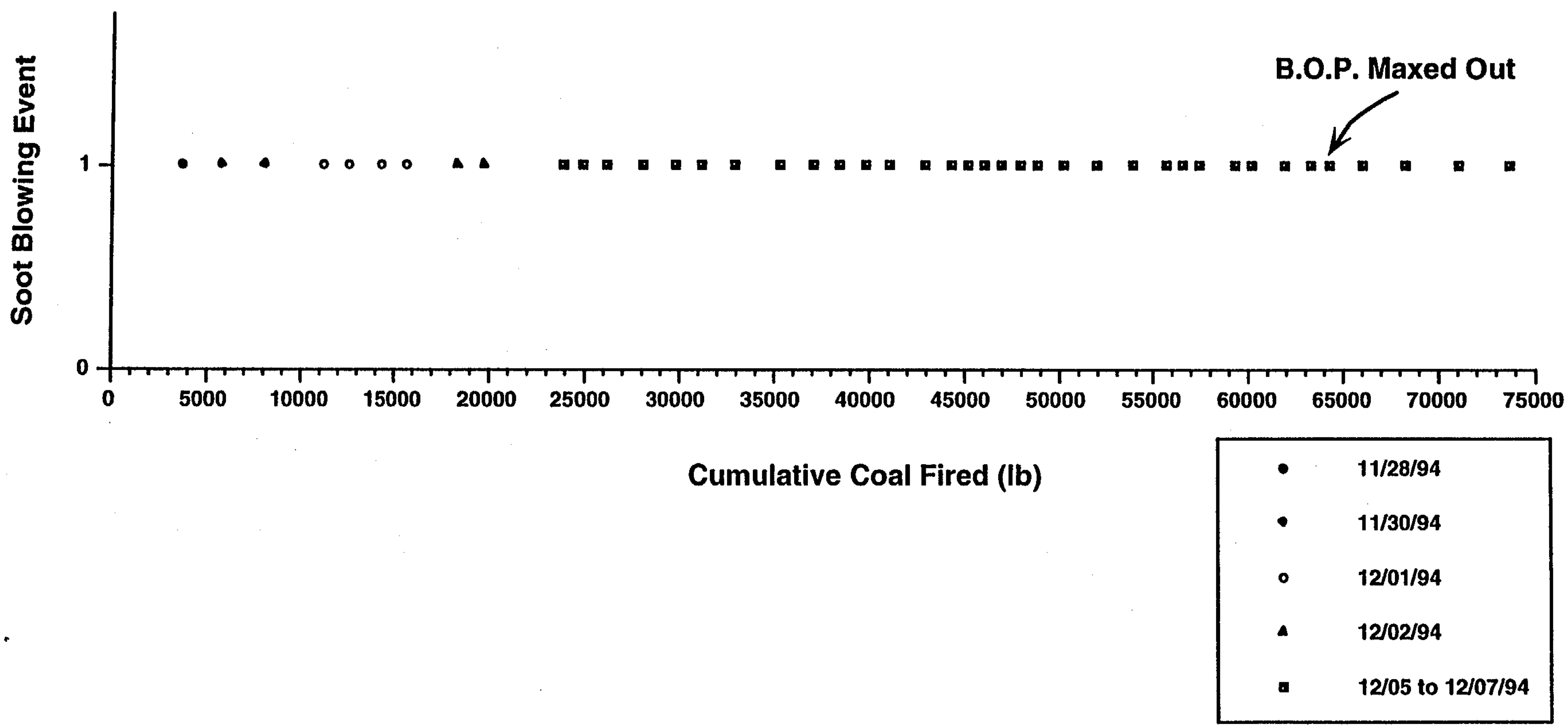


Figure G-7. SOOT BLOWING FREQUENCY AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 13 MM Btu/h

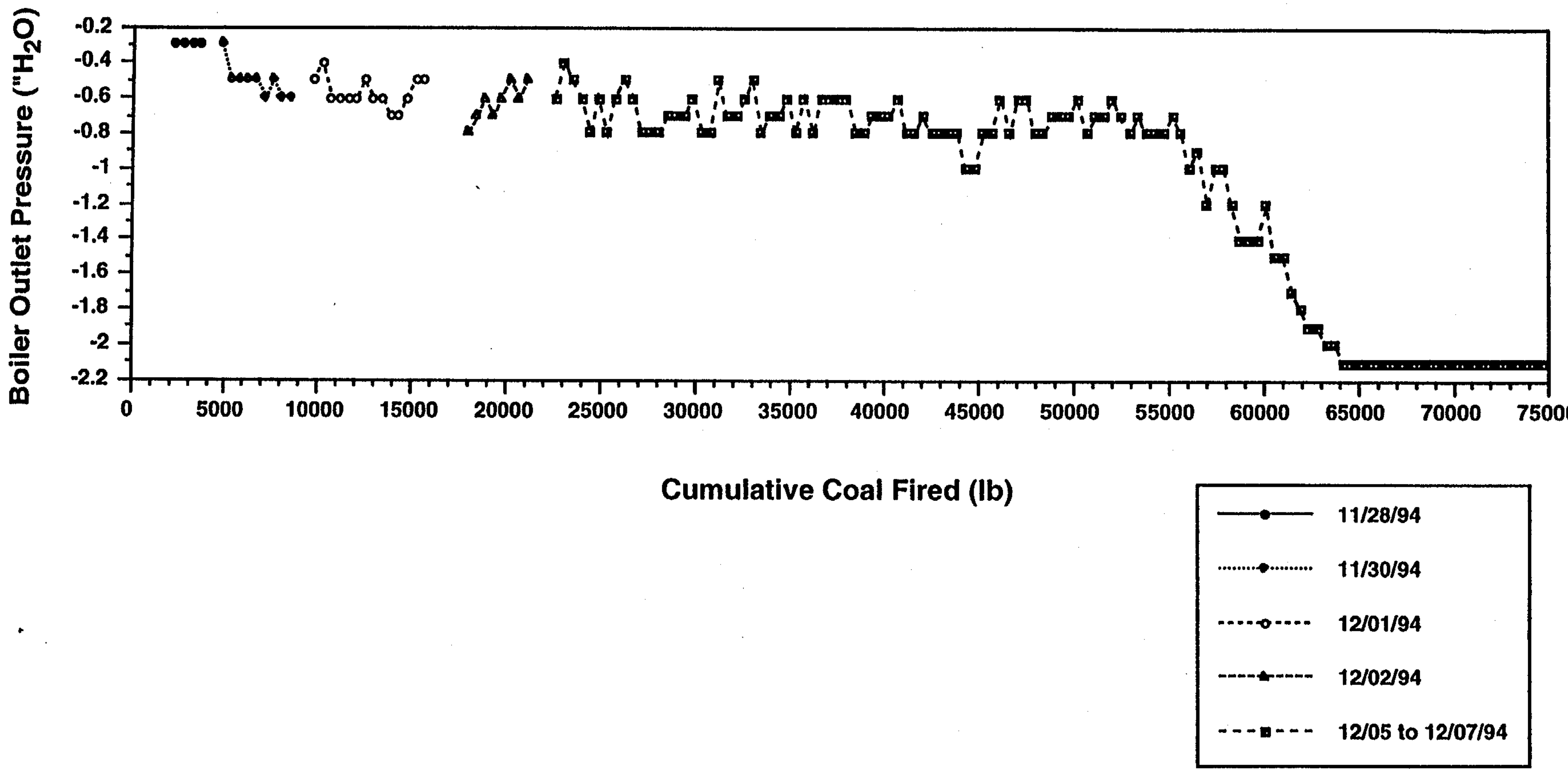


Figure G-8. BOILER OUTLET PRESSURE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 13 MM Btu/h

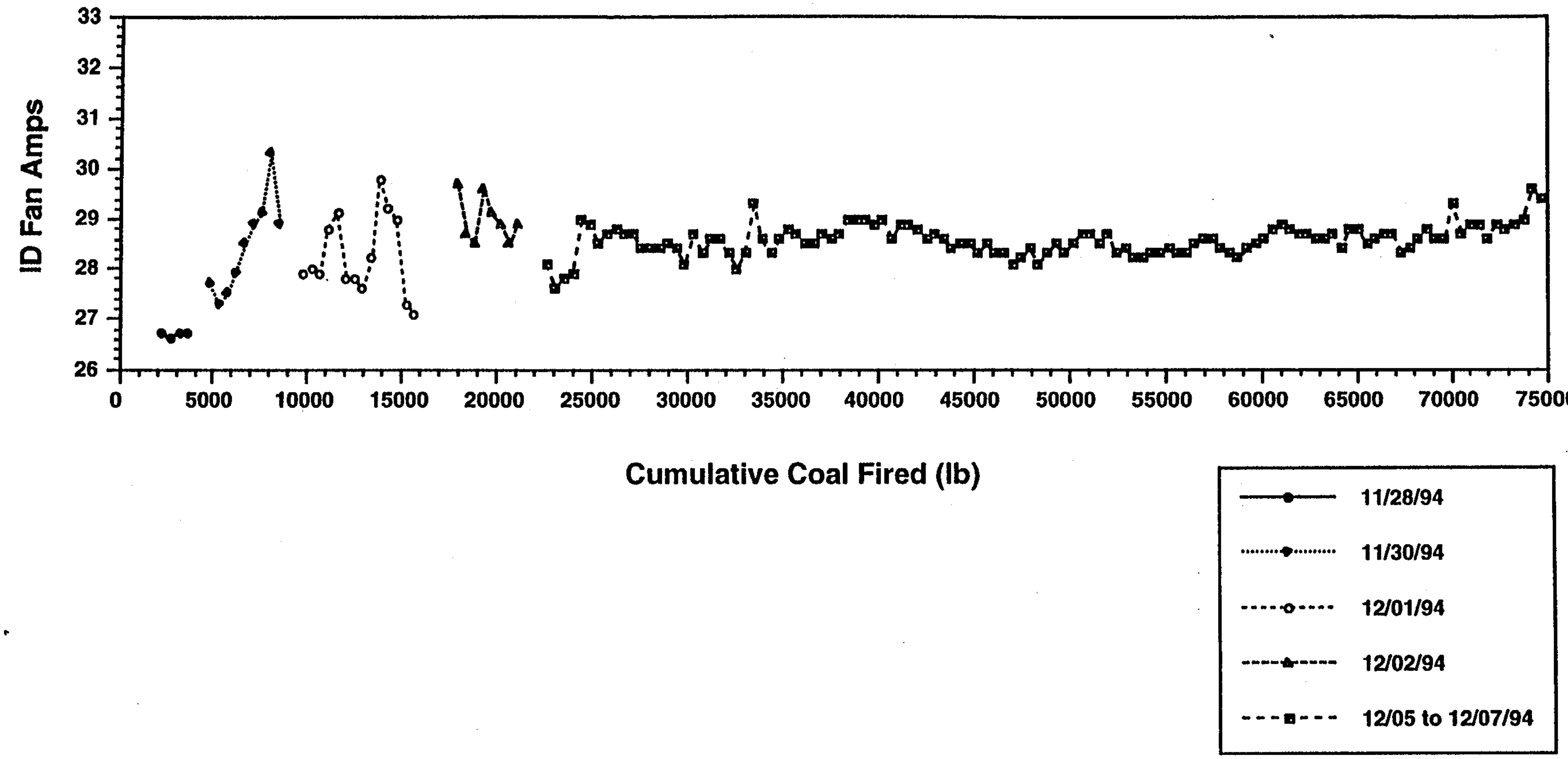


Figure G-9. ID FAN AMPERAGE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 13 MM Btu/h

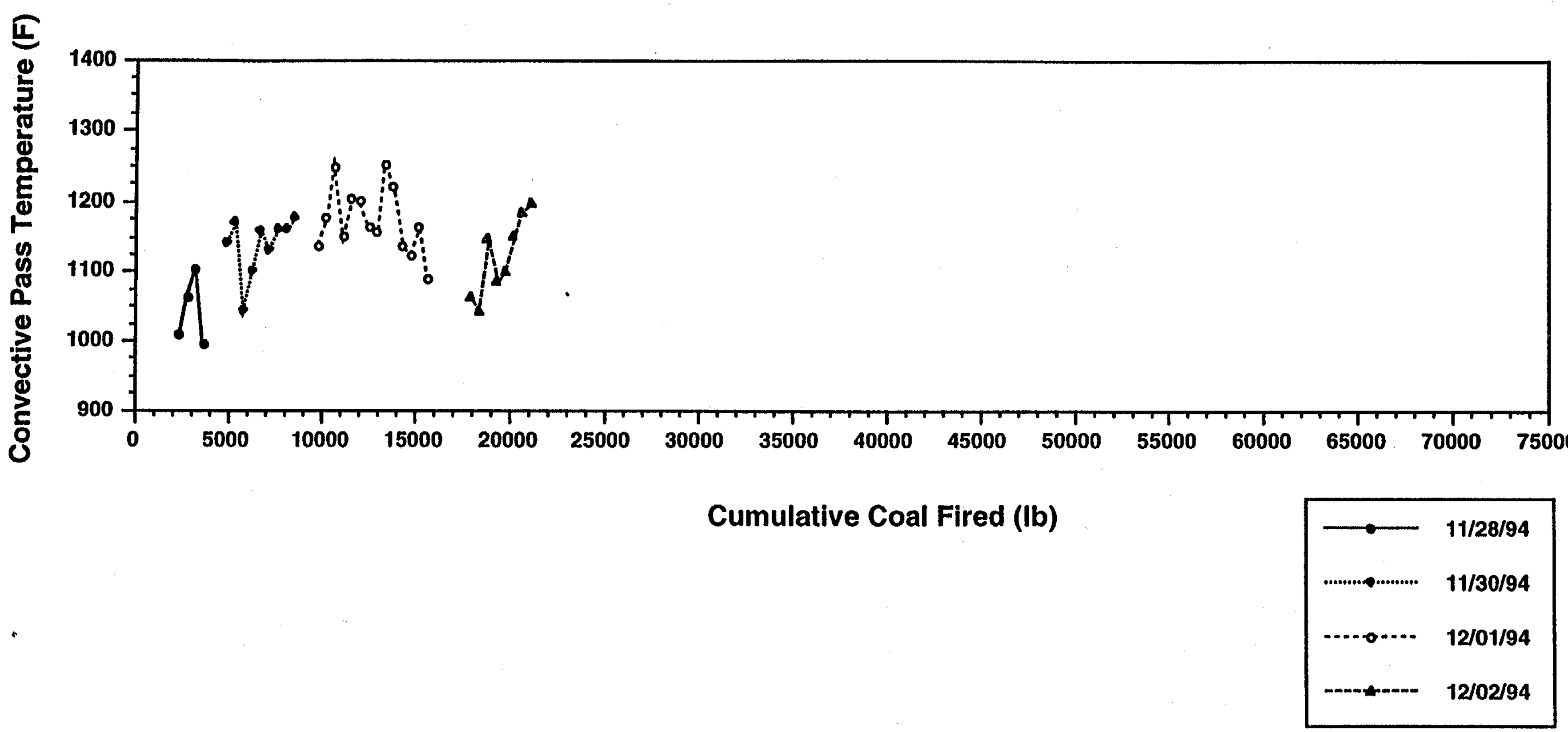


Figure G-10. CONVECTIVE PASS TEMPERATURE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 13 MM Btu/h

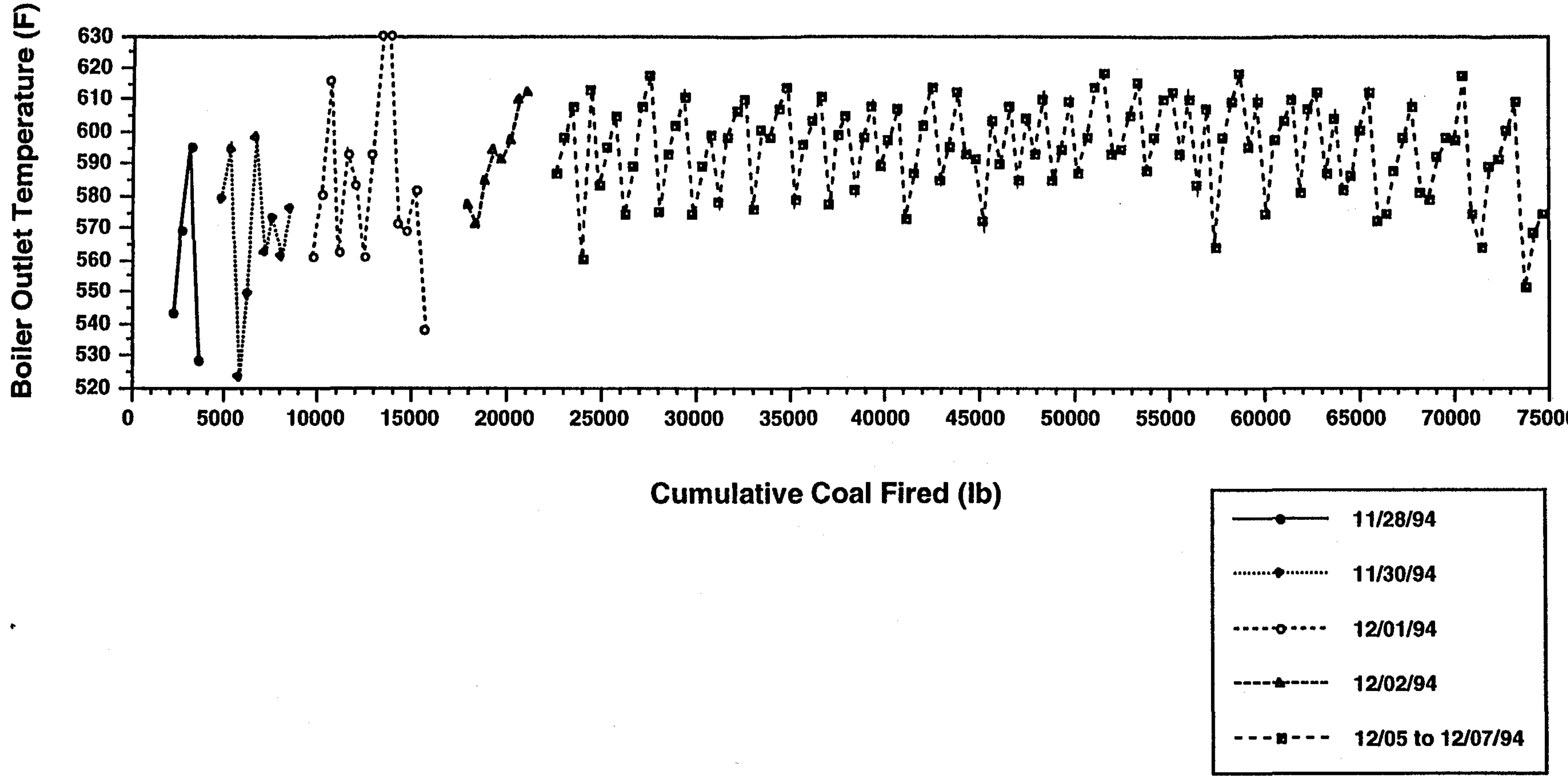


Figure G-11. BOILER OUTLET TEMPERATURE AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 13 MM Btu/h

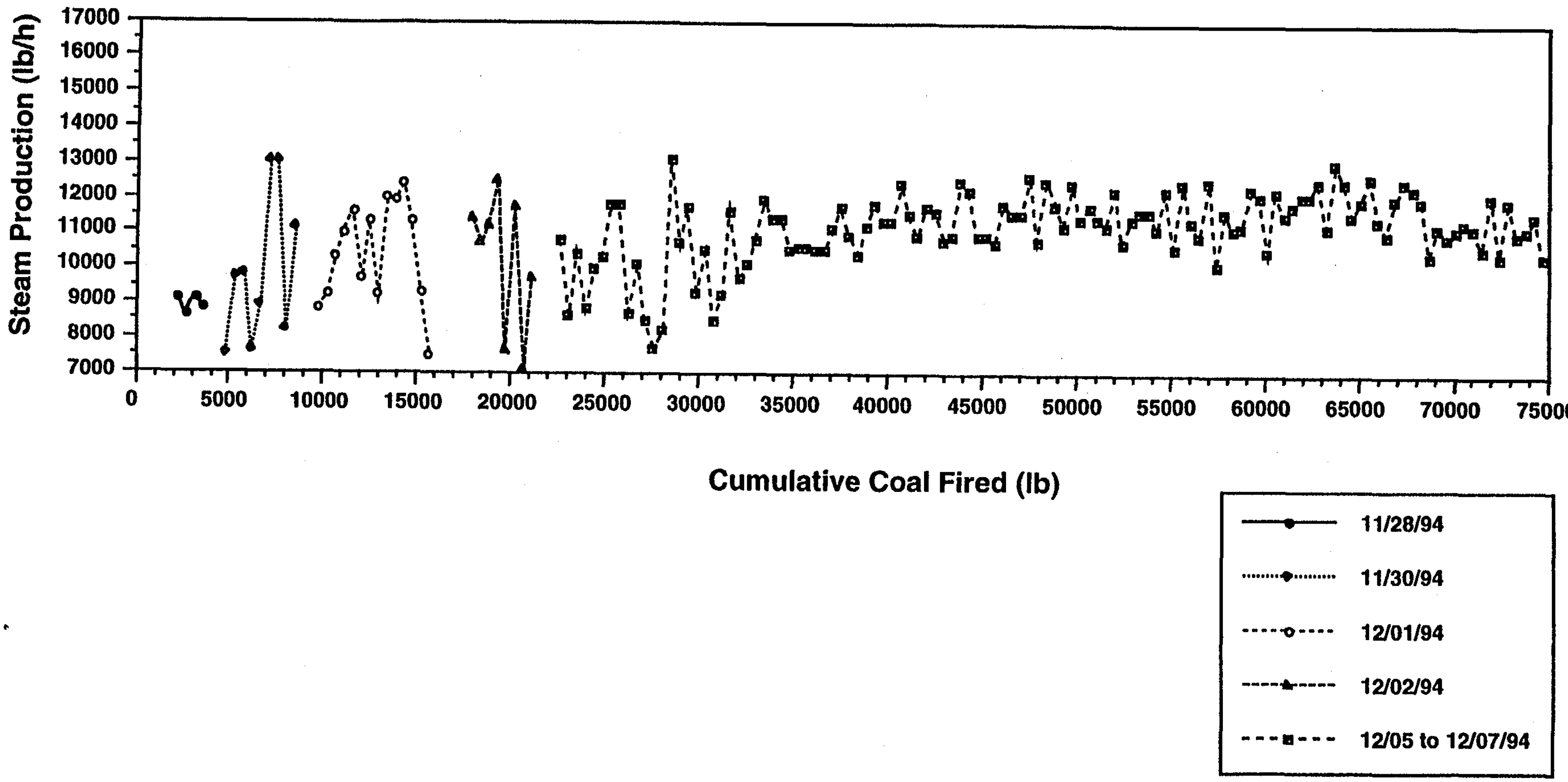


Figure G-12. **STEAM PRODUCTION AS A FUNCTION OF COAL CONSUMPTION WHEN FIRING AT 13 MM Btu/h**

- The B.O.P. started at -0.8" W.C. and began decreasing at 47,000 lb of coal consumed. There was 10,000 lb of coal consumed between the time the B.O.P. started to decrease and when the gauge maxed out. This is equivalent to 8.7 h of operation.
- The sootblowing frequency was typically every half hour and increased to 1.5 and then 2h before boiler shutdown (during the continuous test).
- The boiler was cleaned out on 11/23/94 and 855 lb of ash were removed from the furnace/convective pass entrance and 180 lb of ash were removed from the breaching for a total of 1,035 lb. There was 3,979 lb of ash introduced into the boiler (6.50% ash as-rec.; 61,216 lb of coal fired); 26.0% of the ash was retained in the system.

- The B.O.P. started at -0.8" W.C. and began decreasing at 56,000 lb of coal consumed. There was 8,000 lb of coal consumed between the time the B.O.P. started to decrease and when the gauge maxed out. This is equivalent to 8.9 h of operation.
- After the B.O.P. maxed out, the soot blowing frequency increased to 2, 2.75 2.5, and 2h before the forced shutdown.
- The boiler was cleaned out on 12/09/94 and 740 lb of ash were removed from the furnace/convective pass entrance and 175 lb of ash were removed from the breaching for a total of 915 lb. There was 4,693 lb of ash introduced into the boiler (6.29% ash as-rec.; 74,606 lb of coal fired); 19.5% of the ash was retained in the system.

Deposition Summary -- Two Continuous Tests

Table G-3 summarizes the results of the two continuous tests conducted at the two firing rates. As previously mentioned, the tests were terminated when significant deposition was noted in the entrance to the convective pass when firing at 16 million Btu/h (11/21-11/22/94), and when the rear side panels of the boiler warped and discoloration was noted on the back wall when firing at 13 million Btu/h (12/05-12/07/94). The boiler was shut down on 11/22/94 because it was the first time that such significant deposition was observed at the entrance into the convective pass. The shutdown on 12/07/94 was a forced shutdown due to the sidewall (metal) warping allowing burning between the refractory rear wall and the insulation/metal skin interface.

Table G-3. Deposition Summary -- Two Continuous Tests

11/21/-11/22/94 -- 15.7-16.4 Million Btu/h	12/05-12/07/94 -- 12.7 Million Btu/h
• 37,945 lb of coal were consumed at a rate of 1,148 lb/h for 33 h of operation	• 53,476 lb of coal were consumed at a rate of 904 lb/h for 59 h of operation. (41% more coal was consumed and 79% more operating time was accumulated.)
• The boiler outlet pressure (B.O.P.) maxed out (<-2.2" W.C.) after consuming 33,927 lb of coal	• The B.O.P. maxed out after consuming 43,080 lb of coal (27% more coal was consumed.)

- The B.O.P. started at -0.8" W.C. and began decreasing at 24,000 lb of coal consumed. There was 10,000 lb of coal consumed between the time the B.O.P. started to decrease and when the gauge maxed out. This is equivalent to 8.7 h of operation.
- The sootblowing frequency was typically every half hour and increased to 1.5 and then 2h before boiler shutdown (during the continuous test).
- The ID fan amperage exhibited a decrease from ~31.5 amps to 30.0 amps after consuming ~1,000 lb of coal. The amperage then slowly increased to ~32.5 over the consumption of ~27,000 lb of coal.
- The convective pass temperature decreased from ~1,300 to 1,000°F while the B.O.P. was decreasing.
- Steam production increased as the test progressed.

- The B.O.P. started at -0.8" W.C. and began decreasing at 35,000 lb of coal consumed. There was 8,000 lb of coal consumed between the time the B.O.P. started to decrease and when the gauge maxed out. This is equivalent to 8.9 h of operation.
- After the B.O.P. maxed out, the soot blowing frequency increased to 2, 2.75 2.5, and 2h before the forced shutdown.
- The ID fan amperage was less than that observed during the 15 million Btu/h tests because of the decreased volume of flue gas and was ~28 amps as compared to 30 to 32.5 amps. The amperage was relatively constant at ~28.5 with an increase to ~29.5 at the time of shut down.
- No temperature data was collected.
- Steam production remained relatively constant during the test.

Figures G-5 and G-11 do not accurately show the boiler outlet temperature trends because the data is only recorded every 30 minutes and sootblowing affects the appearances of Figures G-5 and G-11. Consequently, Figures G-13 through G-17 were prepared which show the boiler outlet temperatures, based on a 24-hour clock, for 11/21/94, 11/22/94, 12/05/94, 12/06/94, and 12/07/94, respectively. Figures G-13 to G-17 are traces of only the boiler outlet temperature from the circular charts, which normally contain four temperatures. The decreases in the temperature occur when sootblowing the convective pass. The furnace ash is also blown down after sootblowing the convective pass.

Summary

No operational problems were encountered when operating the boiler on a two-shift per day basis. There was no significant deposition on the boiler walls or accumulation at the convective pass entrance, and the floor blast system entrained the majority of the ash (after a steady-state layer was deposited) that accumulated on the floor. It appears that the ash that deposited on the walls sloughed off due to the cyclic nature of the operation. Conversely, the tests conducted when operating on a continuous

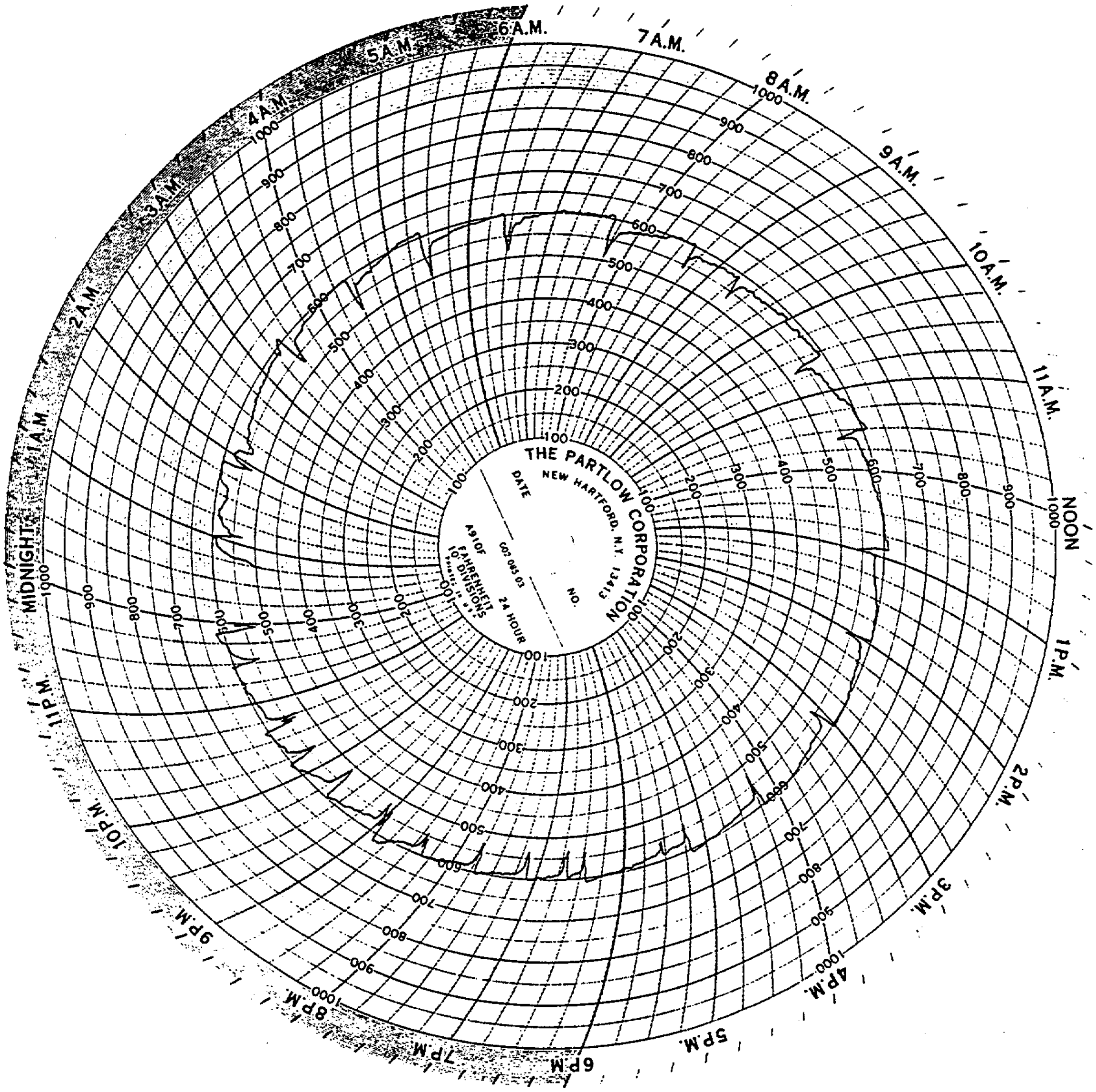


Figure G-13. BOILER OUTLET TEMPERATURE ON 11/21/94

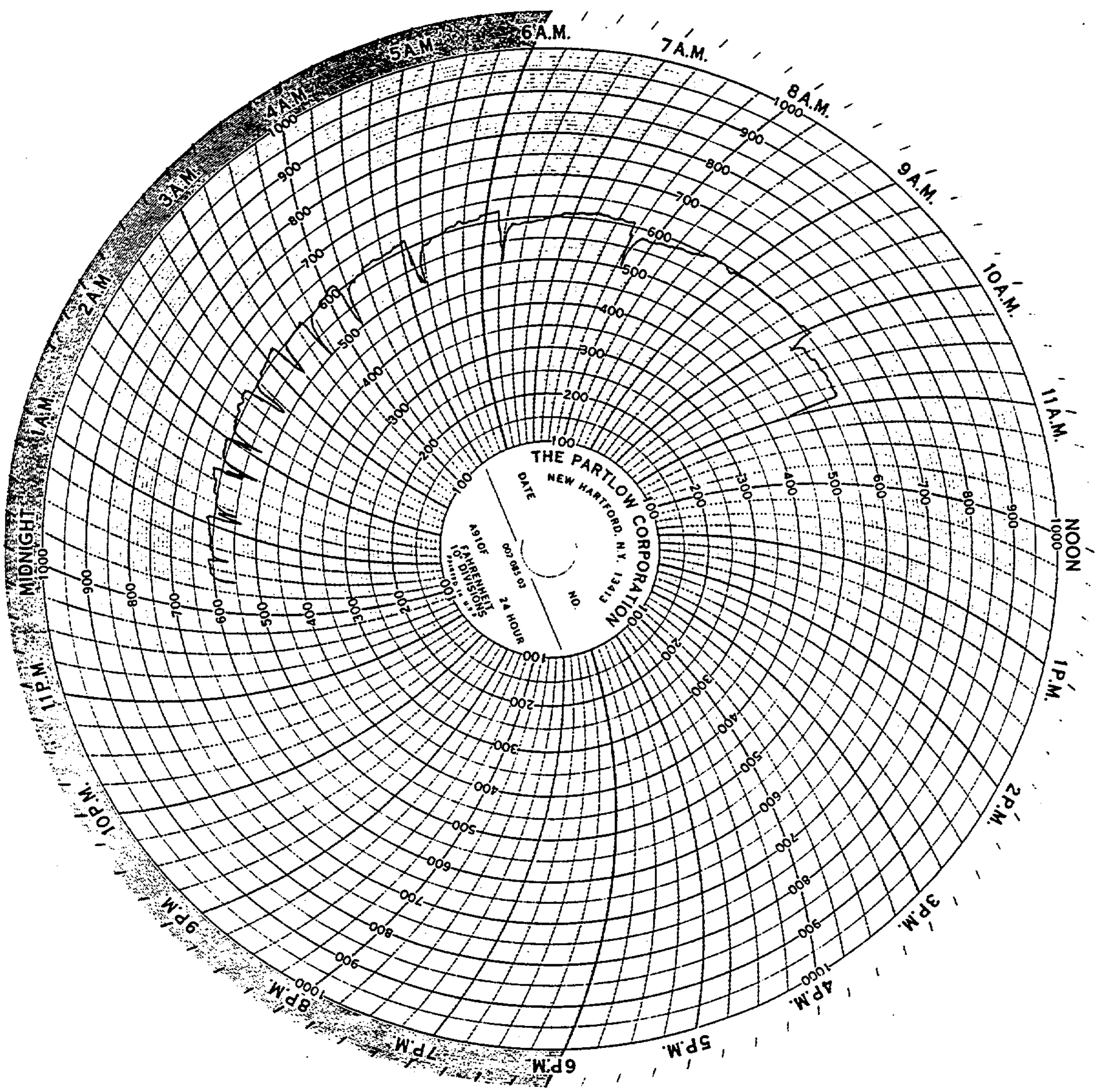


Figure G-14. BOILER OUTLET TEMPERATURE ON 11/22/94

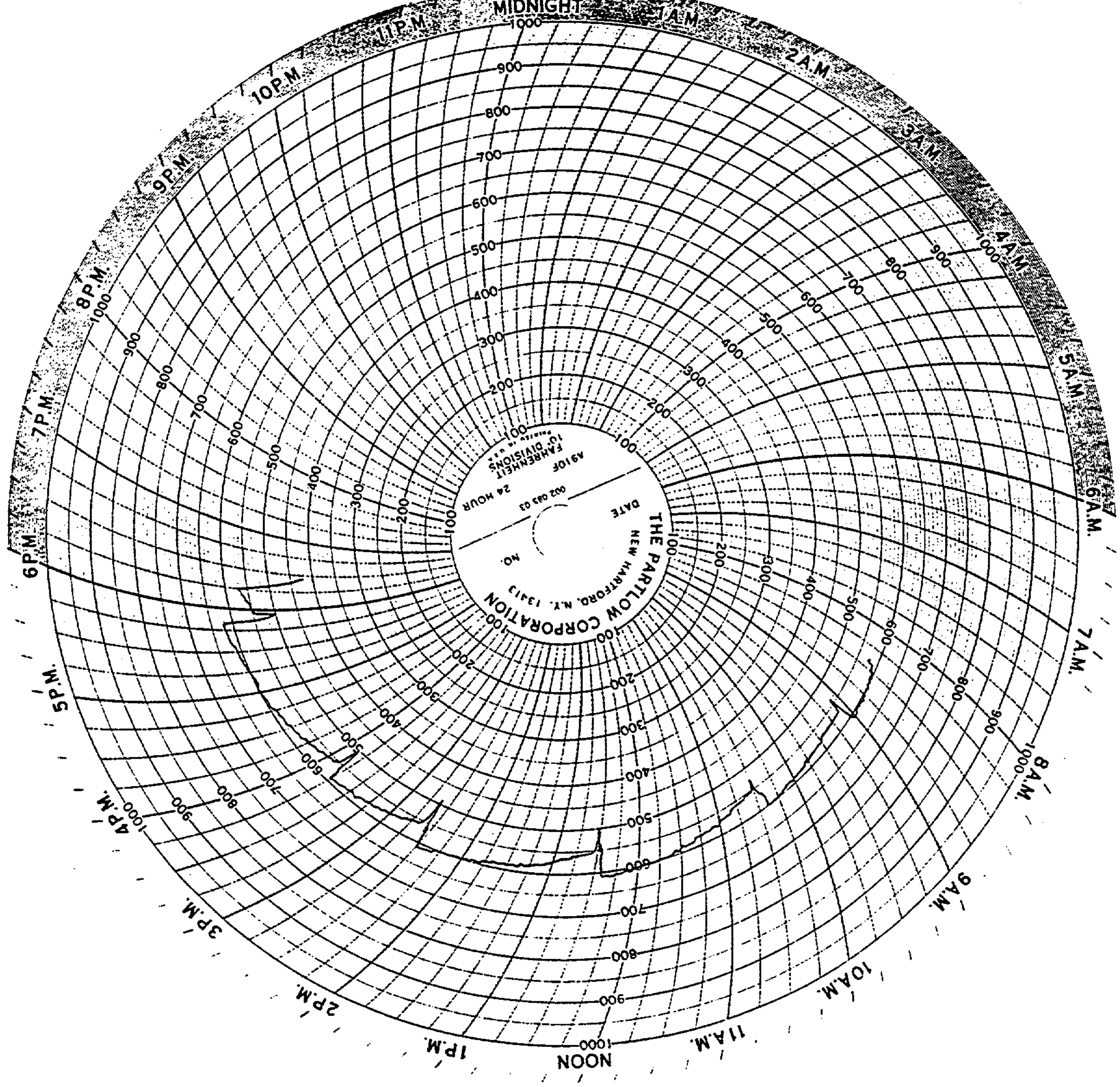


Figure G-15. BOILER OUTLET TEMPERATURE ON 12/05/94

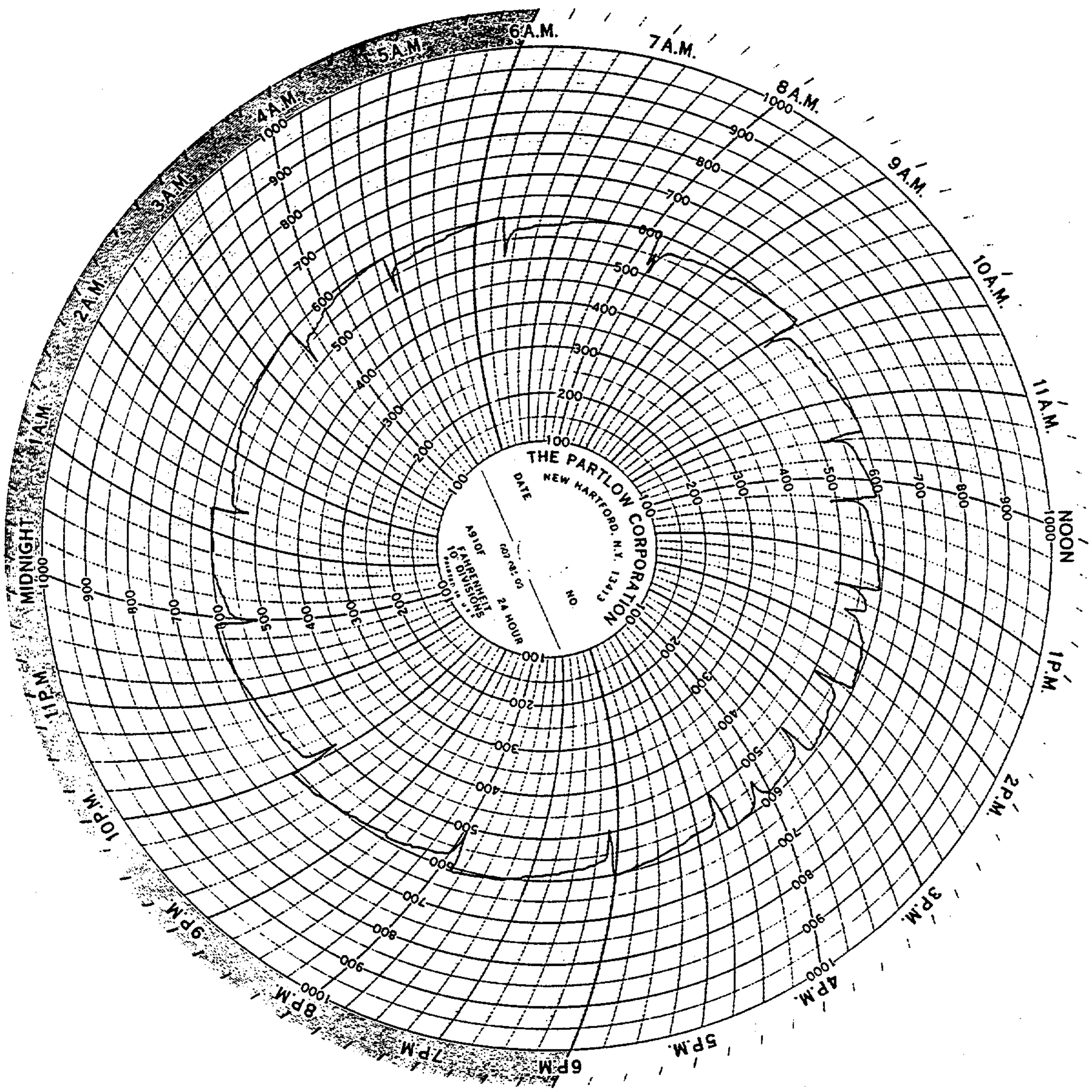


Figure G-16. BOILER OUTLET TEMPERATURE ON 12/06/94

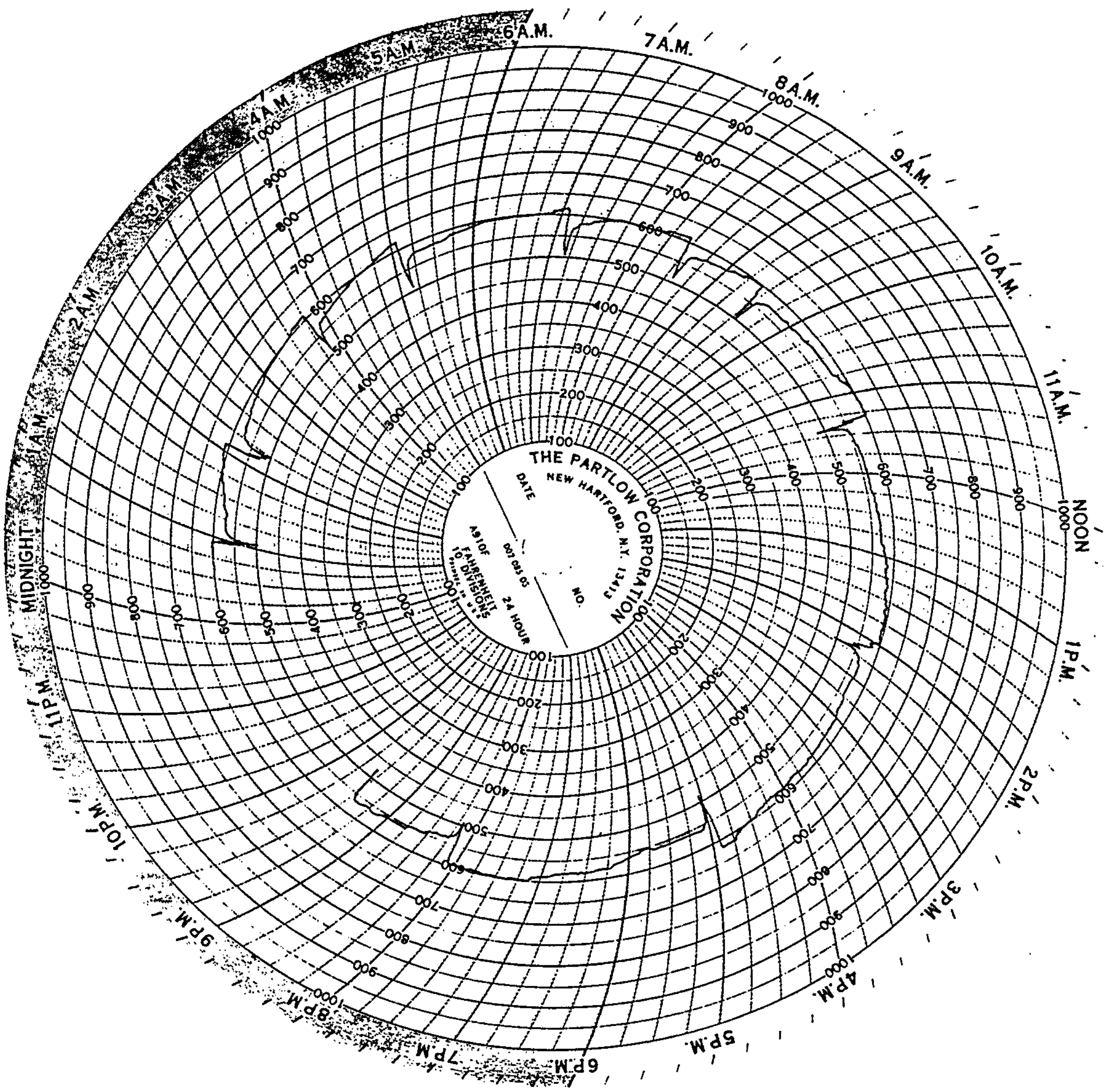


Figure G-17. BOILER OUTLET TEMPERATURE ON 12/07/94

basis were terminated when significant deposition occurred at the entrance to the convective pass (when firing at ~16 MM Btu/h) and when refractory failure around a sight port on the sidewall occurred (when firing at 12.7 MM Btu/h). As a consequence of the excessive ash deposition at the convective pass entrance during continuous testing, a sootblower is being designed for this region and will be used during the next series of testing.

Appendix H. Deposition Testing Summaries

Table H-1. Summary of the Deposition Test Conducted From October 30 to November 6, 1995

Date	Time	Total Coal Fired on this Date (lb)	Cumulative Coal Usage on this Date (lb)	Cumulative Coal Usage since Boiler Cleaning (lb)	Boiler Outlet Pressure ("W.C.)	ID Fan Amp Draw	Convective Pass Probe Temperature (F)	Boiler Outlet Temperature (F)	Steam Production (lb/h)	Sootblows
10/27/95	Boiler cleaned									
10/30/95	0600	10,989	1,255	1,255	-0.7	29.4	949	539	11,400	
	0630		1,825	1,825	-0.7	29.2	986	556	11,800	
	0700		2,395	2,395	-0.7	29.2	1,002	565	11,900	
	0730		2,965	2,965	-0.7	29.4	1,017	577	11,600	
	0800		3,535	3,535	-0.9	29.8	1,045	589	11,904	
Repair chemical feed line into steam drum										
	1830		4,719	4,719	-0.4	28.8	1,059	591	11,457	
	1900		5,289	5,289	-0.4	29.4	1,091	612	12,039	X
	1930		5,859	5,859	-0.5	30.1	959	541	11,777	
	2000		6,429	6,429	-0.6	29.6	964	550	12,094	
	2030		6,999	6,999	-0.6	29.7	995	560	12,162	
	2100		7,569	7,569	-0.6	30.0	1,015	572	12,066	
	2130		8,139	8,139	-0.7	29.9	1,041	582	12,137	
	2200		8,709	8,709	-0.8	29.8	1,048	588	12,071	
	2230		9,279	9,279	-0.7	29.7	1,079	599	12,046	
	2300		9,849	9,849	-0.8	29.7	1,082	604	12,389	X
	2330		10,419	10,419	-0.6	30.4	989	550	13,076	
10/31/95	0000	27,360	10,989	10,989	-0.7	30.4	1,011	569	12,118	
	0030		570	11,559	-0.7	30.4	1,027	575	11,970	
	0100		1,140	12,129	-0.7	30.3	1,041	581	12,108	
	0130		1,710	12,699	-0.7	30.1	1,062	591	12,234	
	0200		2,280	13,269	-0.8	30.2	1,078	602	11,750	X
	0230		2,850	13,839	-0.8	29.9	1,099	607	12,369	
	0300		3,420	14,409	-0.7	30.3	996	551	12,518	
	0330		3,990	14,979	-0.7	30.2	1,008	562	12,201	
	0400		4,560	15,549	-0.7	30.6	1,030	573	12,234	
	0430		5,130	16,119	-0.6	29.6	1,052	582	12,331	
	0500		5,700	16,689	-0.7	29.7	1,073	591	12,360	
	0530		6,270	17,259	-0.7	29.9	1,075	599	12,223	
	0600		6,840	17,829	-0.8	30.1	1,103	608	11,980	
	0630		7,410	18,399	-0.8	30.2	1,116	616	12,100	X
	0700		7,980	18,969	-0.8	30.2	1,021	558	12,847	
	0730		8,550	19,539	-0.8	30.7	1,040	570	12,724	
	0800		9,120	20,109	-0.9	30.7	1,060	580	12,452	X
	0830		9,690	20,679	-1.0	30.4	1,008	560	12,705	
	0900		10,260	21,249	-0.9	30.5	1,008	569	12,223	
	0930		10,830	21,819	-1.0	30.9	1,040	577	12,315	
	1000		11,400	22,389	-0.8	30.9	1,059	585	12,210	
	1030		11,970	22,959	-0.8	30.2	1,073	593	12,351	
	1100		12,540	23,529	-0.8	30.2	1,075	602	12,069	X
	1130		13,110	24,099	-0.7	30.4	1,023	567	12,388	
	1200		13,680	24,669	-0.8	30.3	1,032	574	12,310	
	1230		14,250	25,239	-0.7	30.4	1,047	585	12,116	
	1300		14,820	25,809	-0.7	30.2	1,071	592	12,777	
	1330		15,390	26,379	-0.8	30.0	1,085	602	12,148	X
	1400		15,960	26,949	-0.9	30.5	1,024	567	12,096	
	1430		16,530	27,519	-0.9	30.0	1,048	575	12,023	
	1500		17,100	28,089	-0.9	30.2	1,059	583	11,880	
	1530		17,670	28,659	-0.9	30.1	1,063	595	12,079	X @ 1600
	1630		18,810	29,799	-0.8	30.5	1,046	572	12,073	
	1700		19,380	30,369	-0.9	30.1	1,057	582	12,321	
	1730		19,950	30,939	-0.9	30.1	1,073	589	12,212	X
	1800		20,520	31,509	-0.8	30.1	1,039	564	12,737	
	1830		21,090	32,079	-0.8	30.1	1,049	576	12,067	
	1900		21,660	32,649	-0.7	29.8	1,067	585	12,730	
	1930		22,230	33,219	-0.7	30.2	1,090	597	12,394	X
	2000		22,800	33,789	-0.8	30.4	1,045	567	12,246	
	2100		23,940	34,929	-0.7	30.2	1,065	584	12,291	
	2130		24,510	35,499	-0.8	30.1	1,078	593	12,120	X
	2200		25,080	36,069	-0.8	30.3	1,047	567	12,040	
	2230		25,650	36,639	-0.8	30.2	1,071	578	12,658	
	2300		26,220	37,209	-0.8	30.3	1,080	585	12,681	
	2330		26,790	37,779	-0.6	28.9	1,093	594	12,072	X
11/1/95	0000	18,159	27,360	38,349	-1.1	30.5	1,062	574	12,305	
	0030		570	38,919	-0.4	29.5	1,071	580	12,564	
	0100		1,140	39,489	-0.9	30.7	1,092	589	12,456	
	0130		1,710	40,059	-0.9	30.5	1,116	600	12,633	X
	0200		2,280	40,629	-1.0	30.5	1,056	564	12,699	
	0230		2,850	41,199	-0.5	30.8	1,080	579	12,529	
	0300		3,420	41,769	-0.1	29.4	1,099	590	12,703	

	0330		3,990	42,339	-1.3	30.0	1,115	599	12,294	X
	0400		4,560	42,909	0.1	29.9	1,071	560	12,597	
	0430		5,130	43,479	1.1	30.6	1,089	578	12,191	
	0500		5,700	44,049	0.1	30.5	1,103	588	12,418	
	0530		6,270	44,619	-0.9	30.0	1,118	599	12,198	X
	0600		6,840	45,189	0.3	29.6	1,071	560	12,187	
	0630		7,410	45,759	-0.2	29.4	1,082	575	12,347	
	0700		7,980	46,329	-0.2	31.2	1,109	587	12,441	
	0730		8,550	46,899	-1.5	30.2	1,119	596	12,352	X
	0800		9,120	47,469	-1.5	29.3	1,092	575	12,393	
CE making burner changes/unplugging boiler outlet pressure line										
	1200		13,680	52,029	-0.8	29.7	1,109	572	11,969	
Replace bearing on ash screw										
	2200		15,879	54,228	-0.8	29.6	1,085	590	11,539	
	2230		16,449	54,798	-0.9	30.2	1,089	602	11,982	X
	2300		17,019	55,368	-0.8	30.1	969	550	12,097	
	2330		17,589	55,938	-0.8	29.7	998	557	11,726	
11/2/95	0000	27,360	18,159	56,508	-0.9	29.5	1,033	569	11,752	
	0030		570	57,078	-0.9	29.5	1,065	581	12,491	
	0100		1,140	57,648	-0.9	29.5	1,110	584	11,431	
	0130		1,710	58,218	-0.9	29.9	1,071	592	11,482	
	0200		2,280	58,788	-0.9	29.5	1,137	600	11,342	
	0230		2,850	59,358	-1.0	29.5	1,130	608	12,497	
	0300		3,420	59,928	-1.0	30.0	983	538	11,197	X
	0330		3,990	60,498	-0.9	30.0	1,012	556	12,223	
	0400		4,560	61,068	-0.9	30.0	1,073	569	11,947	
	0430		5,130	61,638	-0.9	30.2	1,088	577	12,069	
	0500		5,700	62,208	-0.9	29.9	1,088	584	11,780	
	0530		6,270	62,778	-0.9	30.0	1,093	597	12,000	
	0600		6,840	63,348	-1.0	30.1	1,109	602	11,999	X
	0630		7,410	63,918	-0.9	30.2	1,042	558	12,588	
	0700		7,980	64,488	-0.9	29.9	1,065	567	11,798	
	0730		8,550	65,058	-0.8	29.8	1,047	576	12,084	
	0800		9,120	65,628	-0.9	29.8	1,070	585	11,786	
	0830		9,690	66,198	-0.8	29.8	1,083	593	11,988	
	0900		10,260	66,768	-0.9	30.1	1,142	606	11,987	X
	0930		10,830	67,338	-0.9	30.2	1,023	557	12,200	
	1030		11,970	68,478	-0.9	30.0	1,110	574	12,218	
	1100		12,540	69,048	-0.8	30.5	1,129	585	11,832	
	1130		13,110	69,618	-0.9	29.9	1,152	598	11,919	X
	1200		13,680	70,188	-0.8	30.1	1,088	555	12,188	
	1230		14,250	70,758	-0.9	29.9	1,102	570	12,238	
	1300		14,820	71,328	-0.8	30.0	1,133	582	12,498	
	1330		15,390	71,898	-0.8	29.8	1,153	592	12,069	X
	1400		15,960	72,468	-0.8	30.1		560	11,986	
	1430		16,530	73,038	-0.8	29.7	1,109	572	12,133	
	1500		17,100	73,608	-0.9	29.7	1,137	586	11,579	
	1530		17,670	74,178	-0.8	29.9	1,172	599	11,789	
	1600		18,240	74,748	-0.8	30.0	1,079	620	12,237	X
	1630		18,810	75,318	-0.8	29.8	1,095	565	11,126	
	1700		19,380	75,888	-0.8	29.8	1,138	584	11,961	
	1730		19,950	76,458	-0.8	30.1	1,163	593	11,328	
	1800		20,520	77,028	-0.8	29.8	1,183	605	11,828	X
	1830		21,090	77,598	-0.8	29.8	1,101	566	12,023	
	1900		21,660	78,168	-0.8	29.9	1,122	578	11,957	
	1930		22,230	78,738	-0.8	29.8	1,154	590	12,184	
	2000		22,800	79,308	-0.9	29.9	1,164	601	11,703	X
	2030		23,370	79,878	-0.8	29.9	1,104	568	11,812	
	2100		23,940	80,448	-0.9	30.0	1,136	580	11,981	
	2130		24,510	81,018	-0.9	29.9	1,156	591	11,749	
	2200		25,080	81,588	-0.9	29.6	1,179	601	11,825	X
	2230		25,650	82,158	-0.8	29.8	1,088	562	11,870	
	2300		26,220	82,728	-0.9	30.1	1,125	580	11,943	
	2330		26,790	83,298	-0.8	29.9	1,144	589	12,052	
11/3/95	0000	27,360	27,360	83,868	-0.9	30.4	1,175	602	12,083	
	0030		570	84,438	-0.9	29.8	1,197	610	11,965	X
	0100		1,140	85,008	-0.8	30.7	1,028	548	10,519	
	0130		1,710	85,578	-0.9	30.2	1,085	561	10,129	
	0200		2,280	86,148	-0.9	29.8	1,103	578	12,001	
	0230		2,850	86,718	-0.9	29.7	1,118	591	12,326	
	0300		3,420	87,288	-0.9	29.6	1,146	601	12,304	
	0330		3,990	87,858	-0.9	29.7	1,171	611	11,515	
	0400		4,560	88,428	-0.9	29.6	1,195	620	12,173	X
	0430		5,130	88,998	-0.8	30.0	1,068	558	11,997	
	0500		5,700	89,568	-0.8	29.8	1,097	572	11,672	
	0530		6,270	90,138	-0.9	30.1	1,119	581	11,769	
	0600		6,840	90,708	-0.9	30.0	1,150	595	12,267	

Table H-1. Summary of the Deposition Test Conducted From October 30 to November 6, 1995

	0630		7,410	91,278	-0.9	29.9	1,178	608	12,248	
	0700		7,980	91,848	-0.9	29.9	1,190	612	11,773	
	0730		8,550	92,418	-0.9	29.5	1,212	624	12,138	X
	0800		9,120	92,988	-0.9	29.8	1,089	564	11,842	
	0830		9,690	93,558	-0.9	30.3	1,111	577	11,774	
	0900		10,260	94,128	-0.9	30.5	1,137	587	12,089	
	0930		10,830	94,698	-0.9	30.0	1,157	598	12,316	
	1000		11,400	95,268	-0.9	30.1	1,173	609	12,400	X
	1030		11,970	95,838	-0.8	29.8	1,063	555	12,215	
	1100		12,540	96,408	-0.8	29.8	1,100	572	12,550	
	1130		13,110	96,978	-0.9	30.0	1,132	588	12,365	
	1200		13,680	97,548	-0.9	29.8	1,161	600	12,069	
	1230		14,250	98,118	-1.0	30.2	1,193	623	11,963	X
	1300		14,820	98,688	-0.9	30.4	1,095	570	12,622	
	1330		15,390	99,258	-0.9	30.1	1,087	572	11,888	
	1400		15,960	99,828	-1.0	30.5	1,106	589	12,009	
	1430		16,530	100,398	-0.8	30.6	1,118	594	11,970	
	1500		17,100	100,968	-0.9	29.9	1,126	600	12,288	X
	1530		17,670	101,538	-0.9	30.2	1,075	566	11,882	
	1600		18,240	102,108	-0.9	30.3	1,093	579	12,542	
	1630		18,810	102,678	-0.9	30.1	1,108	591	12,251	
	1700		19,380	103,248	-0.9	30.4	1,121	599	12,401	X
	1730		19,950	103,818	-1.0	30.4	1,089	569	12,218	
	1800		20,520	104,388	-1.0	30.4	1,108	585	12,300	
	1830		21,090	104,958	-1.0	30.0	1,120	591	12,077	
	1900		21,660	105,528	-1.0	30.4	1,144	603	12,523	X
	1930		22,230	106,098	-0.8	30.1	1,092	572	11,915	
	2000		22,800	106,668	-0.9	30.3	1,102	583	12,297	
	2030		23,370	107,238	-0.9	30.4	1,114	592	11,897	
	2100		23,940	107,808	-0.9	30.2	1,125	599	12,278	
	2130		24,510	108,378	-1.0	30.3	1,163	610	12,107	X
	2200		25,080	108,948	-0.8	30.4	1,090	577	12,057	
	2230		25,650	109,518	-0.8	30.3	1,113	588	12,150	
	2300		26,220	110,088	-1.0	30.6	1,128	597	11,838	
	2330		26,790	110,658	-0.9	30.5	1,088	577	11,842	X
11/4/95	0000	27,360	27,360	111,228						
	0030		570	111,798	-0.8	30.5	1,129	598	12,010	
	0100		1,140	112,368	-1.0	30.5	1,158	610	12,255	X
	0130		1,710	112,938	-0.9	30.4	1,091	570	12,077	
	0200		2,280	113,508	-0.9	30.4	1,107	583	12,055	
	0230		2,850	114,078	-0.9	30.1	1,138	598	12,002	
	0300		3,420	114,648	-0.9	29.8	1,144	601	11,749	
	0330		3,990	115,218	-0.9	29.9	1,161	610	11,895	X
	0400		4,560	115,788	-0.8	30.1	1,095	555	11,711	
	0430		5,130	116,358	-0.8	30.0	1,115	579	11,777	
	0500		5,700	116,928	-0.7	30.0	1,142	591	12,148	
	0530		6,270	117,498	-1.0	30.6	1,166	603	11,752	
	0600		6,840	118,068	-0.9	30.6	1,183	615	12,120	X
	0630		7,410	118,638	-0.9	30.0	1,102	572	11,941	
	0700		7,980	119,208	-0.8	30.2	1,129	584	11,535	
	0730		8,550	119,778	-0.9	30.3	1,152	592	11,866	
	0800		9,120	120,348	-0.9	30.1	1,176	607	12,129	
	0830		9,690	120,918	-0.9	29.9	1,190	614	11,949	X
	0900		10,260	121,488	-0.8	30.6	1,102	560	11,640	
	0930		10,830	122,058	-0.9	30.2	1,115	578	11,559	
	1000		11,400	122,628	-0.9	30.0	1,135	592	11,436	
	1030		11,970	123,198	-0.9	30.4	1,171	605	11,917	
	1100		12,540	123,768	-0.8	30.0	1,187	613	11,936	X
	1130		13,110	124,338	-0.8	30.1	1,105	571	12,027	
	1200		13,680	124,908	-0.8	30.4	1,128	583	11,992	
	1230		14,250	125,478	-0.9	30.2	1,160	596	11,966	
	1300		14,820	126,048	-1.0	30.2	1,175	607	11,663	X
	1330		15,390	126,618	-0.8	30.2	1,108	565	12,340	
	1400		15,960	127,188	-1.0	30.6	1,122	582	11,746	
	1430		16,530	127,758	-1.0	30.5	1,158	594	11,863	
	1500		17,100	128,328	-0.9	30.1	1,171	604	11,919	X
	1530		17,670	128,898	-0.9	30.4	1,106	573	11,818	
	1600		18,240	129,468	-0.9	30.2	1,126	585	11,847	
	1630		18,810	130,038	-0.9	29.7	1,155	592	12,068	
	1700		19,380	130,608	-0.9	30.3	1,177	605	11,802	X
	1730		19,950	131,178	-0.9	30.3	1,129	571	12,227	
	1800		20,520	131,748	-1.0	30.2	1,147	585	11,782	
	1830		21,090	132,318	-0.9	30.1	1,182	597	11,975	
	1900		21,660	132,888	-1.0	30.2	1,218	609	12,083	X
	1930		22,230	133,458	-0.9	30.3	1,147	573	12,270	
	2000		22,800	134,028	-1.0	30.3	1,168	588	11,823	
	2030		23,370	134,598	-1.0	30.5	1,179	596	11,616	

Table H-1. Summary of the Deposition Test Conducted From October 30 to November 6, 1995

	2100		23,940	135,168	-1.0	30.2	1,206	609	11,720	X
	2130		24,510	135,738	-1.0	30.2	1,137	574	12,491	
	2200		25,080	136,308	-0.9	30.3	1,164	588	12,205	
	2230		25,650	136,878	-1.0	30.2	1,190	602	12,308	X
	2300		26,220	137,448	-0.9	30.3	1,130	573	12,151	
	2330		26,790	138,018	-1.0	30.6	1,152	588	11,702	
11/5/95	0000	27,360	27,360	138,588	-1.1	30.3	1,191	603	12,394	
	0030		570	139,158	-1.1	30.1	1,198	614	11,460	X
	0100		1,140	139,728	-1.0	30.1	1,129	559	13,010	
	0130		1,710	140,298	-1.0	30.4	1,150	581	11,938	
	0200		2,280	140,868	-1.0	30.1	1,175	595	11,806	
	0230		2,850	141,438	-1.0	30.2	1,193	606	11,889	
	0300		3,420	142,008	-1.0	30.1	1,208	615	12,750	X
	0330		3,990	142,578	-1.0	30.3	1,131	572	11,778	
	0400		4,560	143,148	-1.0	30.8	1,172	589	11,917	
	0430		5,130	143,718	-1.0	30.2	1,194	602	12,184	
	0500		5,700	144,288	-1.1	30.5	1,216	612	11,928	
	0530		6,270	144,858	-1.0	30.3	1,228	621	11,464	X
	0600		6,840	145,428	-1.0	30.6	1,163	577	11,838	
	0630		7,410	145,998	-1.0	30.6	1,190	592	12,254	
	0700		7,980	146,568	-1.0	30.6	1,221	605	12,737	
	0730		8,550	147,138	-1.0	30.6	1,214	610	12,242	X
	0800		9,120	147,708	-1.1	31.0	1,142	570	12,034	
	0830		9,690	148,278	-1.1	30.8	1,171	584	12,144	
	0900		10,260	148,848	-1.0	30.3	1,189	598	12,219	
	0930		10,830	149,418	-1.1	30.1	1,221	610	11,954	X
	1000		11,400	149,988	-1.0	30.2	1,149	569	12,288	
	1030		11,970	150,558	-1.0	30.3	1,175	586	12,273	
	1100		12,540	151,128	-1.0	30.2	1,201	597	12,111	
	1130		13,110	151,698	-0.9	30.3	1,225	608	11,869	X
	1200		13,680	152,268	-1.0	30.1	1,150	567	11,816	
	1230		14,250	152,838	-1.0	30.2	1,179	584	11,892	
	1300		14,820	153,408	-1.0	30.4	1,196	597	11,402	
	1330		15,390	153,978	-1.1	30.1	1,221	607	11,883	X
	1400		15,960	154,548	-1.0	30.2	1,151	568	12,076	
	1430		16,530	155,118	-1.0	30.3	1,180	585	11,966	
	1500		17,100	155,688	-1.0	30.0	1,211	599	11,864	
	1530		17,670	156,258	-1.0	29.9	1,237	609	12,180	X
	1600		18,240	156,828	-1.0	30.2	1,167	569	11,871	
	1630		18,810	157,398	-1.1	30.2	1,206	587	12,252	
	1700		19,380	157,968	-1.1	30.2	1,231	601	11,732	
	1730		19,950	158,538	-1.0	30.0	1,254	611	11,985	X
	1800		20,520	159,108	-1.1	30.0	1,197	574	12,264	
	1830		21,090	159,678	-1.0	30.1	1,235	591	11,855	
	1900		21,660	160,248	-1.1	30.1	1,255	604	11,897	
	1930		22,230	160,818	-1.1	29.8	1,278	614	11,742	X
	2000		22,800	161,388	-1.0	30.4	1,212	573	12,355	
	2030		23,370	161,958	-1.0	30.2	1,234	589	11,900	
	2100		23,940	162,528	-1.0	30.2	1,266	601	11,702	
	2130		24,510	163,098	-1.1	30.0	1,277	613	12,237	X
	2200		25,080	163,668	-1.0	30.1	1,220	571	12,406	
	2230		25,650	164,238	-1.1	30.1	1,234	591	12,096	
	2300		26,220	164,808	-1.1	30.0	1,265	601	12,138	
	2330		26,790	165,378	-1.2	30.3	1,281	610	11,765	X
11/6/95	0000	14,250	27,360	165,948	-0.9	30.0	1,241	575	11,891	
	0030		570	166,518	-1.0	30.2	1,265	589	11,998	
	0100		1,140	167,088	-1.0	30.4	1,286	602	12,280	
	0130		1,710	167,658	-1.0	30.0	1,243	568	12,251	X
	0200		2,280	168,228	-0.9	30.2	1,264	583	11,621	
	0230		2,850	168,798	-1.0	30.8	1,309	597	11,789	
	0300		3,420	169,368	-1.0	30.1	1,282	595	11,941	
	0330		3,990	169,938	-1.0	29.9	1,304	607	12,110	X
	0400		4,560	170,508	-1.0	30.4	1,275	578	11,851	
	0430		5,130	171,078	-1.0	30.3	1,306	594	11,988	
	0500		5,700	171,648	-1.0	30.2	1,292	595	11,869	
	0530		6,270	172,218	-1.0	30.0	1,317	606	12,000	X
	0600		6,840	172,788	-1.0	30.3	1,257	581	12,281	
	0630		7,410	173,358	-1.0	30.3	1,263	591	12,215	
	0700		7,980	173,928	-1.0	30.5	1,286	602	12,001	X
	0730		8,550	174,498	-1.1	30.4	1,249	575	11,900	
	0800		9,120	175,068	-1.1	30.7	1,222	592	11,988	
	0830		9,690	175,638	-1.1	30.5	1,235	604	11,902	X
	0900		10,260	176,208	-1.0	30.6	1,187	569	12,082	
	0930		10,830	176,778	-1.0	30.6	1,209	589	12,095	
	1000		11,400	177,348	-1.2	30.4	1,277	599	11,990	
	1030		11,970	177,918	-1.1	30.1	1,274	601	12,043	X
	1230		14,250	178,638						

Table H-2. Summary of Deposition Testing Conducted from November 21 to December 19, 1995

Date	Time	Total Coal Fired on this Date (lb)	Cumulative Coal Usage on this Date (lb)	Cumulative Coal Usage since Boiler Cleaning (lb)	Boiler Outlet Pressure ("W.C.)	ID Fan Amp Draw	Convective Pass Probe Temperature (F)	Boiler Outlet Temperature (F)	Steam Production (lb/h)	Sootblows
11/16/95	(Mixture of Middle Kittanning (MK) Seam and Upper Freeport (UF) Seam coal delivered)									
11/20/95	Boiler cleaned									
11/21/95		2,491	2,491	2,491						
11/22/95	1630	8,452	1,612	4,103	-0.6	30.9	NM	599	12,336	
(MK/UF)	1700		2,182	4,673	-0.8	30.8	NM	606	12,307	X
	1730		2,752	5,243	-0.8	30.6	NM	547	12673	
	1800		3,322	5,813	-0.8	30.5	NM	554	12,285	
	1830		3,892	6,383	-0.8	30.6	NM	558	13,037	
	1900		4,462	6,953	-0.8	30.7	NM	563	12,894	
	1930		5,032	7,523	-0.8	30.7	NM	571	12,810	
	2000		5,602	8,093	-0.8	30.7	NM	581	12,426	
	2030		6,172	8,663	-0.8	31.1	NM	590	12,711	X
	2100		6,742	9,233	-0.8	30.9	NM	600	12,555	
	2130		7,312	9,803	-0.8	31.2	NM	608	13,088	
	2200		7,882	10,373	-0.8	31.0	NM	546	13,059	
	2230		8,452	10,943	-0.8	31.3	NM	558	13,132	
11/28/95	1000	4,928	368	11,311	-0.6	30.8	NM	550	12,276	
(MK/UF)	1030		938	11,881	-0.7	30.8	NM	565	12,134	
	1100		1,508	12,451	-0.8	30.8	NM	577	12,167	
	1130		2,078	13,021	-0.8	30.8	NM	586	12,282	
	1200		2,648	13,591	-0.8	30.6	NM	595	12,505	
	1230		3,218	14,161	-0.8	30.8	NM	605	12,680	X
	1300		3,788	14,731	-0.8	30.9	NM	546	12,847	
	1330		4,358	15,301	-0.8	31.0	NM	557	12,865	
	1400		4,928	15,871	-0.8	30.8	NM	568	12,821	
11/29/95	1100	4,546	556	16,427	-0.8	31.0	NM	565	11,371	
(MK/UF)	1130		1,126	16,997	-0.8	30.8	NM	576	12,447	
	1200		1,696	17,567	-0.8	30.7	NM	584	12,645	
	1230		2,266	18,137	-0.8	30.8	NM	594	12,741	
	1300		2,836	18,707	-0.8	30.6	NM	599	12,516	
	1330		3,406	19,277	-0.8	30.8	NM	605	12,654	X
	1400		3,976	19,847	-0.6	30.9	NM	533	12,560	
	1430		4,546	20,417	-0.7	30.8	NM	548	12,659	
11/30/95	Kentucky (K) coal delivered									
	0900	10,141	2,161	22,578	-0.7	31.0	NM	572	12,735	
(MK/UF/K)	0930		2,731	23,148	-0.8	30.9	NM	587	12,904	
	1000		3,301	23,718	-0.7	31.1	NM	595	12,796	
	1030		3,871	24,288	-0.7	30.4	NM	605	12,386	
	1100		4,441	24,858	-0.7	30.8	NM	610	12,888	
	1130		5,011	25,428	-0.7	30.5	NM	615	13,073	
	1200		5,581	25,998	-0.7	29.8	NM	536	12,693	X
	1230		6,151	26,568	-0.6	30.0	NM	551	12,497	
	1300		6,721	27,138	-0.6	29.8	NM	565	12,676	
	1330		7,291	27,708	-0.6	29.8	NM	582	12,194	
	1400		7,861	28,278	-0.6	29.6	NM	595	12,800	
	1435		8,431	28,848	-0.6	29.0	NM	517	12,237	
	1500		9,001	29,418	-0.6	29.4	NM	565	12,400	
	1530		9,571	29,988	-0.5	28.0	NM	578	10,860	
	1600		10,141	30,558	-0.6	29.1	NM	523	12,226	
12/13/95	1600	10,332	1,212	31,770	-0.8	32.8	NM	609	12,546	
(K)	1630		1,782	32,340	-0.7	32.3	NM	534	12,793	X
	1700		2,352	32,910	-0.8	32.1	NM	554	12,589	
	1730		2,922	33,480	-0.8	32.2	NM	569	12,899	
	1800		3,492	34,050	-0.8	31.8	NM	580	12,964	
	1830		4,062	34,620	-0.8	32.0	NM	588	12,516	
	1900		4,632	35,190	-0.8	32.0	NM	600	12,302	
	1930		5,202	35,760	-0.8	32.0	NM	546	12,528	X
	2000		5,772	36,330	-0.8	32.0	NM	560	12,502	
	2030		6,342	36,900	-0.8	32.0	NM	574	12,642	
	2100		6,912	37,470	-0.8	31.9	NM	583	13,025	
	2130		7,482	38,040	-0.8	31.6	NM	587	12,871	
	2200		8,052	38,610	-0.8	32.3	NM	597	12,676	
	2230		8,622	39,180	-0.8	31.7	NM	543	13,686	X

Table H-2. Summary of Deposition Testing Conducted from November 21 to December 19, 1995

	2300		9,192	39,750	-0.8	31.5	NM	560	12,923	
	2330		9,762	40,320	-0.8	31.9	NM	572	12,792	
12/14/95	0000	27,360	10,332	40,890	-0.8	31.8	NM	581	12,543	
(K)	0030		570	41,460	-0.8	31.7	NM	585	12,906	
	0100		1,140	42,030	-0.8	31.6	NM	592	12,702	
	0130		1,710	42,600	-0.8	31.5	NM	603	12,848	X
	0200		2,280	43,170	-0.6	31.3	NM	550	12,828	
	0230		2,850	43,740	-0.6	31.5	NM	561	13,002	
	0300		3,420	44,310	-0.8	31.2	NM	571	12,868	
	0330		3,990	44,880	-0.7	31.1	NM	581	12,819	
	0400		4,560	45,450	-0.8	31.6	NM	591	12,714	
	0430		5,130	46,020	-0.8	31.3	NM	600	12,654	X
	0500		5,700	46,590	-0.9	31.7	NM	554	12,691	
	0530		6,270	47,160	-0.8	31.4	NM	565	12,845	
	0600		6,840	47,730	-0.8	31.7	NM	575	12,380	
	0630		7,410	48,300	-0.9	31.7	NM	584	12,892	
	0700		7,980	48,870	-1.0	31.5	NM	593	12,644	X
	0730		8,550	49,440	-0.8	31.6	NM	554	13,062	
	0800		9,120	50,010	-0.8	31.8	NM	568	12,918	
	0830		9,690	50,580	-0.8	31.5	NM	575	12,653	
	0900		10,260	51,150	-0.8	31.5	NM	583	12,638	
	0930		10,830	51,720	-0.9	31.3	NM	593	12,545	
	1000		11,400	52,290	-0.8	31.5	NM	600	13,069	X
	1030		11,970	52,860	-0.8	31.2	NM	561	12,538	
	1100		12,540	53,430	-0.8	31.6	NM	574	12,748	
	1130		13,110	54,000	-0.9	31.6	NM	584	13,004	
	1200		13,680	54,570	-0.9	31.4	NM	590	13,037	
	1230		14,250	55,140	-0.9	31.0	NM	599	12,627	X
	1300		14,820	55,710	-0.9	31.2	NM	564	13,080	
	1330		15,390	56,280	-0.9	31.0	NM	576	13,088	
	1400		15,960	56,850	-0.9	30.9	NM	581	12,386	
	1430		16,530	57,420	-0.9	30.9	NM	590	12,899	X
	1500		17,100	57,990	-0.8	31.5	NM	555	12,621	
	1530		17,670	58,560	-0.8	31.5	NM	570	12,947	
	1600		18,240	59,130	-0.8	31.8	NM	581	12,605	
	1630		18,810	59,700	-0.8	31.4	NM	589	12,813	
	1700		19,380	60,270	-0.8	31.2	NM	600	12,800	
	1730		19,950	60,840	-0.6	31.2	NM	524	14,290	X
	1800		20,520	61,410	-0.8	31.3	NM	573	12,810	
	1830		21,090	61,980	-0.8	31.3	NM	582	12,575	
	1900		21,660	62,550	-0.8	31.2	NM	591	12,865	
	1930		22,230	63,120	-0.8	31.4	NM	540	13,315	X
	2000		22,800	63,690	-0.9	31.5	NM	570	12,766	
	2030		23,370	64,260	-0.8	31.3	NM	584	13,092	
	2100		23,940	64,830	-0.9	31.5	NM	590	13,074	X
	2130		24,510	65,400	-0.9	31.4	NM	574	13,055	
	2200		25,080	65,970	-0.9	31.4	NM	579	13,081	
	2230		25,650	66,540	-0.8	31.3	NM	587	12,665	
	2300		26,220	67,110	-0.9	31.6	NM	599	13,340	X
	2330		26,790	67,680	-0.9	31.5	NM	571	13,144	
12/15/95	0000	27,360	27,360	68,250	-0.9	31.4		584	13,102	
(K)	0030		570	68,820	-0.9	31.8		598	13,144	
	0100		1,140	69,390	-0.9	31.5		605	12,877	X
	0130		1,710	69,960	-0.9	31.3		555	12,125	
	0200		2,280	70,530	-0.9	31.7		576	13,109	
	0230		2,850	71,100	-0.9	31.7		587	12,746	
	0300		3,420	71,670	-0.9	31.5		598	12,703	X
	0330		3,990	72,240	-0.9	31.7		556	13,457	
	0400		4,560	72,810	-0.8	31.8		576	13,144	
	0430		5,130	73,380	-0.9	31.5		586	12,876	
	0500		5,700	73,950	-0.9	31.4		596	12,682	X
	0530		6,270	74,520	-0.9	31.3		548	13,211	
	0600		6,840	75,090	-0.8	31.6		573	13,504	
	0630		7,410	75,660	-0.8	31.7		584	13,225	
	0700		7,980	76,230	-0.9	31.3		594	12,856	X
	0730		8,550	76,800	-0.9	31.7		566	13,134	
	0800		9,120	77,370	-0.9	31.6		580	13,364	
	0830		9,690	77,940	-0.9	31.6		589	13,288	
	0900		10,260	78,510	-0.9	31.5		602	13,440	X
	0930		10,830	79,080	-0.9	31.6		565	13,571	
	1000		11,400	79,650	-0.8	31.7	1,117	580	13,437	
	1030		11,970	80,220	-0.9	31.5	1,136	588	13,755	
	1100		12,540	80,790	-0.9	31.6	1,158	601	13,703	X
	1130		13,110	81,360	-0.9	31.7	1,117	565	13,762	
	1200		13,680	81,930	-0.9	31.6	1,122	577	13,665	

Table H-2. Summary of Deposition Testing Conducted from November 21 to December 19, 1995

	1230		14,250	82,500	-0.9	31.2	1,137	583	13,744	
	1300		14,820	83,070	-0.9	31.3	1,160	601	12,909	X
	1330		15,390	83,640	-0.9	31.5	1,090	553	12,465	
	1400		15,960	84,210	-0.8	31.2	1,116	571	12,432	
	1430		16,530	84,780	-0.8	31.0	1,135	580	12,746	
	1500		17,100	85,350	-0.8	31.2	1,161	590	12,801	
	1530		17,670	85,920	-0.8	31.2	1,175	595	12,610	
	1600		18,240	86,490	-0.8	31.2	1,194	605	12,812	X
	1630		18,810	87,060	-0.9	31.2	1,083	554	12,595	
	1700		19,380	87,630	-0.8	31.6	1,122	571	12,409	
	1730		19,950	88,200	-0.8	31.3	1,147	584	12,279	
	1800		20,520	88,770	-0.9	31.2	1,173	594	12,691	
	1830		21,090	89,340	-0.8	31.1	1,097	557	11,573	X
	1900		21,660	89,910	-0.8	31.1	1,125	573	12,664	
	1930		22,230	90,480	-0.8	31.0	1,151	583	12,662	
	2000		22,800	91,050	-0.9	31.5	1,169	594	11,690	
	2030		23,370	91,620	-0.9	31.2	1,080	529	12,540	X
	2100		23,940	92,190	-0.7	31.1	1,114	569	11,896	
	2130		24,510	92,760	-0.8	31.2	1,139	579	12,451	
	2200		25,080	93,330	-0.9	31.1	1,169	593	13,105	
	2230		25,650	93,900	-0.8	31.2	1,074	513	10,813	X
	2300		26,220	94,470	-0.9	31.3	1,104	565	13,204	
	2330		26,790	95,040	-0.9	31.3	1,135	579	12,590	
12/16/95	0000	27,360	27,360	95,610	-0.9	30.8	1,170	590	14,128	
(K)	0030		570	96,180	-0.9	31.1	1,193	602	13,275	X
	0100		1,140	96,750	-0.8	31.3	1,095	552	13,297	
	0130		1,710	97,320	-0.9	31.1	1,125	571	12,444	
	0200		2,280	97,890	-0.9	31.0	1,152	584	12,715	
	0230		2,850	98,460	-0.8	30.9	1,184	594	12,918	X
	0300		3,420	99,030	-0.8	30.8	1,096	552	13,091	
	0330		3,990	99,600	-1.0	31.1	1,131	574	11,910	
	0400		4,560	100,170	-0.9	31.2	1,155	586	12,133	
	0430		5,130	100,740	-0.9	30.7	1,186	596	13,477	X
	0500		5,700	101,310	-0.9	31.1	1,104	556	12,650	
	0530		6,270	101,880	-0.9	31.4	1,143	575	11,689	
	0600		6,840	102,450	-0.9	30.9	1,171	587	13,114	
	0630		7,410	103,020	-0.9	31.1	1,209	601	12,839	X
	0700		7,980	103,590	-0.9	31.0	1,113	558	12,453	
	0730		8,550	104,160	-0.9	31.2	1,136	575	13,591	
	0800		9,120	104,730	-0.9	31.2	1,170	584	13,204	
	0830		9,690	105,300	-0.9	31.0	1,178	593	13,279	X
	0900		10,260	105,870	-0.9	31.2	1,139	566	13,379	
	0930		10,830	106,440	-0.9	31.2	1,172	576	13,442	
	1000		11,400	107,010	-0.8	31.2	1,185	583	12,656	
	1030		11,970	107,580	-0.9	31.2	1,205	593	12,621	X
	1100		12,540	108,150	-0.9	30.9	1,145	558	12,780	
	1130		13,110	108,720	-0.9	31.1	1,169	574	13,434	
	1200		13,680	109,290	-0.9	31.2	1,195	586	13,957	
	1230		14,250	109,860	-0.9	31.3	1,215	593	13,271	
	1300		14,820	110,430	-1.0	31.2	1,232	601	12,630	X
	1330		15,390	111,000	-0.9	31.4	1,186	567	13,571	
	1400		15,960	111,570	-0.9	31.3	1,190	576	13,585	
	1430		16,530	112,140	-0.8	31.1	1,220	588	13,297	
	1500		17,100	112,710	-0.9	31.0	1,211	594	12,474	
	1530		17,670	113,280	-0.9	31.1	1,234	604	13,285	X
	1600		18,240	113,850	-0.9	31.2	1,164	563	13,108	
	1630		18,810	114,420	-0.9	31.2	1,169	576	12,639	
	1700		19,380	114,990	-0.9	31.3	1,202	592	13,321	
	1730		19,950	115,560	-0.9	31.1	1,219	600	12,804	
	1800		20,520	116,130	-0.9	31.4	1,232	609	13,491	X
	1830		21,090	116,700	-1.0	31.3	1,169	562	12,381	
	1900		21,660	117,270	-0.9	31.1	1,194	580	13,365	
	1930		22,230	117,840	-0.9	31.3	1,187	583	12,416	
	2000		22,800	118,410	-0.9	30.9	1,220	596	13,469	
	2030		23,370	118,980	-0.8	31.0	1,245	607	12,946	X
	2100		23,940	119,550	-0.8	31.1	1,135	553	14,290	
	2130		24,510	120,120	-0.9	31.0	1,181	581	13,333	
	2200		25,080	120,690	-0.7	31.2	1,195	590	12,503	
	2230		25,650	121,260	-0.9	30.8	1,228	611	12,905	X
	2300		26,220	121,830	-0.9	31.0	1,138	561	12,627	
	2330		26,790	122,400	-0.9	31.2	1,154	578	12,937	
12/17/95	0000	27,360	27,360	122,970	-0.8	31.0	1,175	591	12,749	
(K)	0030		570	123,540	-0.9	30.9	1,180	599	13,001	X
	0100		1,140	124,110	-0.9	30.9	1,131	547	14,290	
	0130		1,710	124,680	-1.0	31.2	1,157	577	12,644	

Table H-2. Summary of Deposition Testing Conducted from November 21 to December 19, 1995

	0200		2,280	125,250	-1.0	31.0	1,177	587	12,101	
	0230		2,850	125,820	-1.0	30.8	1,193	597	13,225	X
	0300		3,420	126,390	-0.8	31.3	1,129	551	14,322	
	0330		3,990	126,960	-1.0	31.0	1,155	580	13,042	
	0400		4,560	127,530	-0.9	31.1	1,183	594	12,603	
	0430		5,130	128,100	-0.9	31.0	1,202	605	12,604	X
	0500		5,700	128,670	-0.9	30.8	1,126	556	12,310	
	0530		6,270	129,240	-0.9	30.8	1,170	585	12,604	
	0600		6,840	129,810	-0.9	30.8	1,195	596	12,870	
	0630		7,410	130,380	-0.9	31.1	1,235	618	12,484	X
	0700		7,980	130,950	-0.9	31.2	1,139	564	12,807	
	0730		8,550	131,520	-0.8	30.7	1,172	575	13,169	
	0800		9,120	132,090	-0.9	31.6	1,210	604	12,389	
	0830		9,690	132,660	-1.0	31.3	1,232	616	13,446	X
	0900		10,260	133,230	-0.8	30.9	1,119	551	13,953	
	0930		10,830	133,800	-0.9	31.1	1,167	577	12,508	
	1000		11,400	134,370	-1.0	31.3	1,202	598	12,601	
	1030		11,970	134,940	-0.9	31.2	1,226	609	13,011	X
	1100		12,540	135,510	-0.9	31.2	1,133	561	12,804	
	1130		13,110	136,080	-0.9	31.0	1,161	580	13,121	
	1200		13,680	136,650	-0.9	31.0	1,239	592	12,847	
	1230		14,250	137,220	-0.8	30.3	1,255	600	13,114	
	1300		14,820	137,790	-0.9	30.5	1,282	619	12,671	X
	1330		15,390	138,360	-0.9	30.6	1,167	560	12,986	
	1400		15,960	138,930	-0.8	30.8	1,198	579	13,118	
	1430		16,530	139,500	-0.8	30.6	1,214	594	11,980	
	1500		17,100	140,070	-0.9	30.7	1,241	610	12,084	
	1530		17,670	140,640	-0.9	30.5	1,250	622	12,638	X
	1600		18,240	141,210	-0.8	31.1	1,144	551	12,456	
	1630		18,810	141,780	-0.9	30.6	1,172	576	12,369	
	1700		19,380	142,350	-0.9	31.1	1,198	593	12,300	
	1730		19,950	142,920	-0.9	30.8	1,230	611	12,290	X
	1800		20,520	143,490	-0.9	30.7	1,150	560	12,007	
	1830		21,090	144,060	-1.0	31.3	1,177	580	13,013	
	1900		21,660	144,630	-0.9	30.8	1,192	592	12,336	
	1930		22,230	145,200	-1.0	31.1	1,200	605	12,491	X
	2000		22,800	145,770	-0.9	31.1	1,137	555	12,185	
	2030		23,370	146,340	-0.9	30.5	1,165	583	13,192	
	2100		23,940	146,910	-0.9	30.3	1,194	598	12,119	
	2130		24,510	147,480	-0.9	30.7	1,199	615	13,029	X
	2200		25,080	148,050	-0.8	30.7	1,117	551	12,549	
	2230		25,650	148,620	-0.8	30.7	1,156	579	12,899	
	2300		26,220	149,190	-0.9	30.5	1,151	595	13,069	
	2330		26,790	149,760	-0.9	30.8	1,191	613	12,479	X
12/18/95	0000	27,360	27,360	150,330	-0.9	30.5	1,208	627	12,662	
(K)	0030		570	150,900	-0.9	30.6	1,127	564	12,348	X
	0100		1,140	151,470	-0.9	30.6	1,173	592	12,802	
	0130		1,710	152,040	-0.9	30.7	1,187	610	13,146	
	0200		2,280	152,610	-0.8	30.7	1,208	620	13,353	X
	0230		2,850	153,180	-0.9	30.6	1,090	554	12,755	
	0300		3,420	153,750	-0.8	31.0	1,129	587	13,073	
	0330		3,990	154,320	-0.7	30.9	1,149	597	12,558	
	0400		4,560	154,890	-0.8	31.0	1,181	619	13,108	
	0430		5,130	155,460	-0.8	30.9	1,154	593	12,201	X
	0500		5,700	156,030	-0.8	31.2	1,115	560	13,266	
	0530		6,270	156,600	-0.7	30.7	1,181	584	12,825	
	0600		6,840	157,170	-0.9	31.0	1,222	621	12,877	X
	0630		7,410	157,740	-0.9	31.0	1,114	554	12,835	
	0700		7,980	158,310	-0.8	31.0	1,147	588	12,923	
	0730		8,550	158,880	-0.9	30.8	1,170	604	12,171	
	0800		9,120	159,450	1.0	31.1	1,194	621	12,638	X
	0830		9,690	160,020	-0.9	31.0	1,092	559	13,240	
	0900		10,260	160,590	-0.9	31.0	1,158	584	12,696	
	0930		10,830	161,160	-0.9	30.9	1,186	606	13,488	
	1000		11,400	161,730	-0.9	30.9	1,204	619	13,318	X
	1030		11,970	162,300	-0.9	30.9	1,155	566	13,425	
	1100		12,540	162,870	-1.0	31.2	1,177	589	13,387	
	1130		13,110	163,440	-1.0	30.9	1,191	604	13,391	
	1200		13,680	164,010	-0.9	31.1	1,202	614	13,385	X
	1230		14,250	164,580	-1.0	30.7	1,111	564	13,758	
	1300		14,820	165,150	-1.0	30.8	1,144	583	12,738	
	1330		15,390	165,720	-1.0	30.6	1,175	595	13,448	
	1400		15,960	166,290	-1.0	30.7	1,200	607	12,308	X
	1430		16,530	166,860	-1.1	30.0	1,115	563	12,592	
	1500		17,100	167,430	-1.0	30.1	1,149	584	12,848	

Table H-2. Summary of Deposition Testing Conducted from November 21 to December 19, 1995

	1530		17,670	168,000	-1.1	29.5	1,168	595	12,958	
	1600		18,240	168,570	-1.0	29.7	1,196	607	12,464	
	1630		18,810	169,140	-0.9	29.6	1,134	551	13,265	X
	1700		19,380	169,710	-1.0	30.1	1,160	554	13,080	
	1730		19,950	170,280	-1.0	29.7	1,191	595	12,137	
	1800		20,520	170,850	-1.0	29.7	1,249	609	12,535	
	1830		21,090	171,420	-0.9	29.5	1,153	535	11,618	X
	1900		21,660	171,990	-1.0	29.7	1,229	591	12,204	
	1930		22,230	172,560	-1.1	29.9	1,256	604	12,522	
	2000		22,800	173,130	-1.2	29.7	1,194	548	12,210	X
	2030		23,370	173,700	-1.0	29.7	1,207	584	12,638	
	2100		23,940	174,270	-1.0	29.5	1,217	599	13,044	
	2130		24,510	174,840	-0.9	29.7	1,198	532	11,423	X
	2200		25,080	175,410	-1.0	29.6	1,222	585	11,953	
	2230		25,650	175,980	-1.0	29.5	1,229	600	12,336	
	2300		26,220	176,550	-1.0	29.7	1,185	523	10,958	X
	2330		26,790	177,120	-1.0	29.5	1,191	585	12,943	
12/19/95	0000	9,633	27,360	177,690	-1.1	29.8	1,252	599	12,909	
(K)	0030		570	178,260	-1.2	29.5	1,265	609	12,667	X
	0100		1,140	178,830	-1.1	29.6	1,214	551	13,742	
	0130		1,710	179,400	-1.2	29.3	1,234	588	12,104	
	0200		2,280	179,970	-1.2	29.4	1,250	602	12,732	X
	0230		2,850	180,540	-1.1	29.6	1,177	561	12,397	
	0300		3,420	181,110	-1.2	29.7	1,191	584	12,740	
	0330		3,990	181,680	-1.3	29.4	1,210	601	12770	
	0400		4,560	182,250	-1.3	29.3	1,204	612	12,450	X
	0430		5,130	182,820	-1.3	29.8	1,130	567	12,070	
	0500		5,700	183,390	-1.3	29.6	1,165	586	12,844	
	0530		6,270	183,960	-1.5	29.7	1,194	600	12,912	
	0600		6,840	184,530	-1.4	29.5	1,244	613	13,036	X
	0630		7,410	185,100	-1.6	29.6	1,115	562	12,143	
	0700		7,980	185,670	-1.7	29.8	1,189	585	12,850	
	0730		8,550	186,240	-1.7	29.8	1,259	596	13,022	
	0800		9,120	186,810	-1.7	29.8	1,304	607	12,511	
	0827		9,633	187,380						

Table H-3. Summary of Deposition Testing Conducted from January 8 to 16, 1996

Date	Time	Total Coal Fired on this Date (lb)	Cumulative Coal Usage on this Date (lb)	Cumulative Coal Usage since Boiler Cleaning (lb)	Boiler Outlet Pressure ("W.C.)	ID Fan Amp Draw	Convective Pass Probe Temperature (F)	Boiler Outlet Temperature (F)	Steam Production (lb/h)	Sootblows
12/20/95	Boiler cleaned									
1/8/96		1,244	1,244	1,244						
1/9/96	0030	27,288	558	1,802	-0.7	30.4	969	534	12,413	
	0100		1,116	2,360	-0.6	30.4	995	545	12,442	
	0130		1,674	2,918	-0.7	30.4	1,009	555	10,746	
	0200		2,232	3,476	-0.7	30.2	1,035	563	10,892	
	0230		2,790	4,034	-0.7	30.3	1,051	570	12,276	
	0300		3,348	4,592	-0.8	30.8	1,070	582	12,642	
	0330		3,906	5,150	-0.8	30.7	1,087	586	11,638	
	0400		4,464	5,708	-0.8	30.3	1,094	596	11,869	
	0430		5,022	6,266	-0.9	30.6	1,108	603	11,899	
	0500		5,580	6,824	-0.8	31.0	1,132	615	13,149	
	0530		6,138	7,382	-0.8	30.9	1,155	615	13,232	
	0600		6,696	7,940	-1.0	31.0	942	519	12,888	X
	0630		7,254	8,498	-0.7	31.2	961	531	13,272	
	0700		7,812	9,056	-0.8	31.1	993	543	13,417	
	0730		8,370	9,614	-0.7	31.6	1,005	549	12,972	
	0800		8,928	10,172	-0.7	31.3	1,036	557	13,440	
	0830		9,486	10,730	-0.8	31.4	1,044	566	13,222	
	0900		10,044	11,288	-0.6	31.5	1,063	571	13,094	
	0930		10,602	11,846	-0.8	31.5	1,078	575	14,499	
	1000		11,160	12,404	-1.0	31.5	1,086	583	13,599	
	1030		11,718	12,962	-0.9	31.6	1,107	590	12,606	
	1100		12,276	13,520	-0.9	31.4	1,118	598	12,891	
	1130		12,834	14,078	-0.9	31.5	1,129	602	12,609	
	1200		13,392	14,636	-0.8	31.2	979	535	13,367	X
	1230		13,950	15,194	-0.8	31.4	997	541	12,810	
	1300		14,508	15,752	-0.8	31.4	1,025	551	13,083	
	1330		15,066	16,310	-0.6	31.2	1,048	558	13,262	
	1400		15,624	16,868	-0.7	31.4	1,058	565	12,711	
	1430		16,182	17,426	-0.7	31.0	1,078	571	12,578	
	1500		16,740	17,984	-0.9	31.2	1,084	580	13,494	
	1530		17,298	18,542	-0.8	31.0	1,098	583	13,073	
	1600		17,856	19,100	-0.8	31.2	1,125	591	13,325	
	1630		18,414	19,658	-0.8	31.2	1,131	597	13,221	
	1700		18,972	20,216	-0.8	31.0	1,160	603	13,709	
	1730		19,566	20,810	Photohelic sensor line plugging; line was cleaned					
	1800		20,160	21,404	-0.8	32.0	1,059	550	13,878	X
	1830		20,754	21,998	-0.8	32.0	1,097	563	14,457	
	1900		21,348	22,592	-0.8	32.2	1,126	572	14,435	
	1930		21,942	23,186	-0.7	32.0	1,131	578	14,116	
	2000		22,536	23,780	-0.7	32.3	1,131	586	13,942	
	2030		23,130	24,374	-1.0	32.8	1,142	597	14,554	
	2100		23,724	24,968	-1.0	32.4	1,150	605	14,343	
	2130		24,318	25,562	-1.0	32.6	1,074	606	14,460	
	2200		24,912	26,156	-1.2	33.5	1,097	565	14,116	X
	2230		25,506	26,750	-2.0	35.2	1,123	572	14,185	
	2300		26,100	27,344	-1.0	32.3	1,156	585	14,891	
	2330		26,694	27,938	-1.0	32.1	1,165	595	15,139	
1/10/96	0000	17,456	27,288	28,532	-0.9	33.1	1,181	603	15,273	
	0030		594	29,126	-0.9	32.7	1,199	619	15,282	
	0100		1,188	29,720	-0.9	32.7	1,087	553	14,562	
	0130		1,782	30,314	Boiler shut down due to low feedwater pressure					
	0500		1,905	30,437	-0.8	32.7	1,042	561	15,074	
	0530		2,499	31,031	-0.8	33.0	1,047	564	14,990	
	0600		3,093	31,625	-0.8	32.6	1,051	569	14,557	
	0630		3,687	32,219	-0.7	32.3	1,069	568	14,817	
	0700		4,281	32,813	-1.1	32.4	1,063	575	15,148	
	0730		4,875	33,407	-0.9	32.4	1,085	583	15,067	
	0800		5,469	34,001	-0.9	33.0	1,110	594	15,563	
	0830		6,063	34,595						
	0900		6,633	35,165	-1.0	32.8	1,128	601	15,061	
	0930		7,203	35,735	-1.0	32.1	1,127	608	14,742	X
	1000		7,773	36,305	-0.9	31.9	1,101	533	14,913	
	1030		8,343	36,875	-0.8	32.0	1,032	547	14,862	
	1100		8,913	37,445	-0.9	32.2	1,061	557	14,814	
	1130		9,483	38,015	Boiler shut down; ran out of coal					
	1730		10,053	38,585						

Table H-3. Summary of Deposition Testing Conducted from January 8 to 16, 1996

	1800		10,328	38,860						
	1830		10,922	39,454						
	1900		11,516	40,048	-0.9	31.8	1,115	577		
	1930		12,110	40,642	-0.8	31.5	1,117	579		
	2000		12,704	41,236	-0.8	31.5	1,124	582		
	2030		13,298	41,830	-0.9	32.1	1,159	595		
	2100		13,892	42,424	-0.9	32.0	1,169	604		
	2130		14,486	43,018	-0.9	31.5	1,173	609		
	2200		15,080	43,612	-0.9	31.6	1,187	617		
	2230		15,674	44,206	-0.8	32.0	1,196	621		
	2300		16,268	44,800	-0.8	33.6	1,222	627		X
	2330		16,862	45,394	-0.8	32.5	1,108	550		
1/11/96	0000	28,512	17,456	45,988	-0.8	32.7	1,113	560		
	0030		594	46,582	-0.8	32.3	1,133	566		
	0100		1,188	47,176	-0.8	31.7	1,139	564		
	0130		1,782	47,770	-0.8	32.0	1,149	573		
	0200		2,376	48,364	-0.9	31.8	1,169	582		
	0230		2,970	48,958	-0.9	32.0	1,179	590		
	0300		3,564	49,552	-0.9	31.7	1,188	597		
	0330		4,158	50,146	-0.9	31.9	1,207	604		
	0400		4,752	50,740	-0.9	31.8	1,212	609		
	0430		5,346	51,334	-0.9	31.9	1,229	616		
	0500		5,940	51,928	-1.3	31.8	1,237	621		X
	0530		6,534	52,522	-0.8	31.7	1,110	548		
	0600		7,128	53,116	-0.8	31.8	1,146	564		
	0630		7,722	53,710	-0.7	31.9	1,160	576		
	0700		8,316	54,304	-0.7	32.0	1,170	584		
	0730		8,910	54,898	-1.1	32.2	1,190	591		
	0800		9,504	55,492	-1.1	32.1	1,212	598		
	0830		10,098	56,086	-1.0	32.2	1,223	604		X
	0900		10,692	56,680	-0.7	32.3	1,126	556		
	0930		11,286	57,274	-1.2	32.1	1,144	570		
	1000		11,880	57,868	-0.9	32.4	1,160	579		
	1030		12,474	58,462	-0.8	32.3	1,173	587		
	1100		13,068	59,056	-1.1	32.1	1,189	594		
	1130		13,662	59,650	-0.8	31.9	1,197	605		
	1200		14,256	60,244	-1.0	32.1	1,214	609		X
	1230		14,850	60,838	-1.0	32.8	1,140	559		
	1300		15,444	61,432	-0.7	32.3	1,126	566		
	1330		16,038	62,026	-0.7	32.2	1,147	572		
	1400		16,632	62,620	-0.9	31.8	1,159	577		
	1430		17,226	63,214	-1.0	32.3	1,182	586		
	1500		17,820	63,808	-1.0	32.0	1,206	595		X
	1530		18,414	64,402	-0.8	31.9	1,137	560		
	1600		19,008	64,996	-0.8	32.4	1,162	576		
	1630		19,602	65,590	-1.0	32.1	1,163	580		
	1700		20,196	66,184	-1.2	32.5	1,190	586		
	1730		20,790	66,778	-0.8	32.3	1,196	594		
	1800		21,384	67,372	-0.7	32.6	1,209	600		
	1830		21,978	67,966	-0.8	32.2	1,219	606		
	1900		22,572	68,560	-0.9	32.3	1,132	559		X
	1930		23,166	69,154	-0.8	32.5	1,160	571		
	2000		23,760	69,748	-0.9	32.3	1,165	579		
	2030		24,354	70,342	-0.8	32.0	1,178	583		
	2100		24,948	70,936	-1.1	32.0	1,207	589		
	2130		25,542	71,530	-1.0	32.2	1,213	595		
	2200		26,136	72,124	-1.0	32.1	1,234	603		
	2230		26,730	72,718	-1.2	32.1	1,153	564	14,029	X
	2300		27,324	73,312	-0.8	32.2	1,188	589	11,794	
	2330		27,918	73,906	-1.0	32.0	1,200	594	12,110	
1/12/96	0000	27,906	594	74,500	-0.8	32.5	1,222	603	11,710	
	0030		1,188	75,094	-1.2	31.9	1,233	609	11,650	
	0100		1,782	75,688	-1.0	31.5	1,145	565	12,317	
	0130		2,376	76,282	-1.0	32.2	1,180	581	12,041	
	0200		2,970	76,876	-1.0	31.7	1,196	589	11,873	
	0230		3,564	77,470	-1.0	31.7	1,211	597	11,743	
	0300		4,158	78,064	-0.8	31.4	1,219	605	12,331	
	0330		4,752	78,658	-1.0	32.1	1,236	611	12,082	
	0400		5,346	79,252	-0.7	31.5	1,243	618	12,413	X
	0430		5,940	79,846	-0.9	31.7	1,171	565	12,500	
	0500		6,534	80,440	-0.9	31.8	1,189	575	11,875	
	0530		7,128	81,034	-0.8	32.0	1,212	586	12,728	
	0600		7,722	81,628	-1.0	31.6	1,222	593	13,063	
	0630		8,316	82,222	-0.9	31.4	1,218	599	12,999	
	0700		8,910	82,816	-0.9	31.7	1,222	606	13,117	
	0730		9,504	83,410	-1.0	31.4	1,264	612	13,582	X
	0800		10,098	84,004	-0.9	31.8	1,174	562	12,622	

Table H-3. Summary of Deposition Testing Conducted from January 8 to 16, 1996

	0830		10,692	84,598	-0.7	31.5	1,191	570	12,850	
	0900		11,286	85,192	-1.1	32.0	1,199	584	13,106	
	0930		11,880	85,786	-1.1	31.7	1,222	591	11,859	
	1000		12,474	86,380	-1.0	31.9	1,237	603	13,355	X
	1030		13,068	86,974	-0.6	31.8	1,162	560	13,642	
	1100		13,662	87,568	-0.8	31.4	1,187	572	13,225	
	1130		14,256	88,162	-1.1	31.6	1,194	581	11,507	
	1200		14,850	88,756	-0.9	31.4	1,212	595	13,140	
	1230		15,444	89,350	-0.8	31.6	1,225	602	12,126	
	1300		16,038	89,944	-1.2	31.9	1,227	615	12,287	X
	1330		16,632	90,538	-1.0	32.0	1,150	560	13,077	
	1400		17,226	91,132	-0.9	31.5	1,166	567	12,389	
	1430		17,820	91,726	-1.0	31.2	1,199	582	11,211	
	1500		18,414	92,320	-0.8	31.1	1,216	594	13,549	X
	1530		19,008	92,914	-1.1	31.7	1,165	564	13,187	
	1600		19,602	93,508	-0.8	31.7	1,191	579	12,841	
	1630		20,196	94,102	-0.7	31.8	1,208	585	13,164	
	1700		20,790	94,696	Boiler shut down; main coal hopper plugged					
	1830		21,636	96,136	-0.9	31.6	1,130	578	13,575	
	1900		22,206	96,706	-1.0	31.6	1,142	582	13,236	
	1930		22,776	97,276	-1.0	31.6	1,165	592	13,286	
	2000		23,346	97,846	-1.0	31.1	1,158	596	12,758	
	2030		23,916	98,416	-1.0	31.2	1,174	604	12,528	
	2100		24,486	98,986	-1.0	31.0	1,172	611	13,005	
	2130		25,056	99,556	-1.0	31.0	1,187	616	12,998	
	2200		25,626	100,126	-0.9	31.2	1,094	537	14,019	X
	2230		26,196	100,696	-1.0	31.4	1,104	556	13,196	
	2300		26,766	101,266	-1.0	31.6	1,133	566	12,886	
	2330		27,336	101,836	-0.8	31.2	1,151	573	12,682	
1/13/96	0000	27,360	27,906	102,406	-1.0	31.2	1,163	584	12,220	
	0030		570	102,976	-1.0	31.3	1,184	591	12,813	
	0100		1,140	103,546	-1.0	31.2	1,201	599	13,132	
	0130		1,710	104,116	-1.0	31.3	1,217	605	13,134	
	0200		2,280	104,686	-1.0	31.4	1,240	616	12,046	
	0230		2,850	105,256	-1.0	31.2	1,251	620	13,153	X
	0300		3,420	105,826	-1.0	31.5	1,115	556	13,036	
	0330		3,990	106,396	-1.0	32.0	1,133	563	12,551	
	0400		4,560	106,966	-0.9	31.6	1,158	574	13,202	
	0430		5,130	107,536	-0.9	31.3	1,180	582	12,293	
	0500		5,700	108,106	-0.9	31.6	1,209	592	12,133	
	0530		6,270	108,676	-0.9	31.9	1,222	598	12,782	
	0600		6,840	109,246	-0.8	31.4	1,233	609	13,251	
	0630		7,410	109,816	-0.8	31.5	1,266	613	12,456	
	0700		7,980	110,386	-1.0	31.4	1,285	619	11,896	X
	0730		8,550	110,956	-0.8	31.4	1,148	557	12,862	
	0800		9,120	111,526	-0.9	31.4	1,186	570	12,975	
	0830		9,690	112,096	-1.0	31.3	1,191	584	13,074	
	0900		10,260	112,666	-1.0	31.2	1,240	592	12,047	
	0930		10,830	113,236	-1.0	31.1	1,270	604	12,793	
	1000		11,400	113,806	-0.9	31.1	1,285	616	11,862	
	1030		11,970	114,376	-0.9	31.1	1,300	627	12,793	X
	1100		12,540	114,946	-0.9	31.5	1,154	564	12,148	
	1130		13,110	115,516	-0.8	31.5	1,172	573	12,827	
	1200		13,680	116,086	-1.0	31.0	1,215	589	11,994	
	1230		14,250	116,656	-0.8	31.1	1,243	598	11,820	
	1300		14,820	117,226	-0.8	30.9	1,267	611	12,358	
	1330		15,390	117,796	-1.0	30.8	1,303	619	12,865	X
	1400		15,960	118,366	-0.8	31.0	1,186	564	13,028	
	1430		16,530	118,936	-1.0	31.3	1,236	582	11,300	
	1500		17,100	119,506	-0.8	31.4	1,268	592	13,201	
	1530		17,670	120,076	-1.0	31.1	1,279	603	12,155	
	1600		18,240	120,646	-1.1	31.1	1,293	616	13,018	
	1630		18,810	121,216	-1.0	31.1	1,315	624	12,245	X
	1700		19,380	121,786	-1.0	31.0	1,188	564	11,991	
	1730		19,950	122,356	-1.0	30.7	1,236	578	11,759	
	1800		20,520	122,926	-0.9	31.2	1,253	590	12,172	
	1830		21,090	123,496	-0.8	31.0	1,284	604	11,756	
	1900		21,660	124,066	-1.0	31.3	1,308	624	12,181	
	1935		22,230	124,636	-0.8	31.6	1,168	545	13,629	X
	2000		22,800	125,206	-0.9	31.5	1,201	572	13,253	
	2030		23,370	125,776	-1.0	31.7	1,215	580	12,787	
	2100		23,940	126,346	-1.0	31.7	1,235	592	13,001	
	2130		24,510	126,916	-1.2	31.7	1,242	597	11,963	
	2200		25,080	127,486	-1.0	31.5	1,257	608	12,633	
	2230		25,650	128,056	-1.0	31.5	1,260	613	11,945	X
	2300		26,220	128,626	-1.0	31.7	1,163	559	11,617	
	2330		26,790	129,196	-0.8	31.3	1,179	576	11,924	

Table H-3. Summary of Deposition Testing Conducted from January 8 to 16, 1996

1/14/95	0000	27,360	27,360	129,766	-0.8	31.4	1,212	591	11,963	
	0030		570	130,336	-0.9	31.2	1,221	597	12,584	
	0100		1,140	130,906	-1.0	31.4	1,227	602	12,488	
	0130		1,710	131,476	-0.8	31.3	1,240	611	12,931	X
	0200		2,280	132,046	-0.9	31.5	1,174	570	12,557	
	0230		2,850	132,616	-0.9	31.4	1,194	583	12,429	
	0300		3,420	133,186	-0.8	31.3	1,205	592	12,635	
	0330		3,990	133,756	-1.0	31.1	1,221	602	12,581	
	0400		4,560	134,326	-1.0	31.1	1,229	606	12,036	X
	0430		5,130	134,896	-0.9	31.3	1,158	568	12,398	
	0500		5,700	135,466	-1.0	31.4	1,177	583	12,647	
	0530		6,270	136,036	-1.0	31.5	1,200	592	13,429	
	0600		6,840	136,606	-1.0	31.5	1,198	599	12,079	
	0630		7,410	137,176	-0.9	31.4	1,214	605	12,178	
	0700		7,980	137,746	-1.0	31.4	1,218	614	12,578	X
	0730		8,550	138,316	-0.9	31.7	1,134	571	12,456	
	0800		9,120	138,886	-0.9	31.6	1,158	582	11,536	
	0830		9,690	139,456	-1.0	31.4	1,177	591	12,349	
	0900		10,260	140,026	-1.0	31.6	1,177	598	11,865	
	0930		10,830	140,596	-1.0	31.3	1,189	606	12,203	
	1000		11,400	141,166	-1.0	31.4	1,204	612	12,220	X
	1030		11,970	141,736	-1.0	31.6	1,118	562	11,917	
	1100		12,540	142,306	-1.1	31.4	1,148	580	12,865	
	1130		13,110	142,876	-1.1	31.2	1,156	588	12,497	
	1200		13,680	143,446	-1.0	31.0	1,179	594	12,459	
	1230		14,250	144,016	-1.0	30.9	1,188	603	12,563	
	1300		14,820	144,586	-1.1	30.8	1,215	612	13,069	X
	1330		15,390	145,156	-0.9	30.9	1,116	556	12,900	
	1400		15,960	145,726	-0.9	30.9	1,155	576	12,384	
	1430		16,530	146,296	-1.0	30.9	1,187	593	12,815	
	1500		17,100	146,866	-1.1	30.8	1,193	605	12,949	
	1530		17,670	147,436	-1.1	30.6	1,216	617	12,377	
	1600		18,240	148,006	-1.0	30.6	1,243	624	12,871	
	1630		18,810	148,576	-1.0	30.8	1,110	545	14,388	X
	1700		19,380	149,146	-0.9	30.7	1,133	574	12,488	
	1730		19,950	149,716	-0.9	30.8	1,184	588	12,414	
	1800		20,520	150,286	-1.0	30.6	1,190	605	11,969	
	1830		21,090	150,856	-1.0	30.8		616	12,738	X
	1900		21,660	151,426	-1.0	30.9		546	14,453	
	1930		22,230	151,996	-1.0	30.7	1,168	581	12,647	
	2000		22,800	152,566	-1.0	31.1	1,184	597	11,948	
	2030		23,370	153,136	-1.0	31.0	1,208	608	12,877	
	2100		23,940	153,706	-1.0	31.0	1,220	617	12,223	
	2130		24,510	154,276	-1.0	30.9	1,253	623	13,080	X
	2200		25,080	154,846	-1.0	31.1	1,142	549	13,837	
	2230		25,650	155,416	-1.0	31.2	1,163	577	12,567	
	2300		26,220	155,986	-1.1	30.9	1,186	587	12,195	
	2330		26,790	156,556	-0.9	30.7	1,215	597	12,302	
1/15/96	0000	27,360	27,360	157,126	-1.0	30.8	1,233	610	12,473	
	0030		570	157,696	-1.0	31.0	1,251	613	12,601	
	0100		1,140	158,266	-1.0	31.0	1,270	623	12,702	X
	0130		1,710	158,836	-0.9	31.4	1,167	562	12,427	
	0200		2,280	159,406	-1.1	31.4	1,203	580	12,586	
	0230		2,850	159,976	-1.0	31.4	1,215	591	12,535	
	0300		3,420	160,546	-1.0	31.2	1,235	597	12,487	
	0330		3,990	161,116	-1.3	31.2	1,259	608	13,021	
	0400		4,560	161,686	-1.0	31.0	1,264	616	12,937	X
	0430		5,130	162,256	-0.9	31.6	1,176	559	14,428	
	0500		5,700	162,826	-1.2	31.4	1,202	576	12,339	
	0530		6,270	163,396	-1.2	31.5	1,227	586	12,438	
	0600		6,840	163,966	-1.0	31.4	1,249	596	12,818	
	0630		7,410	164,536	-1.2	31.2	1,260	601	12,587	
	0700		7,980	165,106	-1.3	31.7	1,272	608	13,969	
	0730		8,550	165,676	-1.3	31.4	1,286	613	13,602	
	0800		9,120	166,246	-1.1	31.7	1,288	619	14,144	X
	0830		9,690	166,816	-1.1	31.9	1,189	562	14,093	
	0900		10,260	167,386	-1.2	31.8	1,209	580	13,410	
	0930		10,830	167,956	-1.2	31.2	1,213	586	12,784	
	1000		11,400	168,526	-1.1	31.2	1,241	592	13,218	
	1030		11,970	169,096	-1.1	31.4	1,288	600	13,430	
	1100		12,540	169,666	-1.2	31.5	1,308	603	13,442	
	1130		13,110	170,236	-1.2	31.0	1,318	609	13,285	X
	1200		13,680	170,806	-1.2	31.1	1,240	566	12,928	
	1230		14,250	171,376	-1.1	31.2	1,248	577	13,314	
	1300		14,820	171,946	-1.2	31.3	1,268	589	13,333	
	1330		15,390	172,516	-1.2	31.1	1,301	595	12,490	
	1400		15,960	173,086	-1.2	31.4	1,312	605	12,725	X

Table H-3. Summary of Deposition Testing Conducted from January 8 to 16, 1996

	1430		16,530	173,656	-1.0	31.0	1,241	563	13,053	
	1500		17,100	174,226	-1.1	31.2	1,260	577	12,848	
	1530		17,670	174,796	-1.2	31.1	1,267	588	12,772	
	1600		18,240	175,366	-1.2	31.3	1,267	596	13,216	
	1630		18,810	175,936	-1.2	31.4	1,292	603	13,137	X
	1700		19,380	176,506	-1.0	31.3	1,225	551	10,437	
	1730		19,950	177,076	-1.2	31.3	1,264	578	12,987	
	1800		20,520	177,646	-1.3	31.5	1,284	589	12,754	
	1830		21,090	178,216	-1.3	31.3	1,274	598	12,599	
	1900		21,660	178,786	-1.3	31.3	1,282	607	13,861	X
	1930		22,230	179,356	-1.3	31.7	1,180	545	12,023	
	2000		22,800	179,926	-1.1	31.4	1,203	579	12,946	
	2030		23,370	180,496	-1.4	31.2	1,238	591	12,648	
	2100		23,940	181,066	-1.2	31.3	1,245	600	12,569	X
	2130		24,510	181,636	-1.3	31.2	1,166	558	14,232	
	2200		25,080	182,206	-1.0	31.6	1,191	578	13,025	
	2230		25,650	182,776	-1.0	31.5	1,217	590	12,897	
	2300		26,220	183,346	-1.0	31.9	1,230	600	13,332	
	2330		26,790	183,916	-1.0	31.7	1,255	604	12,674	X
1/16/96	0000	19,950	27,360	184,486	-1.2	32.0	1,191	573	13,492	
	0030		570	185,056	-1.4	32.0	1,203	581	13,141	
	0100		1,140	185,626	-1.3	31.5	1,264	594	12,738	
	0130		1,710	186,196	-1.4	31.9	1,261	603	12,512	
	0200		2,280	186,766	-1.4	31.8	1,261	613	12,328	
	0230		2,850	187,336	-1.3	31.5	1,289	616	12,813	X
	0300		3,420	187,906	-1.0	32.0	1,209	559	14,861	
	0330		3,990	188,476	-1.1	31.9	1,237	579	13,019	
	0400		4,560	189,046	-1.1	31.9	1,253	590	12,871	
	0430		5,130	189,616	-1.3	32.0	1,244	598	13,242	
	0500		5,700	190,186	-1.5	31.6	1,251	605	12,917	
	0530		6,270	190,756	-1.6	31.6	1,314	614	12,975	X
	0600		6,840	191,326	-1.6	31.9	1,234	561	14,069	
	0630		7,410	191,896	-1.8	32.0	1,234	580	12,668	
	0700		7,980	192,466	-1.3	31.7	1,235	588	12,947	
	0730		8,550	193,036	-1.4	31.5	1,267	598	12,932	
	0800		9,120	193,606	-1.9	31.6	1,291	605	12,903	
	0830		9,690	194,176	-1.4	31.9	1,319	613	12,589	X
	0900		10,260	194,746	-1.6	32.0	1,237	565	12,995	
	0930		10,830	195,316	-1.4	31.7	1,274	579	12,209	
	1000		11,400	195,886	-2.0	31.7	1,308	589	12,642	
	1030		11,970	196,456	-2.0	32.2	1,273	596	12,192	
	1100		12,540	197,026	-2.0	31.9	1,313	606	12,770	
	1130		13,110	197,596	-2.0	31.8	1,341	612	12,012	X
	1200		13,680	198,166	-1.7	31.9	1,229	569	12,609	
	1230		14,250	198,736	-2.0	32.2	1,262	581	12,644	
	1300		14,820	199,306	-2.1	32.2	1,221	591	12,944	
	1330		15,390	199,876	-2.2	32.1	1,249	597	11,960	
	1400		15,960	200,446	-2.2	32.0	1,254	605	11,989	
	1430		16,530	201,016	-2.2	31.8	1,267	610	12,163	X
	1500		17,100	201,586	-1.6	31.9	1,236	567	12,897	
	1530		17,670	202,156	-2.1	31.7	1,260	582	12,142	
	1600		18,240	202,726	-2.2	31.8	1,262	591	11,864	
	1630		18,810	203,296	-2.2	32.0	1,294	597	12,580	
	1700		19,380	203,866	-2.2	32.3	1,287	605	12,317	X
	1730		19,950	204,436	-2.2	31.8	1,318	612	12,830	

Table H-4. Summary of Deposition Testing Conducted from January 22 to February 17, 1996

Date	Time	Total Coal Fired on this Date (lb)	Cumulative Coal Usage on this Date (lb)	Cumulative Coal Usage since Boiler Cleaning (lb)	Boiler Outlet Pressure ("W.C.)	ID Fan Amp Draw	Convective Pass Probe Temperature (F)	Boiler Outlet Temperature (F)	Steam Production (lb/h)	Sootblows
1/17/96	Boiler cleaned									
1/22/96	1600	10,080	816	816	-0.7	30.0	906	489	11,296	
	1630		1,395	1,395	-0.6	30.5	972	524	12,589	
	1700		1,974	1,974	-0.6	30.3	1,016	541	12,133	
	1730		2,553	2,553	-0.7	30.4	1,045	557	12,323	
	1800		3,132	3,132	-0.7	30.1	1,072	570	11,971	
	1830		3,711	3,711	-0.6	30.2	1,106	585	12,128	
	1900		4,290	4,290	-0.7	29.9	1,121	596	11,505	
	1930		4,869	4,869	-1.0	31.9	1,181	646	11,077	
	2000		5,448	5,448	-0.7	30.8	950	518	12,888	X
	2030		6,027	6,027	-0.8	30.7	969	526	11,493	
	2230		8,343	8,343	-0.8	30.7	1,007	543	12,374	
	2300		8,922	8,922	-1.0	30.6	1,007	544	12,680	
	2330		9,501	9,501	-0.7	30.6	1,024	549	13,155	
1/23/96	0000	10,654	10,080	10,080	-0.7	30.8	1,043	558	12,133	
	0030		579	10,659	-0.7	30.7	1,048	562	12,618	
	0100		1,158	11,238	-0.8	30.4	1,069	569	12,061	
	0130		1,737	11,817	-0.9	30.4	1,083	574	12,990	
	0200		2,316	12,396	-0.8	30.7	1,099	583	13,144	
	0230		2,895	12,975	-1.0	30.5	1,107	589	13,028	
	0300		3,474	13,554	-0.8	30.4	1,114	593	12,421	
	0330		4,053	14,133	-0.9	30.4	1,126	599	13,362	
	0400		4,632	14,712	-0.9	30.6	1,139	601	13,317	X
	0430		5,211	15,291	-0.9	31.6	986	531	13,498	
	0500		5,790	15,870	-0.7	30.8	1,004	535	12,973	
	0530		6,369	16,449	-0.8	30.8	1,027	546	13,575	
	0600		6,948	17,028	-0.8	30.8	1,044	552	12,575	
	0630		7,527	17,607	-1.0	31.3	1,079	567	13,245	
	0700		8,106	18,186	-0.8	31.2	1,027	546	13,794	
	0730		8,685	18,765						
	0800		9,264	19,344						
	0830		9,843	19,923						
	0900		10,422	20,502						
	0912		10,654	20,734						
1/24/96		1,975		22,709						
2/7/96		1,315		24,024						
2/8/96		4,452		28,476						
2/12/96	0530	22,665	1,575	30,051	-0.8	31.4	971	551	12,100	
	0600		2,145	30,621	-0.9	31.6	993	561	12,700	
	0630		2,715	31,191	-0.9	31.7	1,008	566	11,800	
	0700		3,285	31,761	-0.9	31.8	1,015	575	12,500	
	0730		3,855	32,331	-1.1	31.7	1,039	583	13,200	
	0800		4,425	32,901	-1.1	31.6	1,041	590	12,200	
	0830		4,995	33,471	-1.0	31.1	1,055	588	11,838	
	0900		5,565	34,041	-1.1	31.2	1,065	596	13,115	
	0930		6,135	34,611	-0.9	31.1	1,083	605	13,416	X
	1000		6,705	35,181	-0.8	30.9	935	531	14,696	
	1030		7,275	35,751	-1.2	31.3	968	545	13,239	
	1100		7,845	36,321	-1.0	30.8	988	554	13,535	
	1130		8,415	36,891	-0.8	31.1	1,008	565	14,168	
	1200		8,985	37,461	-0.8	30.9	1,024	574	13,692	
	1230		9,555	38,031	-1.0	30.9	1,046	583	12,958	
	1300		10,125	38,601	-0.9	30.8	1,067	590	13,228	
	1330		10,695	39,171	-0.9	30.7	1,082	596	11,582	
	1400		11,265	39,741	-0.8	31.1	1,112	606	14,362	
	1430		11,835	40,311	-1.0	31.0	1,153	614	13,248	X
	1500		12,405	40,881	-0.9	30.8	1,003	543	14,148	
	1530		12,975	41,451	-0.9	31.3	1,035	556	11,678	
	1600		13,545	42,021	-0.8	31.0	1,048	565	13,000	
	1630		14,115	42,591	-0.9	30.8	1,057	572	13,154	
	1700		14,685	43,161	-0.9	30.8	1,079	580	12,920	
	1730		15,255	43,731	-1.0	30.7	1,095	589	11,609	
	1800		15,825	44,301	-1.0	30.9	1,109	599	12,455	

Table H-4. Summary of Deposition Testing Conducted from January 22 to February 17, 1996

	1830		16,395	44,871	-1.2	30.4	1,139	609	12,542	
	1900		16,965	45,441	-0.9	30.6	1,159	615	12,294	X
	1930		17,535	46,011	-1.1	31.0	1,021	552	13,376	
	2000		18,105	46,581	-0.9	31.4	1,051	560	11,982	
	2030		18,675	47,151	-1.0	31.6	1,075	574	13,582	
	2100		19,245	47,721	-0.8	31.2	1,087	579	13,665	
	2130		19,815	48,291	-1.0	31.7	1,104	588	12,612	
	2200		20,385	48,861	-0.8	31.0	1,117	595	13,492	
	2230		20,955	49,431	-1.0	30.9	1,133	602	13,294	
	2300		21,525	50,001	-0.9	31.0	1,145	611	12,644	
	2330		22,095	50,571	-1.0	30.8	1,150	617	13,143	
2/13/96	0000	25,605	22,665	51,141	-1.1	31.2	1,176	623	12,500	
	0030		570	51,711	-1.0	30.7	1,192	631	13,400	X
	0100		1,140	52,281	-0.8	31.1	1,037	544	13,400	
	0130		1,710	52,851	-1.0	30.9	1,060	562	13,600	
	0200		2,280	53,421	-1.1	31.0	1,076	572	13,200	
	0230		2,850	53,991	-1.0	30.8	1,092	582	12,900	
	0300		3,420	54,561	-1.0	31.0	1,132	592	13,300	
	0330		3,990	55,131	-1.0	31.0	1,133	603	13,100	
	0400		4,560	55,701	-0.8	31.0	1,158	610	13,100	
	0430		5,130	56,271	-1.0	31.2	1,168	616	13,800	
	0500		5,700	56,841	-1.0	31.2	1,179	621	13,300	
	0530		6,270	57,411	-1.1	31.3	1,196	627	12,800	X
	0600		6,840	57,981	-0.8	31.7	1,041	550	13,600	
	0630		7,410	58,551	-1.2	31.6	1,070	563	13,100	
	0700		7,980	59,121	-0.7	31.6	1,085	574	13,448	
	0730		8,550	59,691	-1.2	31.5	1,107	583	13,900	
	0800		9,120	60,261	-0.6	31.6	1,114	590	13,997	
	0830		9,630	60,771	-0.5	29.6	1,091	577	13,320	
	0900		10,080	61,221	-0.4	28.7	1,072	560	10,967	
	0930		10,530	61,671	-0.5	28.5	1,095	572	11,467	
	1000		10,980	62,121	-0.5	28.7	1,120	583	11,306	
	1030		11,430	62,571	-0.6	28.6	1,143	594	10,848	
	1100		11,880	63,021	-0.6	29.3	1,162	605	11,074	
	1130		12,330	63,471	-0.6	28.6	1,178	614	11,483	X
	1200		12,780	63,921	-0.4	29.0	985	525	10,675	
	1230		13,230	64,371	-0.4	28.9	1,019	536	11,394	
	1300		13,680	64,821	-0.5	29.0	1,038	543	10,761	
	1330		14,130	65,271	-0.5	28.7	1,064	555	11,031	
	1400		14,580	65,721	-0.5	28.6	1,075	561	10,451	
	1430		15,030	66,171	-0.5	28.7	1,105	570	10,894	
	1500		15,480	66,621	-0.6	28.5	1,111	579	10,771	
	1530		15,930	67,071	-0.5	28.6	1,126	586	10,610	
	1600		16,380	67,521	-0.6	28.8	1,160	599	10,198	
	1630		16,830	67,971	-0.6	28.6	1,164	605	10,393	X
	1700		17,415	68,556	-0.7	32.2	1,097	556	14,249	
	1730		18,000	69,141	-0.9	32.2	1,108	574	13,729	
	1800		18,585	69,726	-0.9	32.0	1,135	583	14,008	
	1830		19,170	70,311	-0.9	31.9	1,155	591	13,976	
	1900		19,755	70,896	-0.8	31.2	1,166	594	14,968	
	1930		20,340	71,481	-0.8	31.0	1,182	602	13,977	
	2000		20,925	72,066	-0.8	31.3	1,186	608	13,782	
	2030		21,510	72,651	-0.9	31.1	1,207	615	14,264	X
	2100		22,095	73,236	-0.9	31.2	1,099	570	14,394	
	2130		22,680	73,821	-0.8	31.4	1,120	582	13,289	
	2200		23,265	74,406	-0.8	31.1	1,134	592	13,666	
	2230		23,850	74,991	-0.9	31.4	1,147	597	13,381	
	2300		24,435	75,576	-0.9	31.1	1,166	606	12,990	
	2330		25,020	76,161	-0.9	30.9	1,169	611	13,190	
12/14/96	0000	25,920	25,605	76,746	-0.8	31.1	1,078	570	12,900	
	0030		585	77,331	-0.9	31.2	1,109	583	12,600	
	0100		1,170	77,916	-1.0	31.1	1,130	591	13,100	
	0130		1,755	78,501	-0.9	30.7	1,148	602	12,700	
	0200		2,340	79,086	-0.9	30.8	1,169	604	12,500	
	0230		2,925	79,671	-0.9	31.1	1,195	617	13,500	X
	0300		3,510	80,256	-0.8	31.0	1,067	555	13,900	
	0330		4,095	80,841	-0.8	31.0	1,084	574	12,800	
	0400		4,680	81,426	-1.0	31.1	1,112	585	12,800	
	0430		5,265	82,011	-0.9	31.1	1,133	542	12,800	
	0500		5,850	82,596	-1.0	31.0	1,144	601	12,600	
	0530		6,435	83,181	-0.9	30.9	1,167	608	12,400	
	0600		7,020	83,766	-0.8	31.0	1,189	616	12,300	X
	0630		7,605	84,351	-1.2	31.1	1,061	531	12,100	
	0700		8,190	84,936	-0.9	31.1	1,089	571	13,115	
	0730		8,775	85,521	-0.8	31.3	1,097	579	13,500	

Table H-4. Summary of Deposition Testing Conducted from January 22 to February 17, 1996

	0800		9,360	86,106	-1.0	31.1	1,111	589	12,743	
	0830		9,945	86,691	-0.9	31.1	1,129	594	13,047	
	0900		10,395	87,141	-0.6	27.8	1,048	549	10,337	
	0930		10,845	87,591	-0.6	28.0	1,069	560	10,433	
	1000		11,295	88,041	-0.7	28.4	1,089	570	10,822	
	1030		11,745	88,491	-0.6	28.4	1,101	578	10,764	
	1100		12,195	88,941	-0.6	28.5	1,103	588	10,089	
	1130		12,645	89,391	-0.6	28.2	1,120	596	10,012	
	1200		13,095	89,841	-0.6	28.1	1,181	601	9,586	X
	1230		13,545	90,291	-0.6	28.5	993	529	10,823	
	1300		13,995	90,741	-0.6	28.2	984	536	9,604	
	1330		14,445	91,191	-0.7	28.1	996	545	10,526	
	1400		14,895	91,641	-0.7	28.0	1,017	551	9,439	
	1430		15,345	92,091	-0.7	28.3	1,067	556	10,567	
	1500		15,795	92,541	-0.7	28.2	1,064	565	9,587	
	1530		16,245	92,991	-0.5	28.4	1,088	574	10,300	
	1600		16,695	93,441	-0.6	28.3	1,107	579	9,674	
	1630		17,145	93,891	-0.7	28.5	1,122	586	9,952	X
	1700		17,730	94,476	-0.9	30.8	1,098	552	12,751	
	1730		18,315	95,061	-0.9	30.8	1,067	571	13,112	
	1800		18,900	95,646	-0.9	30.8	1,095	586	13,442	
	1830		19,485	96,231	-0.9	30.9	1,118	595	12,731	
	1900		20,070	96,816	-1.0	30.7	1,132	601	13,728	
	1930		20,655	97,401	-1.0	30.6	1,148	610	13,428	X
	2000		21,240	97,986	-0.9	30.8	1,059	569	13,439	
	2030		21,825	98,571	-0.9	30.6	1,088	581	12,785	
	2100		22,410	99,156	-0.8	30.4	1,144	591	12,915	
	2130		22,995	99,741	-0.9	30.3	1,135	600	13,013	
	2200		23,580	100,326	-0.9	30.6	1,137	610	12,847	X
	2230		24,165	100,911	-0.8	30.2	1,053	561	13,190	
	2300		24,750	101,496	-0.9	30.3	1,075	577	12,737	
	2330		25,335	102,081	-0.9	30.4	1,098	587	13,445	
2/15/96	0000	24,615	25,920	102,666	-1.0	30.2	1,117	596	13,100	
	0030		585	103,251	-1.0	30.6	1,143	603	13,200	X
	0100		1,170	103,836	-1.2	30.7	1,027	530	12,300	
	0130		1,755	104,421	-1.0	31.0	1,059	570	13,300	
	0200		2,340	105,006	-1.0	30.5	1,083	581	13,000	
	0230		2,925	105,591	-1.0	30.7	1,106	591	13,100	
	0300		3,510	106,176	-1.0	30.8	1,125	599	13,300	X
	0330		4,095	106,761	-0.8	30.4	1,038	539	13,700	
	0400		4,680	107,346	-1.0	30.8	1,063	571	12,700	
	0430		5,265	107,931	-0.9	30.7	1,088	581	13,300	
	0500		5,850	108,516	-1.0	30.6	1,112	593	13,300	
	0530		6,435	109,101	-1.0	30.5	1,133	600	12,900	
	0600		7,020	109,686	-1.0	30.5	1,154	608	12,500	X
	0630		7,605	110,271	-1.0	30.6	1,035	540	13,900	
	0700		8,190	110,856	-0.6	30.8	1,066	572	13,500	
	0730		8,775	111,441	-1.0	30.6	1,085	584	12,600	
	0800		9,360	112,026	-0.9	30.8	1,106	595	12,810	
	0830		9,810	112,476	-0.9	29.1	1,047	589	10,215	
	0900		10,260	112,926	-0.8	29.3	1,061	583	10,210	
	0930		10,710	113,376	-0.8	29.4	1,097	596	11,171	
	1000		11,160	113,826	-0.9	29.9	1,098	596	11,112	
	1030		11,610	114,276	-1.0	30.0	1,121	603	12,822	
	1100		12,060	114,726	-0.9	30.6	1,158	609	12,999	
	1130		12,510	115,176	1.0	31.2	1,016	527	11,737	X
	1200		12,960	115,626	-1.0	31.1	1,022	572	13,007	
	1230		13,410	116,076	-0.8	30.5	1,058	573	12,467	
	1300		13,860	116,526	-1.0	30.4	1,054	578	11,133	
	1330		14,310	116,976	-1.0	30.6	1,039	581	10,985	
	1400		14,760	117,426	-1.0	30.0	1,041	589	11,495	
	1430		15,210	117,876	-1.0	29.8	1,054	584	10,825	
	1500		15,660	118,326	-1.0	29.9	1,072	587	10,660	
	1530		16,110	118,776	-1.0	29.6	1,081	592	10,781	
	1600		16,560	119,226	-1.0	29.5	1,064	592	10,186	
	1630		17,010	119,676	-0.9	29.8	1,091	600	10,431	
	1700		17,595	120,261	-1.0	30.8	1,046	563	13,572	X
	1730		18,180	120,846	-1.1	30.9	1,045	578	13,494	
	1800		18,765	121,431	-1.0	30.6	1,065	586	13,283	
	1830		19,350	122,016	-1.0	30.5	1,090	596	13,287	
	1900		19,935	122,601	-1.0	30.2	1,108	606	12,982	
	1930		20,520	123,186	-1.0	30.5	1,127	514	13,190	X
	2000		21,105	123,771	-1.0	30.5	1,019	574	12,822	
	2030		21,690	124,356	-1.0	30.8	1,048	584	13,474	
	2100		22,275	124,941	-1.0	30.6	1,068	595	13,378	

Table H-4. Summary of Deposition Testing Conducted from January 22 to February 17, 1996

	2130		22,860	125,526	-1.0	30.7	1,085	504	13,352	
	2200		23,445	126,111	-1.1	30.6	1,114	612	12,784	X
	2230		24,030	126,696	-1.1	30.6	1,006	566	13,370	
	2300		24,615	127,281						
2/16/96	0430	23,915	1,100	128,381	-1.0	31.2	1,000	571	12,700	
	0500		1,685	128,966	-1.0	31.0	1,017	583	12,300	
	0530		2,270	129,551	-1.1	31.0	1,053	588	12,300	
	0600		2,855	130,136	-1.2	30.8	1,050	597	12,700	X
	0630		3,440	130,721	-1.4	30.9	961	530	16,500	
	0700		4,025	131,306	-1.0	30.8	988	559	13,000	
	0730		4,610	131,891	-1.0	30.8	1,001	567	12,500	
	0800		5,195	132,476	-1.0	30.7	1,001	577	13,315	
	0830		5,780	133,061	-1.1	30.7	1,021	581	12,603	
	0900		6,365	133,646	-0.7	28.9	961	563	10,222	
	0930		6,950	134,231	-0.7	28.7	970	563	9,836	
	1000		7,535	134,816	-0.8	28.4	1,002	569	10,092	
	1030		8,120	135,401	-0.7	28.9	1,017	572	11,022	
	1100		8,705	135,986	-0.8	28.6	1,068	577	10,115	
	1130		9,290	136,571	-0.8	28.7	1,072	582	10,837	
	1200		9,875	137,156	-0.9	28.3	1,088	587	10,433	
	1230		10,460	137,741	-0.8	28.8	1,102	593	10,239	
	1300		11,045	138,326	-1.0	28.4	1,120	598	9,935	X
	1330		11,630	138,911	-0.9	28.6	957	530	10,155	
	1400		12,215	139,496	-0.8	28.9	986	536	9,838	
	1430		12,800	140,081	-0.9	29.0	1,000	546	10,175	
	1500		13,385	140,666	-0.9	28.9	1,022	552	10,349	
	1530		13,970	141,251	-0.9	28.6	1,032	559	9,548	
	1600		14,555	141,836	-1.0	29.0	1,061	565	10,056	
	1630		15,140	142,421	-1.0	28.9	1,079	567	9,912	
	1700		15,725	143,006	-1.2	29.5	1,150	588	11,689	
	1730		16,310	143,591	-1.0	29.4	1,155	590	11,005	
	1800		16,895	144,176	-1.3	30.3	1,066	555	13,434	
	1830		17,480	144,761	-1.3	31.3	1,110	574	13,025	
	1900		18,065	145,346	-1.5	31.0	1,097	591	13,576	
	1930		18,650	145,931	-1.5	30.7	1,116	602	13,124	X
	2000		19,235	146,516	-1.4	31.0	1,029	560	13,397	
	2030		19,820	147,101	-1.4	30.8	1,054	575	13,457	
	2100		20,405	147,686	-1.4	30.6	1,077	589	13,996	
	2130		20,990	148,271	-1.4	30.7	1,105	600	12,424	X
	2200		21,575	148,856	-1.3	31.0	1,058	563	13,109	
	2230		22,160	149,441	-1.4	30.6	1,084	583	13,437	
	2300		22,745	150,026	-1.5	30.8	1,101	593	13,279	
	2330		23,330	150,611	-1.3	31.0	1,103	602	13,434	X
2/17/96	0000	22,470	23,915	151,196	-1.2	30.8	1,062	570	12,700	
	0030		585	151,781	-1.4	30.7	1,092	586	13,300	
	0100		1,170	152,366	-1.4	30.9	1,119	597	13,300	X
	0130		1,755	152,951	-1.5	31.1	1,039	536	12,400	
	0200		2,340	153,536	-1.3	30.6	1,079	571	13,300	
	0230		2,925	154,121	-1.4	30.7	1,118	587	12,600	
	0300		3,510	154,706	-1.4	30.8	1,155	597	13,200	X
	0330		4,095	155,291	-1.5	31.4	1,073	530	12,300	
	0400		4,680	155,876	-1.5	31.2	1,098	566	14,100	
	0430		5,265	156,461	-1.5	30.6	1,123	580	12,600	
	0500		5,850	157,046	-1.5	30.1	1,138	592	13,600	
	0530		6,435	157,631	-1.5	30.7	1,074	540	13,800	X
	0600		7,020	158,216	-1.6	30.7	1,105	570	12,900	
	0630		7,605	158,801	-1.5	30.6	1,137	582	13,200	
	0700		8,190	159,386	-1.5	30.4	1,178	590	12,700	X
	0730		8,775	159,971	-1.7	30.6	1,089	523	12,300	
	0800		9,270	160,466	-1.1	28.1	1,023	537	10,100	
	0830		9,720	160,916	-1.0	28.1	1,042	543	10,500	
	0900		10,170	161,366	-0.8	28.4	1,061	550	10,100	
	0930		10,620	161,816	-1.1	28.6	1,084	560	10,500	
	1000		11,070	162,266	-1.2	29.1	1,100	574	10,800	
	1030		11,520	162,716	-1.3	29.2	1,119	580	10,000	
	1100		11,970	163,166	-1.3	29.3	1,156	590	11,700	
	1130		12,420	163,616	-1.5	29.9	1,165	605	11,400	X
	1200		12,870	164,066	-1.6	30.9	1,043	552	11,100	
	1230		13,320	164,516	-1.6	30.0	1,058	560	11,300	
	1300		13,770	164,966	-1.6	30.1	1,088	580	12,700	
	1330		14,220	165,416	-1.6	30.2	1,126	593	12,900	
	1400		14,670	165,866	-1.7	30.0	1,136	601	11,800	X
	1430		15,120	166,316	-1.8	30.7	1,068	560	12,900	
	1500		15,570	166,766	-1.7	30.8	1,081	565	11,000	
	1530		16,020	167,216	-1.8	30.3	1,115	577	12,300	

Table H-4. Summary of Deposition Testing Conducted from January 22 to February 17, 1996

	1600		16,470	167,666	-1.8	30.6	1,092	575	10,700	
	1630		16,920	168,116	-1.8	30.2	1,099	575	10,300	
	1700		17,370	168,566	-1.7	30.2	1,142	582	11,300	
	1730		17,820	169,016	-1.7	29.6	1,114	573	9,800	
	1800		18,270	169,466	-1.7	28.9	1,128	574	10,300	
	1830		18,720	169,916	-1.7	28.7	1,120	575	10,200	
	1900		19,170	170,366	-1.8	28.9	1,129	578	9,500	
	1930		19,620	170,816	-1.8	29.0	1,120	581	9,400	
	2000		20,070	171,266	-1.9	29.0	1,143	585	9,700	
	2030		20,520	171,716	-1.9	28.9	1,119	587	9,800	X
	2100		20,970	172,166	-1.8	28.8	1,012	531	9,700	
	2130		21,420	172,616	-1.9	28.8	1,031	541	9,600	
	2200		21,870	173,066	-1.9	28.7	1,042	547	10,100	
	2230		22,320	173,516	-2.0	29.1	1,079	549	9,600	
	2240		22,470	173,666						
2/18/95	Boiler cleaned									