Appendix 5.0-4

NEW YORK STATE ELECTRIC AND GAS CORPORATION
MILLIKEN STATION, UNIT #1, LUDLOWVILLE, NEW YORK
MICRONIZED FUEL AND REBURN TEST PROGRAM

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MILLIKEN STATION, UNIT #1

LUDLOWVILLE, NEW YORK

MICRONIZED FUEL AND REBURN TEST PROGRAM

REPORT NO. 97-08

ABB C-E SERVICES, INC.
PERFORMANCE SERVICES

ABB

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ABB C-E SERVICES, INC.

MICRONIZED FUEL AND REBURN TEST PROGRAM
AT
NEW YORK STATE ELECTRIC AND GAS CORPORATION
MILLIKEN STATION
UNIT #1

LUDLOWVILLE, NEW YORK
ORIGINAL CE CONTRACT No. 7452

REPORT No. 97-08

SUBMITTED

BY

PERFORMANCE SERVICES

MAY 19, 1997

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INTRODUCTION

This report presents the results of the Micronized Fuel Reburn Test Program conducted at New York State Electric and Gas Corp., Milliken Station, Unit #1. The test program consisted of the acquisition of emissions and plant operating board data. Thirty-five (35) tests were performed to meet the objectives of this test program. The information in this report is to be submitted to New York State Electric and Gas Corp. for inclusion in a proposal for subsequent submittal to the United States Department of Energy (U. S. DOE), clean coal technology phase IV program.

UNIT DESCRIPTION

New York State Electric and Gas Corporation, Milliken Station, Unit #1 is a Combustion Engineering controlled circulation, plain tube furnace. The unit was originally designed to fire eastern bituminous coal through four (4) No. 613 Raymond bowl mills. This unit has been modified with four (4) DB Riley, Inc. MPS 150 mills, equipped with planetary reducers, hydro-pneumatic roller loading, and hydraulically driven dynamic classifiers (type SLS). These mills were originally guaranteed to produce 18.4 TON/HR of pulverized coal with a minimum fineness of 87% through a 200 mesh screen and 98% through a 100 mesh screen while grinding eastern bituminous coal. The unit was designed for a maximum continuous rating (MCR) of 900,000 LB/HR main steam flow at predicted superheater outlet conditions of 1,005°F and 1,900 PSIG. At this MCR rating, a reheat inlet flow of 811,000 LB/HR is heated to a predicted reheat outlet temperature of 1005°F. Reheat outlet temperature is controlled by fuel nozzle tilt, and superheat temperature is controlled by desuperheating spray. Furnace designations are from right to left.

This unit's firing system was modified with the installation of a Level III, Low NO_x Concentric Firing System. This modification included the addition of closed coupled overfire air (CCOFA) and separated overfire air (SOFA) systems.

Original contract data and unit side elevation sheets are presented on Sheets A1 and A2.

TEST OBJECTIVE

The objective of this test program was to assess the achievable level of NO_x reduction with the existing firing system using Micronized Fuel Reburn. The reburn fuel was introduced through the top fuel elevation (Mill 1A1).

DISCUSSION

During the period from March 12 through March 26, 1997, ABB C-E Services (ABB CES) performed thirty-five (35) tests for New York State Electric and Gas Corp.

TEST #1, FULL LOAD

Test #1 was performed as a baseline comparison to Test # 7 as referenced in ABB C-E Services Report, New York Electric & Gas Company, Miliken Station, Lansing, New York, Unit #1, Contract #72292, LNCFS III - Tuning Report, April 1994, prepared by Jeffrey M. Zak.

Steam flow for this test was 1,013,000 LB/HR (113% MCR) with fuel nozzle tilts and windbox to furnace ΔP set at -2.5 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 1%, 50%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 50% and 1% open, respectively. The Auxiliary air dampers were set at 20%, 19%, and 19%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 19%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 86%, 87%, 60%, and 60% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, 1A3, 1B4 averaged 13.4 TON/HR and 96 RPM. ABB measured O_2 content at the airheater gas inlet was 4.8% with NO_x and CO concentrations of 232 PPM (0.32 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.9 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 4.5%.

TEST #2, FULL LOAD

Test #2 was performed as a baseline comparison to Test # 8 as referenced in the ABB C-E Services, LNCFS III - Tuning Report, April 1994.

Steam flow for this test was 1,026,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP set at -3.4 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 1%, 50%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 50% and 1% open, respectively. The Auxiliary air dampers were set at 19%, 18%, and 18%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 18%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 85%, 88%, 60%, and 60% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, 1A3, 1B4 averaged 13.4 TON/HR and 96 RPM. ABB measured O_2 content at the airheater gas inlet was 4.7% with NO_x and CO concentrations of 235 PPM (0.32 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.9 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.8%.

TEST #3, FULL LOAD

Steam flow for Test #3 was 1,037,000 LB/HR (115% MCR) with fuel nozzle tilts and windbox to furnace ΔP set at -0.3 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 25%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 10% and 1% open, respectively. The Auxiliary air dampers were set at 8%, 37%, and 37%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 37%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 59%, 98%, 100%, and 98% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, 1A3, 1B4 averaged 13.4 TON/HR and 96 RPM. ABB measured O_2 content at the airheater gas inlet was 4.4% with NO_x and CO concentrations of 274 PPM (0.38 LB/MBTU) and 0 PPM, respectively. CO_2 measured

14.2 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 8.4%.

TEST #3B, FULL LOAD

Test #3B was performed at the same conditions as Test #3 with the exception that the middle SOFA damper was adjusted to 50% open as compared to 25% open as in Test #3, and the upper CCOFA damper was opened to 35% open, as compared to 10% as in Test #3.

Actual steam flow for this test was 1,018,000 LB/HR (113% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.3 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 25%, and 25%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 25%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 59%, 99%, 100%, and 98% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, A3, 1B4 averaged 13.4 TON/HR and 96 RPM. ABB measured O_2 content at the airheater gas inlet was 4.4% with NO_x and CO concentrations of 229 PPM (0.31 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.2 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 4.8%.

TEST #4, FULL LOAD

Test #4 was performed at the same conditions as Test #3B with a lower O_2 content setting.

Actual steam flow for this test was 1,034,000 LB/HR (115% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0.1 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper

and lower CCOFA dampers were set at 35% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 8%, and 7%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 8%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, A3, 1B4 averaged 13.6 TON/HR and 97 RPM. ABB measured O_2 at the airheater gas inlet was 3.7% with NO_x and CO concentrations of 189 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 15.0 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 6.5%.

TEST #5, FULL LOAD

Test #5 was performed at the same conditions as Test #3B with a higher O_2 setting.

Actual steam flow for this test was 1,010,000 LB/HR (112% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0.1 degrees and 4.1" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 36% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 29%, and 29%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 29%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, 1A3, 1B4 averaged 13.6 TON/HR and 97 RPM. ABB measured O_2 content at the airheater gas inlet was 5.2% with NO_x and CO concentrations of 289 PPM (0.39 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.6 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 4.1%.

TEST #6, FULL LOAD

Steam flow for Test #6 was 1,022,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0 degrees and 3.6" H_2O, respectively. The upper, middle and

lower SOFA dampers were set at 9%, 50%, and 99% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. All Auxiliary air dampers were set at 31%, open for elevation levels 1, 2, and 3, with the bottom auxiliary air damper opened to 30%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 100%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1 was 13.6 TON/HR and 115 RPM, with mills 1B2, 1A3, 1B4 averaging 13.8 TON/HR and 96 RPM. ABB measured O_2 content at the airheater gas inlet was 5.1% with NO_x and CO concentrations of 282 PPM (0.38 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.5 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 2.7%.

TEST #6B, FULL LOAD

Test #6B was performed at the same conditions as Test #6 with a lower O_2 concentrations of 4.6% for comparison. This test was run for fifteen minutes with no economizer outlet flyash sample taken.

Steam flow for this was 1,029,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0 degrees and 3.5" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 9%, 50%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. The Auxiliary air dampers were set at 26%, 26%, and 26%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 26%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 100%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1 was 13.6 TON/HR and 116 RPM, with mills 1B2, 1A3, 1B4 averaging 13.8 TON/HR and 97 RPM. ABB measured O_2 content at the airheater gas inlet was 4.6% with NO_x and CO concentrations of 251 PPM (0.34 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.8 percent.

TEST #7, FULL LOAD

Test #7 was a reburn simulation test with the upper mill (1A1) set at a classifier speed of 115 RPM.

Steam flow for this test was 1,011,000 LB/HR (112% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0.1 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 36% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 16%, and 16%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 16%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 99% open, respectively. Mill loading and classifier speed for mills 1A1 was 13.6 TON/HR and 115 RPM, with mills 1B2, 1A3, 1B4 averaging 13.4 TON/HR and 97 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 223 PPM (0.30 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.2 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.7%.

TEST #8, FULL LOAD

Test #8 was a repeat of Test #5 at similar conditions with a higher O_2 and mill 1A1 set to a classifier speed of 115 RPM.

Steam flow for this test was 1,073,000 LB/HR (119% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.1 degrees and 3.4" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 51%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. All Auxiliary air dampers were set at 38% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1 was 13.6 TON/HR and 115 RPM, with mills 1B2, 1A3, 1B4 averaging 13.4 TON/HR

and 97 RPM. ABB measured O_2 content at the airheater gas inlet was 5.1% with NO_x and CO concentrations of 272 PPM (0.37 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.5 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.6%.

TEST #9, FULL LOAD

Test #9 was a repeat of Test #4 at similar conditions, with a lower O_2 and mill 1A1 set to a classifier speed of 115 RPM.

Steam flow for this test was 1,002,000 LB/HR (111% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.1 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 36% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 5%, and 5%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 6%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 99% open, respectively. Mill loading and classifier speed for mills 1A1 was 13.6 TON/HR and 115 RPM, with mills 1B2, 1A3, 1B4 averaging 13.3 TON/HR and 97 RPM. ABB measured O_2 content at the airheater gas inlet was 3.7% with NO_x and CO concentrations of 184 PPM (0.25 LB/MBTU) and 0 PPM, respectively. CO_2 measured 15.0 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.8%.

TEST #10, FULL LOAD

Steam flow for Test #10 was 1,026,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0.1 degrees and 3.7" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. The Auxiliary air dampers were set at 19%, 19%, and 19%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 20%. Fuel air dampers 1A1,

1B2, 1A3, and 1B4, were set at 60%, 100%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1 was 13.6 TON/HR and 115 RPM, with mills 1B2, 1A3, 1B4 averaging 13.8 TON/HR and 96 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 225 PPM (0.31 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.0 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.9%.

TEST #11, FULL LOAD

Test #11 was a repeat of Test #6B at similar conditions, with SOFA tilts adjusted to +15.7 degrees as compared to test #6B (SOFA tilts at 0.6 degrees).

Steam flow was 1,028,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0.1 degrees and 3.6" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 9%, 50%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. All Auxiliary air dampers were set at 26% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1 was 13.6 TON/HR and 116 RPM, with mills 1B2, 1A3, 1B4 averaging 13.8 TON/HR and 97 RPM. ABB measured O_2 content at the airheater gas inlet was 4.7% with NO_x and CO concentrations of 238 PPM (0.32 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.7 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.1%.

TEST #12, FULL LOAD

Steam flow for Test #12 was 1,025,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.4 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 36% and 9% open, respectively. The Auxiliary air dampers were set at 8%, 15%, and 15%, open for elevation levels 1, 2, and 3,

respectively, with the bottom auxiliary air damper opened to 16%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 99% open, respectively. Mill loading and classifier speed for mills 1A1 was 12.1 TON/HR and 98 RPM, with mills 1B2, 1A3, 1B4 averaging 14.0 TON/HR and 98 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 209 PPM (0.28 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.9 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 4.1%.

TEST #13B, FULL LOAD

Test #13B was performed with the mill classifiers set at their maximum speed, just below the point of mill rumble.

Steam flow was 1,013,000 LB/HR (113% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.2 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 51%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. All Auxiliary air dampers were set at 12% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 99%, and 99% open, respectively. Mill loading and classifier speed for mills 1A1 was 12.0 TON/HR and 119 RPM, with mills 1B2, 1A3, 1B4 averaging 14.4 TON/HR and 110 RPM. ABB measured O_2 content at the airheater gas inlet was 4.4% with NO_x and CO concentrations of 191 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.1 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.2%.

TEST #14, FULL LOAD

Test #14 was performed with the mill classifiers set at their maximum speed, just below the point of mill rumble and at similar conditions as seen in Test #7.

Steam flow was 1,026,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 51%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 36% and 1% open, respectively. The Auxiliary air dampers were set at 7%, 18%, and 17%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 18%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 100%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1 1B2, 1A3 and 1B4 was 13.5 TON/HR / 110 RPM, 13.5 TON/HR / 101 RPM, 13.4 TON/HR / 108 RPM, and 13.6 TON/HR / 114 RPM, respectively. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 205 PPM (0.28 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.9 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 6.7%.

TEST #15, FULL LOAD

Steam flow for Test #15 was 1,019,000 LB/HR (113% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.2 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 25%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. All Auxiliary air dampers were set at 11% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 79%, 81%, and 81% open, respectively. Mill loading and classifier speed for mills 1A1 1B2, 1A3, 1B4 averaged 13.5 TON/HR and 98 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 210 PPM (0.29 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.0 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 4.0%.

TEST #16, FULL LOAD

Test #16 was performed at the similar test conditions as Test #15 with more aggressive staging of the SOFA dampers.

Steam flow for Test #16 was 1,023,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.2 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 1%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. The Auxiliary air dampers were set at 5%, 5%, and 4%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 2%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 79%, 81%, and 81% open, respectively. Mill loading and classifier speed for mills 1A1 1B2, 1A3, 1B4 averaged 13.5 TON/HR and 97 RPM. ABB measured O_2 content at the airheater gas inlet was 4.6% with NO_x and CO concentrations of 188 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.9 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 4.1%.

TEST #17, FULL LOAD

Steam flow for Test #17 was 1,030,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.5 degrees and 3.8" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 24%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. All Auxiliary air dampers were set at 11% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 80%, 79%, and 79% open, respectively. Mill loading and classifier speed for mills 1A1 1B2, 1A3, 1B4 averaged 13.8 TON/HR and 105 RPM. ABB measured O_2 content at the airheater gas inlet was 4.4% with NO_x and CO concentrations of 208 PPM (0.28 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.3 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 3.5%.

TEST #18, FULL LOAD

Steam flow for Test #18 was 1,012,000 LB/HR (112% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.2 degrees and 3.8" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 1%, and 100% open, respectively. Upper

and lower CCOFA dampers were set at 100% and 1% open, respectively. The Auxiliary air dampers were set at 3%, 3%, and 2%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 3%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 79%, 81%, and 81% open, respectively. Mill loading and classifier speed for mills 1A1 was 12.5 TON/HR / 125 RPM, 1B2 was 14.0 TON/HR / 130 RPM, 1A3 was 14.5 TON/HR / 98 RPM, and 1B4 was 14.4 TON/HR and 119 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 179 PPM (0.24 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.9 percent. ABB analysis of the economizer outlet flyash showed a carbon content of 2.7%.

TEST #18B, FULL LOAD

Test #18B was performed at the similar test conditions as Test #17 with changes made to the SOFA dampers.

Steam flow for Test #18B was 1,012,000 LB/HR (112% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.5 degrees and 3.8" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 1%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. The Auxiliary air dampers were set at 6%, 5%, and 5%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 6%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 80%, 80%, and 80% open, respectively. Mill loading and classifier speed for mills 1A1 1B2, 1A3, 1B4 averaged 13.7 TON/HR and 105 RPM. ABB measured O_2 content at the airheater gas inlet was 4.6% with NO_x and CO concentrations of 192 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.1 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 2.5%.

TEST #19, FULL LOAD

Test #19 was performed as a micronized reburn simulation test.

Steam flow for this test was 1,012,000 LB/HR (112% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.4 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 15%, and 15%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 15%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 59%, 100%, 100%, and 99% open, respectively. Mill loading and classifier speed for mills 1A1 was 12.0 TON/HR and 98 RPM, with mills 1B2, 1A3, 1B4 averaging 13.9 TON/HR and 98 RPM. ABB measured O_2 content at the airheater gas inlet was 4.4% with NO_x and CO concentrations of 202 PPM (0.27 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.2 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 5.3%.

TEST #20, FULL LOAD

Test #20 was performed at similar conditions as Test #19 with the major difference being mill 1A1 having a loading and classifier speed to 10 TON/HR and 128 RPM.

Steam flow for this test was 1,022,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0 degrees and 4.1" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 15%, and 15%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 15%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 100%, 99%, and 99% open, respectively. Mill loading and classifier speed for mills 1A1 was 10 TON/HR and 128 RPM, with mills 1B2, 1A3, 1B4 averaging 14.5 TON/HR and 98 RPM. ABB measured O_2 content at the

airheater gas inlet was 4.5% with NO_x and CO concentrations of 201 PPM (0.27 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.1 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 4.3%.

TEST #21, FULL LOAD

Test #21 was performed at similar conditions as Test #19 with the major difference being mill 1A1 having mill loading and classifier speed lowered to 8.2 TON/HR and 127 RPM.

Steam flow for this test was 994,000 LB/HR (110% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.4 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 16%, and 16%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 16%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 59%, 99%, 99%, and 99% open, respectively. Mill loading and classifier speed for mills 1A1 was 8.2 TON/HR and 127 RPM, with mills 1B2, 1A3, 1B4 averaging 14.8 TON/HR and 99 RPM. ABB measured O_2 content at the airheater gas inlet was 4.6% with NO_x and CO concentrations of 199 PPM (0.27 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.0 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 4.1%.

TEST #22, FULL LOAD

Test #22 was performed at similar conditions as Test #1 with the major difference being, the upper mill (1A1) out of service.

Steam flow for this test was 1,024,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -1.7 degrees and 3.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 1%, 51%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 50% and 1% open, respectively. All Auxiliary air

dampers were set at 24% open for elevation levels 1, 2, and 3, with the bottom auxiliary air damper opened to 38%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 5%, 88%, 60%, and 60% open, respectively. Upper mill 1A1 was out of service with mill loading and classifier speed for mills 1B2, 1A3, 1B4 averaging 18.2 TON/HR and 105 RPM. ABB measured O_2 content at the airheater gas inlet was 4.6% with NO_x and CO concentrations of 187 PPM (0.26 LB/MBTU) and 23 PPM, respectively. CO_2 measured 14.0 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 5.8%.

TEST #23, FULL LOAD

Steam flow for Test #23 was 1,033,000 LB/HR (115% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.5 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 36% and 1% open, respectively. The Auxiliary air dampers were set at 3%, 13%, and 13%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 13%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 99%, 100%, and 100% open, respectively. Mill loading and classifier speed for mills 1A1 was 7.9 TON/HR and 133 RPM, with mills 1B2, 1A3, 1B4 averaging 15.6 TON/HR and 107 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 194 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.1 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 3.7%.

TEST #24, FULL LOAD

Test #24 was performed at similar conditions as Test #18B. For Test #24, the primary air flow was increased to 65.0 KPPH form 60.9 KPPH.

Steam flow for this test was 1,006,000 LB/HR (112% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.3 degrees and 3.9" H_2O, respectively. The upper, middle

and lower SOFA dampers were set at 99%, 1%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 0%, and 1%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 0%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 81%, 80%, and 81% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, 1A3, 1B4 averaged 13.3 TON/HR and 105 RPM. ABB measured O_2 content at the airheater gas inlet was 4.6% with NO_x and CO concentrations of 200 PPM (0.27 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.8 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 3.3%.

TEST #25, FULL LOAD

Test #25 was performed at similar conditions as Test #18B. For Test #25, the primary air flow was decreased to 55.3 KPPH form 60.9 KPPH.

Steam flow for this test was 1,1016,000 LB/HR (113% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.2 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 1%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. All Auxiliary air dampers were set at 5% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 81%, 80%, and 81% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, 1A3, 1B4 averaged 13.4 TON/HR and 105 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 188 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.8 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 4.0%.

TEST #26, FULL LOAD

For Test # 26 steam flow was 1,027,000 LB/HR (114% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.3 degrees and 4.1" H_2O, respectively. The upper, middle

and lower SOFA dampers were set at 99%, 50%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 36% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 22%, and 22%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 22%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 100%, 100%, and 100% open, respectively. Mill loading and classifier speed for mill 1A1 was 12.0 TON/HR and 85 RPM. Mills 1B2, 1A3, and 1B4 averaged 13.7 TON/HR and 96 RPM. ABB measured O_2 content at the airheater gas inlet was 4.4% with NO_x and CO concentrations of 223 PPM (0.30 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.7 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 6.7%.

TEST #27, FULL LOAD

For Test #27 steam flow was 1,019,000 LB/HR (113% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.3 degrees and 4.0" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 1%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. All Auxiliary air dampers were set at 4% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 81%, 81%, and 80% open, respectively. Mill loading and classifier speed for mills 1A1, 1B2, 1A3, 1B4 averaged 13.2 TON/HR and 95 RPM. ABB measured O_2 content at the airheater gas inlet was 4.5% with NO_x and CO concentrations of 193 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.7 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 4.8%.

TEST #28, FULL LOAD

Steam flow for Test #28 was 1,073,000 LB/HR (119% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.1 degrees and 3.4" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 51%, and 10% open, respectively. Upper and lower CCOFA dampers were set at 35% and 1% open, respectively. All Auxiliary air dampers were set at 38% open. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at

60%, 99%, 100%, and 100% open, respectively. Mill loading and classifier speed for mill 1A1 was 13.5 TON/HR and 115 RPM, and Mills 1B2, 1A3, 1B4 averaged 14.3 TON/HR and 105 RPM. ABB measured O_2 content at the airheater gas inlet was 4.8% with NO_x and CO concentrations of 265 PPM (0.36 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.6 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 5.3%.

TEST #29, 110 MW

Test #29 was performed a lower load of 110 MW with all four (4) mills in service.

For this test, steam flow was 813,000 LB/HR (90% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -0.2 degrees and 1.9" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 75%, 1%, and 76% open, respectively. Upper and lower CCOFA dampers were set at 75% and 1% open, respectively. The Auxiliary air dampers were set at 1%, 2%, and 2%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 2%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 60%, 80%, 80%, and 80% open, respectively. Mill loading and classifier speed for mill 1A1 was 8.0 TON/HR and 131 RPM. Mills 1B2, 1A3, and 1B4 averaged 11.8 TON/HR and 118 RPM. ABB measured O_2 content at the airheater gas inlet was 3.7% with NO_x and CO concentrations of 165 PPM (0.22 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.8 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 3.8%.

TEST #30, 75 MW

Test #30 was performed a lower load of 75 MW with the lower three mills (1B2, 1A3, and 1B4) in service.

For this test, steam flow was 559,000 LB/HR (62% MCR) with fuel nozzle tilts and windbox to furnace ΔP of 0.2 degrees and 1.5" H_2O, respectively. The upper, middle and

lower SOFA dampers were set at 1%, 51%, and 1% open, respectively. Upper and lower CCOFA dampers were set at 51% and 50% open, respectively. The Auxiliary air dampers were set at 1%, 7%, and 7%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 7%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 3%, 80%, 80%, and 80% open, respectively. Upper mill 1A1 was taken out of service and mills 1B2, 1A3, and 1B4 averaged 10.4 TON/HR and 120 RPM. ABB measured O_2 content at the airheater gas inlet was 5.5% with NO_x and CO concentrations of 210 PPM (0.29 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.2 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 3.0%.

TEST #31 FULL LOAD

For Test #31 the lower mill (1B4) was taken out of service.

Steam flow was 1,013,000 LB/HR (113% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -3.6 degrees and 3.8" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 100%, 100%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 100% and 36% open, respectively. The Auxiliary air dampers were set at 36%, 37%, and 37%, open for elevation levels 1, 2, and 3, respectively, with the bottom auxiliary air damper opened to 4%. Fuel air dampers 1A1, 1B2, 1A3, and 1B4, were set at 100%, 100%, 100%, and 4% open, respectively. Mill loading and classifier speed for mills 1A1 1B2, and 1A3, averaged 17.6 TON/HR and 103 RPM with the lower mill (1B4) out of service. ABB measured O_2 content at the airheater gas inlet was 4.7% with NO_x and CO concentrations of 241 PPM (0.33 LB/MBTU) and 0 PPM, respectively. CO_2 measured 13.9 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 3.5%.

TEST #32 FULL LOAD

For Test #32 the lower mill (1B4) was taken out of service.

Steam flow was 990,000 LB/HR (110% MCR) with fuel nozzle tilts and windbox to furnace ΔP of -3.6 degrees and 3.7" H_2O, respectively. The upper, middle and lower SOFA dampers were set at 99%, 1%, and 100% open, respectively. Upper and lower CCOFA dampers were set at 100% and 1% open, respectively. All Auxiliary air dampers were set at 24% open for elevation levels 1, 2, and 3, with the bottom auxiliary air damper opened to 4%. All fuel air dampers were set at 100% open. Mill loading and classifier speed for mills 1A1 1B2, 1A3, averaged 17.4 TON/HR and 103 RPM with the lower mill (1B4) out of service. ABB measured O_2 content at the airheater gas inlet was 4.4% with NO_x and CO concentrations of 191 PPM (0.26 LB/MBTU) and 0 PPM, respectively. CO_2 measured 14.0 percent. Economizer outlet flyash analysis performed by ABB resulted in a carbon content of 3.3%

TEST METHODS AND INSTRUMENTATION

TEST CALCULATIONS

NO_x Calculation

ABB NO_x emissions were calculated on a LB/MBTU basis utilizing the measured NO_x concentrations in PPM, measured oxygen level, along with the assigned EPA F factor of 9780. A summary of NO_x emissions is located on Sheets 1 and 7.

CO Calculation

CO emissions were calculated on a PPM basis corrected to 3.0% oxygen concentration. A summary of CO emissions is located on Sheets 1 and 7.

TEST INSTRUMENTATION

ABB Gas Analysis

ABB gas samples were continuously obtained from each of the two (2) air heater inlet ducts using a twelve (12) point sampling grid gas analysis probes in conjunction with a

multi-point sampler at each duct. The two (2), twelve (12) point composite samples were analyzed for O_2 and blended through flow meters into one (1) composite sample for analysis of NO_x, CO_2 and CO.

ABB Gas analysis was performed using the following continuous monitoring analyzers:

SPECIES	MANUFACTURER	TYPE	MEAS. AS
1. Oxygen	Teledyne	electrochemical	% O_2
2. Carbon Monoxide	Fuji	non-dispersive infrared	PPM CO
3. Carbon Dioxide	Fuji	non-dispersive infrared	% CO_2
4. Oxides of Nitrogen	Thermo-Electron	chemiluminescent	PPM NO_x

The gas analyzers were calibrated before each test day with traceable EPA Protocol 1 calibration gases. Calibration checks were performed at the beginning and end of all test days. Gas certifications are located on Sheets 18 through 22. Prior to testing, each air heater probe was leak checked for quality assurance purposes, with the resultant data presented on Sheet 17. All gas emissions data was continuously recorded on multi-channel chart recorders and sent to the Automated Data Acquisition and Reduction System for simultaneous data evaluation.

SAMPLE COLLECTION

Flyash (Particulate) Samples

Flyash samples were obtained using EPA Method #17 isokinetic sampling techniques to determine the carbon content of the flyash. The samples were extracted from the economizer outlet duct. The results of the isokinetic variation calculations indicate that all the samples were extracted within the standard limits of 100% ±10% and are presented on Sheets 8 through 14. The samples were delivered to ABB Power Plant Laboratories for analysis of carbon content. Carbon content was determined using a LECO CHN-600 analyzer, not by an LOI method. LOI, or loss on ignition, is subject to errors and therefore

not a reliable measure of carbon. The LOI analysis is an empirical method that employs the weighing of a sample before and after an ignition temperature of approximately 1400°F. In this process, several weight changes occur: hydrates are driven off, reduced iron oxide is brought to its highest oxidation state (Fe_2O_3), decomposition reactions as well as combining reactions can occur and, of course, any residual carbon is burned. There are gains and losses that cannot be detailed and the LOI value has little real meaning. The use of instrumental methods to determine elemental carbon, hydrogen, and nitrogen in coal is the subject of ASTM Method D-5373. This method also provides a framework for developing instrument and calibration protocols for determination of carbon in ash. These protocols are instrument specific and as previously noted ABB C-E Power Plant Laboratories (ABB C-E PPL) uses the LECO CHN-600 analyzer. The methods implemented include:

1. Type and amount of standard reference material used for calibration.
2. Homogeneity and moisture content of sample.
3. Instrument parameters including:
   a. Furnace temperature(s)
   b. Oxygen flow profiles
   c. Linearization range
   d. Sample weight range

Sufficient numbers of analysis of each sample are required to determine the standard deviation for each reported result. Multiple replicate analysis of each sample, typically three (3) analyses for well mixed homogeneous samples, are interspersed with additional runs of validation standards (other than the calibration standard). These standards should be of similar chemical and physical composition to the unknown sample. ABB C-E PPL knows of no such industry standard reference material for flyash and bottom ash samples. The use of mixed standards introduces a degree of uncertainty associated with sample homogeneity. According to a specification of ASTM D-5373, ABB C-E PPL uses

pure chemical compound, EDTA, to standardize the LECO CHN-600 analyzer. The instrument is calibrated to EDTA and verified with at least one standard coal sample before analysis of the unknown sample. Following the analysis the instrument is verified using EDTA. Results of the analysis are presented on Sheets 15 and 16.

Results of loss on ignition testing performed by NYSEG are presented on Sheets 1 through 7 along with the ABB Power Plant Laboratories analysis of carbon content.

DATA COLLECTION

Automated Data Acquisition and Reduction System (ADARS)

The Automated Data Acquisition and Reduction System consisted of the following:

1. Thermocouples and gas analyzer instrumentation which supplied the analog inputs.

2. The Fluke data logging system, which scanned and converted the analog signals into digital output.

3. A personal computer which received the data from the data logging system, performed engineering calculations, and created calculated data files on disk media.

The data logging hardware consisted of a John Fluke data logger and extender chassis. This microprocessor-based data acquisition system scanned the analog input signals from the test instrumentation. The digital values generated by the data logger were sent to the personal computer via an RS 232 serial port connection.

The computer system consisted of a personal computer and printer. Software developed by ABB CES handled all hardware interfacing, data transferals, and data manipulations.

The ADARS system was programmed to scan the signals on one (1) minute intervals for all steady state tests and transient tests.

The ADARS system provided the opportunity to perform on-line calculations as the data was received and stored for each data scan. Processed test data was viewed prior to each test to verify steady state operation.

At the completion of each test, automatically collected data was averaged by applying statistical analysis using Chauvenet's criterion to reject data points exceeding predetermined criteria. Statistical information on each point was computed and has been incorporated in all presented data. All steady state parameters that deviate from the allowable criteria were identified, rejected, and filed prior to the averaging process.

All raw, processed, and averaged data files were stored on the computer fixed disk. These fixed data disk files were backed up at the conclusion of each day on two (2) sets of floppy disks and were stored in separate locations. ABB C-E will maintain the data on 2 sets of customer proprietary floppy disks in separate locations for a minimum of five (5) years.

Plant Operating Data

Existing applicable plant instrumentation data along with plant control room data was recorded to document the operating conditions, during the test program. This data is presented on Sheets A3 through A368.

Field Notes are presented on Sheets A369 through 377.

ABB C-E SERVICES, INC. PERSONNEL

Barry Walsh	Lead Test Engineer
Bruce Lucas	Lead Test Technician
Steve Desroches	Technical Service Engineer
Rich LaFlesh	Fuel Firing Systems Engineering

NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
ABB CE CONTRACT # 7452

ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS

TEST NUMBER		1	2	3	3B	4
DATE	1997	3/12	3/12	3/12	3/12	3/13
START TIME	HRS	0910	1100	1410	1600	0835
STOP TIME	HRS	1010	1200	1520	1700	0935
GENERATION	MW	139	142	142	142	140
STEAM FLOW	KLB/HR	1013	1026	1037	1018	1034
FUEL NOZZLE TILT	DEG	-2.5	-3.4	-0.3	-0.3	+0.1
WINDBOX TO FURN DP	"H_2O	3.9	3.9	4.0	3.9	4.0
FUEL FIRED		COAL				
MILLS IN SERVICE		1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4
– ABB GAS ANALYSIS, AIRHEATER GAS INLET –						
AIRHEATER INLET LEFT DUCT O_2	%	4.6	4.6	4.5	4.0	3.6
AIRHEATER INLET RIGHT DUCT O_2	%	4.8	4.9	4.4	4.7	3.8
AIRHEATER IN L/ R AVG. O_2	%	4.8	4.7	4.4	4.4	3.7
NO_x COMPOSITE	PPM	209	213	252	211	182
NO_x COMPOSITE CORR 3% O_2	PPM	232	235	274	229	189
NO_x COMPOSITE EPA F FACTOR	LB/MBTU	0.32	0.32	0.36	0.31	0.26
CO COMPOSITE	PPM	0	0	0	0	0
CO COMPOSITE CORR 3% O_2	PPM	0	0	0	0	0
CO COMPOSITE EPA F FACTOR	LB/MBTU	0.00	0.00	0.00	0.00	0.00
CO_2 COMPOSITE	%	13.9	13.9	14.2	14.2	15.0
– BOARD DATA –						
ECON. OUTLET PLANT O_2	%	3.3	3.2	3.5	3.2	2.7
SUPERHEAT OUTLET TEMP.	DEG F	996	998	994	1008	999
REHEAT OUTLET TEMP.	DEG F	1003	1002	997	1009	1002
SOFA TILT	DEG	+15.1	+0.1	+0.2	+0.2	+0.0
TOP SOFA DAMPER	% OPEN	1	1	99	99	99
MIDDLE SOFA DAMPER	% OPEN	50	50	25	50	50
BOTTOM SOFA DAMPER	% OPEN	100	100	10	10	10
TOP CCOFA DAMPER	% OPEN	50	50	10	35	35
BOTTOM CCOFA DAMPER	% OPEN	1	1	1	1	1
1A1 FA DAMPER	% OPEN	86	85	59	59	60
LEVEL 1 ST. AUX/CFS DAMPER	% OPEN	20	19	8	1	1
1B2 FA DAMPER	% OPEN	87	88	98	99	99
LEVEL 2 ST. AUX/CFS DAMPER	% OPEN	19	18	37	25	8
1A3 FA DAMPER	% OPEN	60	60	100	100	100
LEVEL 3 ST. AUX/CFS	% OPEN	19	18	37	25	7
1B4 FA DAMPER	% OPEN	60	60	98	98	100
BOTTOM AUX AIR DAMPER	% OPEN	19	18	37	25	8
– MILL DATA –						
1A1 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.4/97	13.4/97	13.4/97	13.5/98	13.6/98
1B2 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.4/94	13.4/94	13.4/94	13.4/94	13.5/97
1A3 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.4/97	13.4/97	13.5/97	13.5/97	13.6/98
1B4 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.4/97	13.4/97	13.4/97	13.4/97	13.6/97
PLANT LOI OF FLYASH	%	4.7	4.6	8.8	5.1	6.2
ABB UNBURNED CARBON IN FLYASH	%	4.5	3.8	8.4	4.8	6.5

NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
ABB CE CONTRACT # 7452

ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS

TEST NUMBER		5	6	6B	7	8
DATE	1997	3/13	3/17	3/17	3/13	3/13
START TIME	HRS	1030	1310	1510	1430	0620
STOP TIME	HRS	1130	1410	1530	1530	0920
GENERATION	MW	140	141	153	140	146
STEAM FLOW	KLB/HR	1010	1022	1029	1011	1073
FUEL NOZZLE TILT	DEG	0.1	0.1	0.0	0.1	-0.1
WINDBOX TO FURN DP	"H_2O	+4.1	+3.6	+3.5	+4.0	+3.4
FUEL FIRED		COAL				
MILLS IN SERVICE		1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4
-- ABB GAS ANALYSIS, AIRHEATER GAS INLET --						
AIRHEATER INLET LEFT DUCT O_2	%	5.1	5.3	4.8	4.3	4.8
AIRHEATER INLET RIGHT DUCT O_2	%	5.3	4.8	4.4	4.8	5.4
AIRHEATER IN L/ R AVG. O_2	%	5.2	5.1	4.6	4.5	5.1
NO_x COMPOSITE	PPM	253	249	229	204	240
NO_x COMPOSITE CORR 3% O_2	PPM	289	282	251	223	272
NO_x COMPOSITE EPA F FACTOR	LB/MBTU	0.39	0.38	0.34	0.30	0.37
CO COMPOSITE	PPM	0	0	0	0	0
CO COMPOSITE CORR 3% O_2	PPM	0	0	0	0	0
CO COMPOSITE EPA F FACTOR	LB/MBTU	0.00	0.00	0.00	0.00	0.00
CO_2 COMPOSITE	%	13.6	13.5	13.8	14.2	13.5
-- BOARD DATA --						
ECON. OUTLET PLANT O_2	%	4.0	3.4	2.8	3.2	3.5
SUPERHEAT OUTLET TEMP.	DEG F	1007	1009	1009	999	1005
REHEAT OUTLET TEMP.	DEG F	1006	1012	1013	1008	1009
SOFA TILT	DEG	+0.1	+0.6	+0.6	+0.1	+0.0
TOP SOFA DAMPER	% OPEN	99	9	9	99	99
MIDDLE SOFA DAMPER	% OPEN	50	50	50	50	51
BOTTOM SOFA DAMPER	% OPEN	10	99	100	10	10
TOP CCOFA DAMPER	% OPEN	36	35	35	36	35
BOTTOM CCOFA DAMPER	% OPEN	1	1	1	1	1
1A1 FA DAMPER	% OPEN	60	60	60	60	60
LEVEL 1 ST. AUX/CFS DAMPER	% OPEN	1	31	26	1	38
1B2 FA DAMPER	% OPEN	99	100	100	99	99
LEVEL 2 ST. AUX/CFS DAMPER	% OPEN	29	31	26	16	38
1A3 FA DAMPER	% OPEN	100	100	100	100	100
LEVEL 3 ST. AUX/CFS	% OPEN	29	31	26	16	38
1B4 FA DAMPER	% OPEN	100	100	100	99	99
						100
BOTTOM AUX AIR DAMPER	% OPEN	29	30	26	16	38
-- MILL DATA --						
1A1 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.7/98	13.6/115	13.6/116	13.6/115	13.6/115
1B2 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.5/97	13.6/96	13.6/97	13.4/97	13.4/97
1A3 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.7/97	13.6/96	13.6/96	13.5/97	13.5/97
1B4 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.6/97	13.6/97	13.6/97	13.3/97	13.3/97
PLANT LOI OF FLYASH	%	3.9	2.3	NA	4.0	4.9
ABB UNBURNED CARBON IN FLYASH	%	4.1	2.7	NA	3.7	3.6

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MILLIKEN STATION, UNIT #1
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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS

TEST NUMBER		9	10	11	12	13B
DATE	1997	3/13	3/17	3/17	3/19	3/13
START TIME	HRS	1645	1010	1625	1610	1730
STOP TIME	HRS	1745	1110	1725	1710	1830
GENERATION	MW	140	140	143	142	140
STEAM FLOW	KLB/HR	1002	1026	1028	1025	1013
FUEL NOZZLE TILT	DEG	-0.1	0.1	0.1	-0.4	-0.2
WINDBOX TO FURN DP	"H_2O	+40	+3.7	+3.6	+4.0	+3.9
FUEL FIRED		COAL				
MILLS IN SERVICE		1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4
-- ABB GAS ANALYSIS, AIRHEATER GAS INLET --						
AIRHEATER INLET LEFT DUCT O_2	%	3.6	4.2	4.8	4.3	4.0
AIRHEATER INLET RIGHT DUCT O_2	%	3.7	4.8	4.6	4.7	4.9
AIRHEATER IN L/ R AVG. O_2	%	3.7	4.5	4.7	4.5	4.4
NO_x COMPOSITE	PPM	177	207	216	191	176
NO_x COMPOSITE CORR 3% O_2	PPM	184	225	238	209	191
NO_x COMPOSITE EPA F FACTOR	LB/MBTU	0.25	0.31	0.32	0.28	0.26
CO COMPOSITE	PPM	0	0	0	0	0
CO COMPOSITE CORR 3% O_2	PPM	0	0	0	0	0
CO COMPOSITE EPA F FACTOR	LB/MBTU	0.00	0.00	0.00	0.00	0.00
CO_2 COMPOSITE	%	15.0	14.0	13.7	13.9	14.1
-- BOARD DATA --						
ECON. OUTLET PLANT O_2	%	2.5	3.1	3.0	3.1	2.9
SUPERHEAT OUTLET TEMP.	DEG F	1008	990	1008	1005	1001
REHEAT OUTLET TEMP.	DEG F	1025	987	1013	1008	1005
SOFA TILT	DEG	+0.1	+0.6	+15.7	-0.4	+0.0
TOP SOFA DAMPER	% OPEN	99	99	9	99	99
MIDDLE SOFA DAMPER	% OPEN	50	50	50	51	51
BOTTOM SOFA DAMPER	% OPEN	10	10	100	10	10
TOP CCOFA DAMPER	% OPEN	36	35	35	35	35
BOTTOM CCOFA DAMPER	% OPEN	1	1	1	9	1
1A1 FA DAMPER	% OPEN	60	60	60	60	60
LEVEL 1 ST. AUX/CFS DAMPER	% OPEN	1	19	26	8	12
1B2 FA DAMPER	% OPEN	99	100	99	99	99
LEVEL 2 ST. AUX/CFS DAMPER	% OPEN	5	19	26	15	12
1A3 FA DAMPER	% OPEN	100	100	100	100	99
LEVEL 3 ST. AUX/CFS	% OPEN	5	19	26	15	12
1B4 FA DAMPER	% OPEN	99	100	100	99	99
BOTTOM AUX AIR DAMPER	% OPEN	6	20	26	16	12
-- MILL DATA --						
1A1 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.6/115	13.6/115	13.6/116	12.1/98	12.0/119
1B2 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.3/97	13.8/96	13.8/97	14.0/98	14.3/110
1A3 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.3/97	13.8/96	13.9/97	14.0/98	14.4/110
1B4 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.3/97	13.8/97	13.8/97	14.0/98	14.4/110
PLANT LOI OF FLYASH	%	4.6	4.4	2.9	4.4	2.9
ABB UNBURNED CARBON IN FLYASH	%	3.8	3.9	3.1	4.1	3.2

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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS

TEST NUMBER		14	15	16	17	18
DATE	1997	3/21	3/20	3/20	3/24	3/13
START TIME	HRS	1410	0910	1105	1035	1400
STOP TIME	HRS	1510	1010	1205	1135	1445
GENERATION	MW	141	141	141	141	141
STEAM FLOW	KLB/HR	1026	1019	1023	1030	1012
FUEL NOZZLE TILT	DEG	0.0	-0.2	-0.2	-0.5	-0.2
WINDBOX TO FURN DP	"H_2O	+4.0	+3.9	+3.9	+3.8	+3.8
FUEL FIRED		COAL				
MILLS IN SERVICE		1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4
-- ABB GAS ANALYSIS, AIRHEATER GAS INLET --						
AIRHEATER INLET LEFT DUCT O_2	%	4.1	4.4	4.2	4.4	4.3
AIRHEATER INLET RIGHT DUCT O_2	%	4.8	4.6	5.0	4.5	4.7
AIRHEATER IN L/R AVG. O_2	%	4.5	4.5	4.6	4.4	4.5
NO_x COMPOSITE	PPM	188	193	172	191	163
NO_x COMPOSITE CORR 3% O_2	PPM	205	210	188	208	179
NO_x COMPOSITE EPA F FACTOR	LB/MBTU	0.28	0.29	0.26	0.28	0.24
CO COMPOSITE	PPM	0	0	0	0	0
CO COMPOSITE CORR 3% O_2	PPM	0	0	0	0	0
CO COMPOSITE EPA F FACTOR	LB/MBTU	0.00	0.00	0.00	0.00	0.00
CO_2 COMPOSITE	%	13.9	14.0	13.9	14.3	13.9
-- BOARD DATA --						
ECON. OUTLET PLANT O_2	%	3.0	3.0	2.8	3.1	2.8
SUPERHEAT OUTLET TEMP.	DEG F	988	999	1003	985	1006
REHEAT OUTLET TEMP.	DEG F	991	1001	1002	989	1004
SOFA TILT	DEG	+0.1	+0.5	+0.5	+1.0	+0.0
TOP SOFA DAMPER	% OPEN	99	99	99	99	99
MIDDLE SOFA DAMPER	% OPEN	51	25	1	24	1
BOTTOM SOFA DAMPER	% OPEN	10	10	100	10	100
TOP CCOFA DAMPER	% OPEN	36	100	100	100	100
BOTTOM CCOFA DAMPER	% OPEN	1	1	1	1	1
1A1 FA DAMPER	% OPEN	60	60	60	60	60
LEVEL 1 ST. AUX/CFS DAMPER	% OPEN	7	11	5	11	3
1B2 FA DAMPER	% OPEN	100	79	79	80	79
LEVEL 2 ST. AUX/CFS DAMPER	% OPEN	18	11	5	11	3
1A3 FA DAMPER	% OPEN	100	81	81	79	81
LEVEL 3 ST. AUX/CFS	% OPEN	17	11	4	11	2
1B4 FA DAMPER	% OPEN	100	81	81	79	81
BOTTOM AUX AIR DAMPER	% OPEN	18	11	2	11	3
-- MILL DATA --						
1A1 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.5/110	13.5/98	13.6/98	13.8/105	12.5/125
1B2 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.5/101	13.6/98	13.5/97	13.8/105	14.0/130
1A3 LOADING / CLASSIFER SPEED	TON/HR / RPM	13/4/108	13.6/97	13.6/97	13.8/105	14.5/98
1B4 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.6/114	13.5/98	13.5/97	13.8/105	14.4/119
PLANT LOI OF FLYASH	%	6.7	3.8	4.1	3.0	2.3
ABB UNBURNED CARBON IN FLYASH	%	6.7	4.0	4.1	3.5	2.7

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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS

TEST NUMBER		18B	19	20	21	22
DATE	1997	3/24	3/18	3/18	3/18	3/13
START TIME	HRS	1305	0830	1030	1600	0835
STOP TIME	HRS	1405	0930	1130	1715	0935
GENERATION	MW	141	139	138	139	142
STEAM FLOW	KLB/HR	1012	1012	1022	994	1024
FUEL NOZZLE TILT	DEG	-0.5	-0.4	0.0	-0.4	-1.7
WINDBOX TO FURN DP	"H_2O	+3.8	+4.0	+4.1	+3.9	+3.9
FUEL FIRED		COAL				
MILLS IN SERVICE		1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1B2,1A3,1B4
-- ABB GAS ANALYSIS, AIRHEATER GAS INLET --						
AIRHEATER INLET LEFT DUCT O_2	%	4.4	4.2	4.2	4.2	4.2
AIRHEATER INLET RIGHT DUCT O_2	%	4.8	4.6	4.7	4.9	5.0
AIRHEATER IN L/ R AVG. O_2	%	4.6	4.4	4.5	4.6	4.6
NO_x COMPOSITE	PPM	175	186	184	182	171
NO_x COMPOSITE CORR 3% O_2	PPM	192	202	201	199	187
NO_x COMPOSITE EPA F FACTOR	LB/MBTU	0.26	0.27	0.27	0.27	0.26
CO COMPOSITE	PPM	0	0	0	0	21
CO COMPOSITE CORR 3% O_2	PPM	0	0	0	0	23
CO COMPOSITE EPA F FACTOR	LB/MBTU	0.00	0.00	0.00	0.00	0.02
CO_2 COMPOSITE	%	14.1	14.2	14.1	14.0	14.0
-- BOARD DATA --						
ECON. OUTLET PLANT O_2	%	3.1	3.0	3.0	3.0	2.8
SUPERHEAT OUTLET TEMP.	DEG F	1008	993	979	1005	1002
REHEAT OUTLET TEMP.	DEG F	1012	997	979	1007	1009
SOFA TILT	DEG	+1.1	+4.7	+4.8	+4.7	+0.0
TOP SOFA DAMPER	% OPEN	99	99	99	99	1
MIDDLE SOFA DAMPER	% OPEN	1	50	50	50	51
BOTTOM SOFA DAMPER	% OPEN	100	10	10	10	100
TOP CCOFA DAMPER	% OPEN	100	35	35	35	50
BOTTOM CCOFA DAMPER	% OPEN	1	1	1	1	1
1A1 FA DAMPER	% OPEN	60	59	60	59	5
LEVEL 1 ST. AUX/CFS DAMPER	% OPEN	6	1	1	1	24
1B2 FA DAMPER	% OPEN	80	100	100	99	88
LEVEL 2 ST. AUX/CFS DAMPER	% OPEN	5	15	15	16	24
1A3 FA DAMPER	% OPEN	80	100	99	99	60
LEVEL 3 ST. AUX/CFS	% OPEN	5	15	15	16	24
1B4 FA DAMPER	% OPEN	80	99	99	99	60
BOTTOM AUX AIR DAMPER	% OPEN	6	15	15	16	38
-- MILL DATA --						
1A1 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.6/105	12.0/98	10.0/128	8.2/127	0/0
1B2 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.7/104	13.9/98	14.5/98	14.8/99	18.2/105
1A3 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.7/104	13.9/98	14.6/99	14.8/99	18.2/105
1B4 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.6/105	13.9/98	14.5/98	14.8/99	18.2/105
PLANT LOI OF FLYASH	%	2.0	5.4	4.5	4.0	7.6
ABB UNBURNED CARBON IN FLYASH	%	2.5	5.3	4.3	4.1	5.8

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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS

TEST NUMBER		23	24	25	26	27
DATE	1997	3/24	3/25	3/25	3/25	3/13
START TIME	HRS	1535	0835	1100	1640	1410
STOP TIME	HRS	1635	0935	1200	1740	1510
GENERATION	MW	140	140	140	139	140
STEAM FLOW	KLB/HR	1033	1006	1016	1027	1019
FUEL NOZZLE TILT	DEG	-0.5	-0.3	-0.2	-0.3	-0.3
WINDBOX TO FURN DP	"H_2O	+4.0	+3.9	+4.0	+4.1	+4.0
FUEL FIRED		CON.				
MILLS IN SERVICE		1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4
– ABB GAS ANALYSIS, AIRHEATER GAS INLET –						
AIRHEATER INLET LEFT DUCT O_2	%	4.0	4.2	4.4	4.1	4.2
AIRHEATER INLET RIGHT DUCT O_2	%	5.0	4.9	4.7	4.7	4.8
AIRHEATER IN L/ R AVG. O_2	%	4.5	4.6	4.5	4.4	4.5
NO_x COMPOSITE	PPM	178	183	172	206	177
NO_x COMPOSITE CORR 3% O_2	PPM	194	200	188	223	193
NO_x COMPOSITE EPA F FACTOR	LB/MBTU	0.26	0.27	0.26	0.30	0.26
CO COMPOSITE	PPM	0	0	0	0	0
CO COMPOSITE CORR 3% O_2	PPM	0	0	0	0	0
CO COMPOSITE EPA F FACTOR	LB/MBTU	0.00	0.00	0.00	0.00	0.00
CO_2 COMPOSITE	%	14.1	13.8	13.8	13.7	13.7
– BOARD DATA –						
ECON. OUTLET PLANT O_2	%	2.9	3.0	3.1	3.2	3.1
SUPERHEAT OUTLET TEMP.	DEG F	983	1007	1004	986	995
REHEAT OUTLET TEMP.	DEG F	984	1011	1001	985	1003
SOFA TILT	DEG	+1.1	+0.9	+1.0	+1.0	+0.0
TOP SOFA DAMPER	% OPEN	99	99	99	99	99
MIDDLE SOFA DAMPER	% OPEN	50	1	1	50	1
BOTTOM SOFA DAMPER	% OPEN	10	100	100	10	100
TOP CCOFA DAMPER	% OPEN	36	100	100	36	100
BOTTOM CCOFA DAMPER	% OPEN	1	1	1	1	1
1A1 FA DAMPER	% OPEN	60	60	60	60	60
LEVEL 1 ST. AUX/CFS DAMPER	% OPEN	3	1	5	1	4
1B2 FA DAMPER	% OPEN	99	81	81	100	81
LEVEL 2 ST. AUX/CFS DAMPER	% OPEN	13	0	5	22	4
1A3 FA DAMPER	% OPEN	100	80	80	100	81
LEVEL 3 ST. AUX/CFS	% OPEN	13	1	5	22	4
1B4 FA DAMPER	% OPEN	100	81	81	100	80
BOTTOM AUX AIR DAMPER	% OPEN	13	0	5	22	4
– MILL DATA –						
1A1 LOADING / CLASSIFER SPEED	TON/HR / RPM	7.9/133	13.2/105	13.4/104	12.0/85	13.1/95
1B2 LOADING / CLASSIFER SPEED	TON/HR / RPM	15.6/107	13.3/105	13.3/105	13.8/96	13.3/95
1A3 LOADING / CLASSIFER SPEED	TON/HR / RPM	15.6/107	13.4/104	13.5/105	13.7/97	13.2/95
1B4 LOADING / CLASSIFER SPEED	TON/HR / RPM	15.5/107	13.2/104	13.4/104	13.7/96	13.2/95
PLANT LOI OF FLYASH	%	4.3	4.2	4.4	6.7	5.4
ABB UNBURNED CARBON IN FLYASH	%	3.7	3.3	4.0	6.7	4.8

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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS

TEST NUMBER		28	29	30	31	32
DATE	1997	3/14	3/25	3/26	3/21	3/13
START TIME	HRS	1010	2205	0135	0815	1100
STOP TIME	HRS	1110	2305	0235	0915	1200
GENERATION	MW	146	110	76	141	140
STEAM FLOW	KLB/HR	1073	813	559	1013	990
FUEL NOZZLE TILT	DEG	-0.1	-0.2	0.2	-3.6	-3.6
WINDBOX TO FURN DP	"H_2O	+3.4	+1.9	+1.5	+3.8	+3.7
FUEL FIRED		COAL				
MILLS IN SERVICE		1A1,1B2,1A3,1B4	1A1,1B2,1A3,1B4	1B2,1A3,1B4	1A1,1B2,1A3	1A1,1B2,1A3
-- ABB GAS ANALYSIS, AIRHEATER GAS INLET --						
AIRHEATER INLET LEFT DUCT O_2	%	4.7	3.7	5.2	4.9	4.3
AIRHEATER INLET RIGHT DUCT O_2	%	5.0	3.8	5.7	4.4	4.5
AIRHEATER IN L/ R AVG. O_2	%	4.8	3.7	5.5	4.7	4.4
NO_x COMPOSITE	PPM	238	158	181	219	175
NO_x COMPOSITE CORR 3% O_2	PPM	265	165	210	241	191
NO_x COMPOSITE EPA F FACTOR	LB/MBTU	0.36	0.22	0.29	0.33	0.26
CO COMPOSITE	PPM	0	0	0	0	0
CO COMPOSITE CORR 3% O_2	PPM	0	0	0	0	0
CO COMPOSITE EPA F FACTOR	LB/MBTU	0.00	0.00	0.00	0.00	0.00
CO_2 COMPOSITE	%	13.6	14.8	13.2	13.9	14.0
-- BOARD DATA --						
ECON. OUTLET PLANT O_2	%	3.5	2.4	3.8	3.1	2.6
SUPERHEAT OUTLET TEMP.	DEG F	1005	952	946	1009	1008
REHEAT OUTLET TEMP.	DEG F	1009	934	910	1006	1006
SOFA TILT	DEG	+0.2	+0.3	+0.3	+0.5	+0.0
TOP SOFA DAMPER	% OPEN	99	75	1	1	99
MIDDLE SOFA DAMPER	% OPEN	51	1	51	1	1
BOTTOM SOFA DAMPER	% OPEN	10	76	1	81	100
TOP CCOFA DAMPER	% OPEN	35	75	51	100	100
BOTTOM CCOFA DAMPER	% OPEN	1	1	50	100	1
1A1 FA DAMPER	% OPEN	60	60	3	100	100
LEVEL 1 ST. AUX/CFS DAMPER	% OPEN	38	1	1	36	24
1B2 FA DAMPER	% OPEN	99	80	80	100	100
LEVEL 2 ST. AUX/CFS DAMPER	% OPEN	38	2	7	37	24
1A3 FA DAMPER	% OPEN	100	80	80	100	100
LEVEL 3 ST. AUX/CFS	% OPEN	38	2	7	37	24
1B4 FA DAMPER	% OPEN	100	80	80	4	4
BOTTOM AUX AIR DAMPER	% OPEN	38	2	7	0	0
-- MILL DATA --						
1A1 LOADING / CLASSIFER SPEED	TON/HR / RPM	13.5/115	8.0/131	0/0	17.6/103	17.5/102
1B2 LOADING / CLASSIFER SPEED	TON/HR / RPM	14.2/103	11.9/118	10.5/118	17.6/103	17.4/103
1A3 LOADING / CLASSIFER SPEED	TON/HR / RPM	14.3/105	11.8/119	10.4/120	17.6/103	17.4/103
1B4 LOADING / CLASSIFER SPEED	TON/HR / RPM	14.3/106	11.7/118	10.4/122	0/0	0/0
NYSEG LOI OF FLYASH	%	5.8	4.3	3.4	2.6	3.3
ABB UNBURNED CARBON IN FLYASH	%	5.3	3.8	3.0	3.5	3.3

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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS
ISOKINETIC FLYASH RESULTS

		1	2	3	3B	4
TEST NUMBER:						
DATE:		3/12/97	3/12/97	3/12/97	3/12/97	3/13/97
SAMPLE LOCATION:		ECON OUT	ECON OUT	ECON OUT	ECON OUT	ECON OUT
TEST PERIOD:		0910-1010	1100-1200	1410-1520	1600-1700	0835-0935
-- RESULTS --						
ISOKINETIC VARIATION	%	92.4	94.3	96.6	96.7	97.4
-- TEST DATA --						
SAMPLE TIME, Q	MINUTES	60	60	60	60	60
METER VOL, Vm	FT^3	42.253	39.216	40.352	39.240	39.571
STATIC PRESS	INCHES WC	-7.6	-7.6	-7.4	-7.4	-6.6
VEL. HEAD,SQRT DP, AVG	INCHES WC	0.236	0.211	0.219	0.210	0.218
ORIFICE DELTA H, AVG	INCHES WC	1.447	1.165	1.252	1.140	1.235
STACK TEMP, Ts	°F	673	675	675	678	675
METER TEMP, Tm	°F	109	121	115	121	99
O_2 AT SAMPLE LOCATION	%	4.8	4.7	4.4	4.4	3.7
CO_2 AT SAMPLE LOCATION	%	13.9	13.9	14.2	14.2	15.0
CO AT SAMPLE LOCATION	%	0.0	0.0	0.0	0.0	0.0
N_2 (BY DIFFERENCE)	%	81.4	81.4	81.4	81.4	81.3
MOISTURE, Vlc	GM	32.5	36.7	58.6	51.7	52.2
PITOT TUBE CP		0.840	0.840	0.840	0.840	0.840
BAROMETRIC PRESS	"Hg	30.00	29.94	29.94	29.94	29.94
NOZZLE DIAMETER	IN	0.500	0.500	0.500	0.500	0.500
Y FACTOR		0.9730	0.9730	0.9730	0.9730	0.9730
STACK AREA, As	FT^2	760	760	760	760	760
-- CALCULATED DATA --						
METER TEMP, Tm	°R	569	581	575	581	559
STACK TEMP, Ts	°R	1133	1135	1135	1138	1135
METER VOLUME, Vm(STD)	FT^3	38.403	34.785	36.174	34.804	36.460
DRY MOLECULAR WT, Md		30.41	30.41	30.45	30.44	30.55
VOLUME WATER VAPOR, Vw	CU/FT	1.530	1.727	2.758	2.434	2.457
MOISTURE FRACTION, Bws		0.038	0.047	0.071	0.065	0.063
DRY GAS FRACTION, Fd		0.962	0.953	0.929	0.935	0.937
MOL. WEIGHT STACK, Ms		29.93	29.82	29.57	29.63	29.76
STACK PRESS, Ps	"Hg abs	29.44	29.38	29.40	29.40	29.45
STACK VELOCITY, Vs	FT/SEC	19.22	17.28	17.98	17.22	17.78
NOZZLE AREA, An	FT^2	0.00136	0.00136	0.00136	0.00136	0.00136
GAS FLOW, WET, Qa	FT^3/MIN	876304	788015	819977	785275	810913
GAS FLOW, DRY STD,Qsd	FT^3/MIN	386149	342712	348002	334363	347681
DENSITY (STD)	LB/FT^3	0.0777	0.0774	0.0768	0.0769	0.0772
STACK DENSITY, Dst	LB/FT^3	0.0356	0.0353	0.0351	0.0350	0.0354
GAS FLOW, WET	LB/HR	1872138	1671088	1724901	1651074	1720028

NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT#1
ABB CE CONTRACT # 7452

ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS
ISOKINETIC FLYASH RESULTS

		5	6	7	8
TEST NUMBER:		5	6	7	8
DATE:		3/13/97	3/17/97	3/13/97	3/17/97
SAMPLE LOCATION:		ECON OUT	ECON OUT	ECON OUT	ECON OUT
TEST PERIOD:		1030-1130	1310-1410	1430-1530	0820-0920
– RESULTS –					
ISOKINETIC VARIATION	%	96.0	97.0	96.9	96.6
– TEST DATA –					
SAMPLE TIME, Q	MINUTES	60	60	60	60
METER VOL, Vm	FT^3	42.642	44.636	41.451	45.055
STATIC PRESS	INCHES WC	-7.86	-8.1	-7.3	-7.9
VEL. HEAD,SQRT DP, AVG	INCHES WC	0.236	0.243	0.230	0.250
ORIFICE DELTA H, AVG	INCHES WC	1.433	1.560	1.380	1.633
STACK TEMP, Ts	°F	685	685	679	683
METER TEMP, Tm	°F	109	113	104	99
O_2 AT SAMPLE LOCATION	%	5.2	5.1	4.5	5.1
CO_2 AT SAMPLE LOCATION	%	13.6	13.5	14.2	13.5
CO AT SAMPLE LOCATION	%	0.0	0.0	0.0	0.0
N_2 (BY DIFFERENCE)	%	81.2	81.4	81.3	81.4
MOISTURE, Vlc	GM	55.8	64.0	62.9	63.6
PITOT TUBE CP		0.840	0.840	0.840	0.840
BAROMETRIC PRESS	"Hg	30.30	29.80	30.20	29.50
NOZZLE DIAMETER	IN	0.500	0.500	0.500	0.500
Y FACTOR		0.9730	0.9730	0.9730	0.9730
STACK AREA, As	FT^2	760	760	760	760
– CALCULATED DATA –					
METER TEMP, Tm	°R	569	573	564	559
STACK TEMP, Ts	°R	1145	1145	1139	1143
METER VOLUME, Vm(STD)	FT^3	39.081	40.006	38.198	40.958
DRY MOLECULAR WT, Md		30.39	30.36	30.45	30.37
VOLUME WATER VAPOR, Vw	CU/FT	2.627	3.012	2.961	2.994
MOISTURE FRACTION, Bws		0.063	0.070	0.072	0.068
DRY GAS FRACTION, Fd		0.937	0.930	0.928	0.932
MOL. WEIGHT STACK, Ms		29.61	29.50	29.56	29.53
STACK PRESS, Ps	"Hg abs	29.72	29.20	29.66	28.92
STACK VELOCITY, Vs	FT/SEC	19.33	20.09	18.85	20.76
NOZZLE AREA, An	FT^2	0.00136	0.00136	0.00136	0.00136
GAS FLOW, WET, Qa	FT^3/MIN	881609	915880	859567	946644
GAS FLOW, DRY STD,Qsd	FT^3/MIN	378433	383138	366401	393892
DENSITY (STD)	LB/FT^2	0.0769	0.0766	0.0767	0.0767
STACK DENSITY, Dst	LB/FT^3	0.0352	0.0344	0.0352	0.0342
GAS FLOW, WET	LB/HR	1862443	1892969	1817652	1943968

CRUDUST VER 2.2 05-27-96

NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
ABB CE CONTRACT # 7452

ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS
ISOKINETIC FLYASH RESULTS

TEST NUMBER:		9	10	11	12	13B
DATE:		3/13/97	3/17/97	3/17/97	3/19/97	3/20/97
SAMPLE LOCATION:		ECON OUT	ECON OUT	ECON OUT	ECON OUT	ECON OUT
TEST PERIOD:		1645-1745	1010-1110	1625-1725	1610-1710	1730-1830
-- RESULTS --						
ISOKINETIC VARIATION	%	97.5	95.8	95.4	97.3	91.9
-- TEST DATA --						
SAMPLE TIME, Q	MINUTES	60	60	60	60	60
METER VOL, Vm	FT^3	37.962	42.879	42.897	44.534	37.175
STATIC PRESS	INCHES WC	-6.6	-7.3	-7.9	-7.5	-7.1
VEL. HEAD,SQRT DP, AVG	INCHES WC	0.205	0.234	0.233	0.245	0.216
ORIFICE DELTA H, AVG	INCHES WC	1.072	1.440	1.410	1.550	1.202
STACK TEMP, Ts	°F	677	678	685	683	678
METER TEMP, Tm	°F	112	112	119	106	103
O_2 AT SAMPLE LOCATION	%	3.7	4.5	4.7	4.5	4.4
CO_2 AT SAMPLE LOCATION	%	15.0	14.0	13.7	13.9	14.1
CO AT SAMPLE LOCATION	%	0.0	0.0	0.0	0.0	0.0
N_2 (BY DIFFERENCE)	%	81.4	81.6	81.6	81.6	81.5
MOISTURE, Vlc	GM	52.9	55.0	53.2	58.8	58.0
PITOT TUBE CP		0.840	0.840	0.840	0.840	0.840
BAROMETRIC PRESS	"Hg	30.20	29.90	29.80	29.80	29.60
NOZZLE DIAMETER	IN	0.500	0.500	0.500	0.500	0.500
Y FACTOR		0.9730	0.9730	0.9730	0.9730	0.9730
STACK AREA, As	FT^2	760	760	760	760	760
-- CALCULATED DATA --						
METER TEMP, Tm	°R	572	572	579	566	563
STACK TEMP, Ts	°R	1137	1138	1145	1143	1138
METER VOLUME, Vm(STD)	FT^3	34.466	38.610	38.010	40.434	33.661
DRY MOLECULAR WT, Md		30.54	30.41	30.39	30.40	30.43
VOLUME WATER VAPOR, Vw	CU/FT	2.490	2.589	2.504	3.238	2.730
MOISTURE FRACTION, Bws		0.067	0.063	0.062	0.074	0.075
DRY GAS FRACTION, Fd		0.933	0.937	0.938	0.926	0.925
MOL. WEIGHT STACK, Ms		29.69	29.63	29.62	29.48	29.50
STACK PRESS, Ps	"Hg abs	29.71	29.36	29.22	29.25	29.08
STACK VELOCITY, Vs	FT/SEC	16.75	19.25	19.22	20.27	17.90
NOZZLE AREA, An	FT^2	0.00136	0.00136	0.00136	0.00136	0.00136
GAS FLOW, WET, Qa	FT^3/MIN	763686	877975	876249	924434	816206
GAS FLOW, DRY STD,Qsd	FT^3/MIN	328345	374449	370012	386201	340367
DENSITY (STD)	LB/FT^2	0.0771	0.0769	0.0769	0.0765	0.0766
STACK DENSITY, Dst	LB/FT^3	0.0355	0.0350	0.0346	0.0345	0.0345
GAS FLOW, WET	LB/HR	1628394	1844114	1819562	1915569	1690690

NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS
ISOKINETIC FLYASH RESULTS

		14	15	16	17	18
TEST NUMBER:						
DATE:		3/21/97	3/20/97	3/20/97	3/24/97	3/20/97
SAMPLE LOCATION:		ECON OUT	ECON OUT	ECON OUT	ECON OUT	ECON OUT
TEST PERIOD:		1410-1510	0910-1010	1105-1205	1035-1135	1400-1445
-- RESULTS --						
ISOKINETIC VARIATION	%	99.4	98.4	97.9	98.2	90.0
-- TEST DATA --						
SAMPLE TIME, Q	MINUTES	60	60	60	60	60
METER VOL, Vm	FT^3	40.380	42.654	41.656	43.960	36.404
STATIC PRESS	INCHES WC	-7.4	-7.3	-7.6	-7.3	-7.3
VEL. HEAD,SQRT DP, AVG	INCHES WC	0.214	0.231	0.221	0.241	0.212
ORIFICE DELTA H, AVG	INCHES WC	1.198	1.388	1.272	1.535	1.492
STACK TEMP, Ts	°F	679	679	680	678	681
METER TEMP, Tm	°F	111	102	117	101	110
O_2 AT SAMPLE LOCATION	%	4.5	4.5	4.6	4.4	4.5
CO_2 AT SAMPLE LOCATION	%	13.9	14.0	13.9	14.3	13.9
CO AT SAMPLE LOCATION	%	0.0	0.0	0.0	0.0	0.0
N_2 (BY DIFFERENCE)	%	81.6	81.5	81.5	81.2	81.6
MOISTURE, Vlc	GM	64.3	60.0	58.1	59.9	47.2
PITOT TUBE CP		0.840	0.840	0.840	0.840	0.840
BAROMETRIC PRESS	"Hg	29.30	29.60	29.60	30.20	29.50
NOZZLE DIAMETER	IN	0.500	0.500	0.500	0.500	0.500
Y FACTOR		0.9730	0.9730	0.9730	0.9730	0.9730
STACK AREA, As	FT^2	760	760	760	760	760
-- CALCULATED DATA --						
METER TEMP, Tm	°R	571	562	577	561	570
STACK TEMP, Ts	°R	1139	1139	1140	1138	1141
METER VOLUME, Vm(STD)	FT^3	35.666	38.669	36.815	40.775	32.477
DRY MOLECULAR WT, Md		30.40	30.42	30.40	30.47	30.41
VOLUME WATER VAPOR, Vw	CU/FT	3.027	2.824	2.735	2.819	2.222
MOISTURE FRACTION, Bws		0.078	0.068	0.069	0.065	0.064
DRY GAS FRACTION, Fd		0.922	0.932	0.931	0.935	0.936
MOL. WEIGHT STACK, Ms		29.43	29.57	29.54	29.67	29.61
STACK PRESS, Ps	"Hg abs	28.75	29.06	29.04	29.66	28.96
STACK VELOCITY, Vs	FT/SEC	17.82	19.09	18.32	19.67	17.55
NOZZLE AREA, An	FT^2	0.00136	0.00136	0.00136	0.00136	0.00136
GAS FLOW, WET, Qa	FT^3/MIN	812619	870390	835280	897043	800062
GAS FLOW, DRY STD,Qsd	FT^3/MIN	333518	365159	349552	385959	335245
DENSITY (STD)	LB/FT^3	0.0764	0.0768	0.0767	0.0770	0.0769
STACK DENSITY, Dst	LB/FT^3	0.0340	0.0346	0.0345	0.0354	0.0344
GAS FLOW, WET	LB/HR	1658853	1804815	1727990	1906747	1652083

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NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
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ABB C-E SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS
ISOKINETIC FLYASH RESULTS

		18B	19	20	21	22
TEST NUMBER:						
DATE:		3/24/97	3/18/97	3/18/97	3/18/97	3/19/97
SAMPLE LOCATION:		ECON OUT	ECON OUT	ECON OUT	ECON OUT	ECON OUT
TEST PERIOD:		1305-1405	0830-0930	1030-1130	1600-1715	0835-0935
-- RESULTS --						
ISOKINETIC VARIATION	%	107.6	95.1	94.9	95.9	97.1
-- TEST DATA --						
SAMPLE TIME, Q	MINUTES	60	60	60	60	60
METER VOL, Vm	FT^3	46.975	42.166	44.854	40.633	44.291
STATIC PRESS	INCHES WC	-7.5	-7.1	-7.2	-7.1	-7.6
VEL. HEAD,SQRT DP, AVG	INCHES WC	0.229	0.233	0.245	0.221	0.243
ORIFICE DELTA H, AVG	INCHES WC	1.340	1.415	1.542	1.277	1.543
STACK TEMP, Ts	°F	681	678	681	630	681
METER TEMP, Tm	°F	115	116	123	111	104
O_2 AT SAMPLE LOCATION	%	4.6	4.4	4.5	4.5	4.6
CO_2 AT SAMPLE LOCATION	%	14.1	14.2	14.1	14.0	14.0
CO AT SAMPLE LOCATION	%	0.0	0.0	0.0	0.0	0.0
N_2 (BY DIFFERENCE)	%	81.3	81.4	81.4	81.4	81.5
MOISTURE, Vlc	GM	58.9	60.4	60.1	65.9	58.4
PITOT TUBE CP		0.840	0.840	0.840	0.840	0.840
BAROMETRIC PRESS	"Hg	30.20	30.10	30.10	30.10	30.00
NOZZLE DIAMETER	IN	0.500	0.500	0.500	0.500	0.500
Y FACTOR		0.9730	0.9730	0.9730	0.9730	0.9730
STACK AREA, As	FT^2	760	760	760	760	760
-- CALCULATED DATA --						
METER TEMP, Tm	°R	575	576	583	571	564
STACK TEMP, Ts	°R	1141	1138	1141	1090	1141
METER VOLUME, Vm(STD)	FT^3	42.519	37.967	39.906	36.897	40.568
DRY MOLECULAR WT, Md		30.44	30.45	30.44	30.43	30.42
VOLUME WATER VAPOR, Vw	CU/FT	2.772	2.843	2.829	3.102	2.749
MOISTURE FRACTION, Bws		0.061	0.070	0.066	0.078	0.063
DRY GAS FRACTION, Fd		0.939	0.930	0.934	0.922	0.937
MOL. WEIGHT STACK, Ms		29.68	29.58	29.62	29.47	29.63
STACK PRESS, Ps	"Hg abs	29.65	29.58	29.57	29.58	29.44
STACK VELOCITY, Vs	FT/SEC	18.71	19.06	20.06	17.75	19.96
NOZZLE AREA, An	FT^2	0.00136	0.00136	0.00136	0.00136	0.00136
GAS FLOW, WET, Qa	FT^3/MIN	853290	869337	914769	809401	910302
GAS FLOW, DRY STD,Qsd	FT^3/MIN	367234	370783	390688	357558	388071
DENSITY (STD)	LB/FT^2	0.0770	0.0768	0.0769	0.0765	0.0769
STACK DENSITY, Dst	LB/FT^3	0.0353	0.0352	0.0352	0.0366	0.0350
GAS FLOW, WET	LB/HR	1808365	1836541	1929978	1778959	1912299

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NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
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ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS
ISOKINETIC FLYASH RESULTS

		23	24	25	26	27
TEST NUMBER:		23	24	25	26	27
DATE:		3/24/97	3/25/97	3/25/97	3/25/97	3/25/97
SAMPLE LOCATION:		ECON OUT	ECON OUT	ECON OUT	ECON OUT	ECON OUT
TEST PERIOD:		1535-1635	0835-0935	1100-1200	1640-1740	1410-1510
-- RESULTS --						
ISOKINETIC VARIATION	%	97.4	96.3	97.4	96.4	96.6
-- TEST DATA --						
SAMPLE TIME, Q	MINUTES	60	60	60	60	60
METER VOL, Vm	FT^3	43.630	47.901	43.213	47.293	45.013
STATIC PRESS	INCHES WC	-7.1	-7.4	-7.3	-7.6	-7.6
VEL. HEAD,SQRT DP, AVG	INCHES WC	0.237	0.263	0.233	0.256	0.245
ORIFICE DELTA H, AVG	INCHES WC	1.460	1.908	1.415	1.658	1.533
STACK TEMP, Ts	°F	677	683	681	677	680
METER TEMP, Tm	°F	117	110	115	117	110
O_2 AT SAMPLE LOCATION	%	4.5	4.6	4.5	4.4	4.5
CO_2 AT SAMPLE LOCATION	%	14.1	13.8	13.8	13.7	13.7
CO AT SAMPLE LOCATION	%	0.0	0.0	0.0	0.0	0.0
N_2 (BY DIFFERENCE)	%	81.4	81.6	81.7	81.9	81.8
MOISTURE, Vlc	GM	69.8	63.1	63.6	69.1	60.2
PITOT TUBE CP		0.840	0.840	0.840	0.840	0.840
BAROMETRIC PRESS	"Hg	30.20	29.90	29.80	29.60	29.70
NOZZLE DIAMETER	IN	0.500	0.500	0.500	0.500	0.500
Y FACTOR		0.9730	0.9730	0.9730	0.9730	0.9730
STACK AREA, As	FT^2	760	760	760	760	760
-- CALCULATED DATA --						
METER TEMP, Tm	°R	577	570	575	577	570
STACK TEMP, Ts	°R	1137	1143	1141	1137	1140
METER VOLUME, Vm(STD)	FT^3	39.368	43.320	38.573	41.828	40.400
DRY MOLECULAR WT, Md		30.44	30.40	30.39	30.37	30.38
VOLUME WATER VAPOR, Vw	CU/FT	3.285	2.970	2.994	3.253	2.834
MOISTURE FRACTION, Bws		0.077	0.064	0.072	0.072	0.066
DRY GAS FRACTION, Fd		0.923	0.936	0.928	0.928	0.934
MOL. WEIGHT STACK, Ms		29.48	29.60	29.50	29.47	29.57
STACK PRESS, Ps	"Hg abs	29.68	29.36	29.26	29.04	29.14
STACK VELOCITY, Vs	FT/SEC	19.38	21.63	19.22	21.15	20.24
NOZZLE AREA, An	FT^2	0.00136	0.00136	0.00136	0.00136	0.00136
GAS FLOW, WET, Qa	FT^3/MIN	883593	986108	876394	964370	922759
GAS FLOW, DRY STD,Qsd	FT^3/MIN	375393	418154	367964	403127	388678
DENSITY (STD)	LB/FT^3	0.0765	0.0768	0.0766	0.0765	0.0768
STACK DENSITY, Dst	LB/FT^3	0.0352	0.0348	0.0346	0.0345	0.0346
GAS FLOW, WET	LB/HR	1867463	2060173	1821752	1994680	1915504

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NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
ABB CE CONTRACT # 7452

ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

TEST DATA AND RESULTS
ISOKINETIC FLYASH RESULTS

		28	29	30	31	32
TEST NUMBER:						
DATE:		3/14/97	3/25/97	3/26/97	3/21/97	3/21/97
SAMPLE LOCATION:		ECON OUT	ECON OUT	ECON OUT	ECON OUT	ECON OUT
TEST PERIOD:		1010-1110	2205-2305	0135-0235	0815-0915	1100-1200
-- RESULTS --						
ISOKINETIC VARIATION	%	96.5	97.5	98.3	97.7	98.4
-- TEST DATA --						
SAMPLE TIME, Q	MINUTES	60	60	60	60	60
METER VOL, Vm	FT^3	45.979	33.721	30.740	42.178	41.400
STATIC PRESS	INCHES WC	-8.4	-4.6	-3	-7.5	-7.2
VEL. HEAD,SQRT DP, AVG	INCHES WC	0.257	0.179	0.160	0.227	0.221
ORIFICE DELTA H, AVG	INCHES WC	1.700	0.815	0.538	1.363	1.277
STACK TEMP, Ts	°F	687	658	646	681	683
METER TEMP, Tm	°F	100	114	114	108	112
O_2 AT SAMPLE LOCATION	%	4.8	3.7	5.5	4.7	4.4
CO_2 AT SAMPLE LOCATION	%	13.6	14.8	13.2	13.9	14.0
CO AT SAMPLE LOCATION	%	0.0	0.0	0.0	0.0	0.0
N_2 (BY DIFFERENCE)	%	81.6	81.5	81.3	81.5	81.6
MOISTURE, Vlc	GM	69.1	50.5	44.9	57.0	62.6
PITOT TUBE CP		0.840	0.840	0.840	0.840	0.840
BAROMETRIC PRESS	"Hg	29.50	29.50	29.40	29.50	29.40
NOZZLE DIAMETER	IN	0.500	0.500	0.500	0.500	0.500
Y FACTOR		0.9730	0.9730	0.9730	0.9730	0.9730
STACK AREA, As	FT^2	760	760	760	760	760
-- CALCULATED DATA --						
METER TEMP, Tm	°R	560	574	574	568	572
STACK TEMP, Ts	°R	1147	1118	1106	1141	1143
METER VOLUME, Vm(STD)	FT^3	41.752	29.784	27.084	37.715	36.637
DRY MOLECULAR WT, Md		30.37	30.51	30.33	30.40	30.41
VOLUME WATER VAPOR, Vw	CU/FT	3.253	2.377	2.113	2.683	2.947
MOISTURE FRACTION, Bws		0.072	0.074	0.072	0.066	0.074
DRY GAS FRACTION, Fd		0.928	0.926	0.928	0.934	0.926
MOL. WEIGHT STACK, Ms		29.48	29.59	29.44	29.58	29.49
STACK PRESS, Ps	"Hg abs	28.88	29.16	29.18	28.95	28.87
STACK VELOCITY, Vs	FT/SEC	21.40	14.60	13.00	18.84	18.39
NOZZLE AREA, An	FT^2	0.00136	0.00136	0.00136	0.00136	0.00136
GAS FLOW, WET, Qa	FT^3/MIN	975967	665863	592923	859080	838738
GAS FLOW, DRY STD,Qsd	FT^3/MIN	402124	283796	255891	358840	345941
DENSITY (STD)	LB/FT^2	0.0765	0.0768	0.0764	0.0768	0.0766
STACK DENSITY, Dst	LB/FT^3	0.0340	0.0354	0.0356	0.0344	0.0341
GAS FLOW, WET	LB/HR	1990333	1412300	1264875	1770908	1716736

NEW YORK STATE ELECTRIC AND GAS
MILLIKEN STATION, UNIT #1
ABB CE CONTRACT # 7452

ABB CE SERVICES, INC.
PERFORMANCE SERVICES
WINDSOR, CONNECTICUT

Listed below are the results of the total carbon determinations performed on the thirty-five (35) isokinetic fly ash samples taken during the March 1997 testing. These samples were submitted by Barry Walsh on April 15, 1997.

The total carbon measurements were done by a combustion - infrared detection method. The instrument was calibrated against primary standard grade CaCO3 (12.00% C). The precision of this data was determined to be better than ±0.1%.

PPL Sample	Test No.	Date	Time	% Carbon
70720-A	1	3/12/97	09:10-10:10	4.5
70721-A	2	3/12/97	11:00-12:00	3.8
70722-A	3	3/12/97	14:10-15:20	8.4
70723-A	3B	3/12/97	16:00-17:00	4.8
70724-A	4	3/13/97	08:30-09:30	6.5
70725-A	5	3/13/97	10:30-11:30	4.1
70726-A	6	3/17/97	13:10-14:10	2.7
70727-A	7	3/13/97	14:30-15:30	3.7
70728-A	8	3/17/97	08:18-09:18	3.6
70729-A	9	3/13/97	16:45-17:45	3.8
70730-A	10	3/17/97	10:10-11:10	3.9
70731-A	11	3/17/97	16:25-17:25	3.1
70732-A	12	3/19/97	16:15-17:15	4.1
70733-A	13	3/19/97	13:30-14:30	4.8
70734-A	13B	3/20/97	17:30-18:30	3.2

PPL Sample	Test No.	Date	Time	% Carbon
70735-A	14	3/21/97	14:10-15:10	6.7
70736-A	15	3/20/97	09:10-10:10	4.0
70737-A	16	3/20/97	11:05-12:05	4.1
70738-A	17	3/24/97	10;35-11:35	3.5
70739-A	18	3/20/97	14:00-15:00	2.7
70740-A	18B	3/24/97	13:05-14:05	2.5
70741-A	19	3/18/97	08:30-09:30	5.3
70742-A	20	3/18/87	10:30-11:30	4.3
70743-A	21	3/18/97	15:50-17:10	4.1
70744-A	22	3/19/97	08:35-09:35	5.8
70745-A	23	3/24/97	15:36-16:36	3.7
70746-A	24	3/25/97	08:35-09:35	3.3
70747-A	25	3/25/97	10:55-11:55	4.0
70748-A	26	3/25/97	16:46-17:46	6.7
70749-A	27	3/25/97	14:10-15:10	4.8
70750-A	28	3/14/97	10:30-11:30	5.3
70751-A	29	3/25/97	22:05-23:05	3.8
70752-A	30	3/26/97	01:35-02:35	3.0
70753-A	31	3/21/97	08:15-09:15	3.5
70754-A	32	3/21/97	11:00-12:00	3.3