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SOURCE EMISSIONS SURVEY
OF
FIRSTENERGY CORPORATION
OHIO EDISON COMPANY
W.H. SAMMIS POWER PLANT
UNIT NUMBER 1 BAGHOUSE INLET DUCT
AND SOUTH OUTLET DUCT
STRATTON, OHIO
FOR
ELECTRIC POWER RESEARCH INSTITUTE

SEPTEMBER 1999

FILE NUMBER 99-95WHS1

Figures

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1 INTRODUCTION

1.1 Summary of Test Program

METCO Environmental, Dallas, Texas, conducted a source emissions survey of FirstEnergy Corporation, Ohio Edison Company, W.H. Sammis Power Plant, located in Stratton, Ohio, for the Electric Power Research Institute, on September 22, 23, and 24, 1999. The purpose of these tests was to meet the requirements of the EPA Mercury Information Request. Speciated mercury concentrations at the Unit Number 1 Baghouse Inlet Duct, speciated mercury emissions at the Unit Number 1 Baghouse South Outlet Duct, and mercury and chlorine content of the fuel were determined. The sulfur, ash, and Btu content of the fuel were also determined.

The sampling followed the procedures set forth in the Code of Federal Regulations, Title 40, Chapter I, Part 60, Appendix A, Methods 1, 2, 3B, 4, 5, 17, and 19; in the Ontario Hydro Method, Revised July 7, 1999; and ASTM Methods Modified D2234, D6414-99, D2361-95, D-0516, D-3174, and D-3286.

1.2 Key personnel

Mr. Bill Hefley of METCO Environmental was the onsite project manager. Mr. John Pellegrine, Mr. Shane Lee, Mr. Mike Bass, Mr. Jason Conway, Mr. Scott Hart, and Mr. Jason Brown of METCO Environmental performed the testing.

Mr. Dale Kanary of FirstEnergy acted as the utility representative. Mr. Morgan Jones of FirstEnergy performed process monitoring and sampling.

Mr. Paul Chu was the Electric Power Research Institute project manager.

Table 1-1
Test Program Organization

Organization	Individual	Responsibility	Phone Number
Project Team			
METCO	Bill Hefley	Project Manager	(972) 931-7127
Utility			
FirstEnergy	Dale Kanary	Utility Representative	(330) 384-5744
FirstEnergy	Morgan Jones	Process Monitoring	(330) 384-5449
QA/QC			
EPRI	Paul Chu	Project Manager	(650) 855-2812

2 SOURCE AND SAMPLING LOCATION DESCRIPTIONS

2.1 Process Description

W.H. Sammis Unit Number 1 is a 180 net megawatt unit with a dry-bottom bituminous pulverized coal wall-fired boiler. The boiler is equipped with 15 burners arranged for front-wall firing in 5 rows of 3 burners each. The original Foster-Wheeler burners were retrofit with RJM Corporation low NO_x burner. Nominal steam capacity is 1,250,000 lbs/hr and nominal heat input is 1,822 mmBtu/hr. The boiler was placed in operation in 1959.

2.2 Control Equipment Description

The air pollution control equipment consists of an American Air Filter Reverse Gas Baghouse. Flue gases are drawn into individual inlet gas manifolds under negative pressure by the induced draft fans located on the outlet side of the collector. The inlet gas manifold directs the gases to the inlet opening provided for each compartment of the collector. The flue gases flow downward into the upper section of the hopper through the hopper inlet. After entering the hopper, the gases are directed up through the tube sheets and into the fiberglass filter bags where the dust particles are collected on the interior surface. The cleaned gases leave the individual compartment through outlet poppet dampers. The flue gases enter the outlet gas manifold and pass through the induced draft fan to the system's chimney.

Dust collected on the filter bags interior surface is periodically removed by the reverse air system.

One of the collector compartments undergoes a cleaning operation at a given time and the remaining compartments stay on line handling dirty gases. The cleaning operation begins with the outlet gas poppet damper of one compartment closing, which stops flow of gases to that compartment. The reverse air poppet damper for that compartment opens, and the filter bags are subjected to a pressure created by the reverse air fan. The pressure developed in the cleaning compartment causes the filter bags to partially collapse. As the fabric is flexed by the reverse flow, the collected dust cake on the filter bag interior crumbles, falling into the compartment hopper below. At the end of clean period timer sequence, the reverse air damper closes and a null period begins during which time both outlet and reverse air dampers are in the closed position. During this null, dislodged dust is allowed to settle in the compartment hopper. Following the null period is a soft re-inflation period allowing the filter bags to gently repressurize which is accomplished by partially opening the outlet damper for a short time period, after which, outlet damper opens to a full open position.

2.3 Flue Gas and Process Sampling Locations

2.3.1 Inlet Sampling Location

The sampling location on the Unit Number 1 Baghouse Inlet Duct is approximately 100 feet above the ground. The sampling locations are located 73 feet 7 inches (5.65 equivalent duct diameters) downstream from a constriction in the duct and 14 feet (1.08 equivalent duct diameters) upstream from an expansion in the duct.

2.3.2 Outlet Sampling Location

The sampling location on the Unit Number 1 Baghouse South Outlet Duct is approximately 89 feet above the ground. The sampling locations are located 22 feet 3 inches (2.51 equivalent duct diameters) downstream from a bend in the duct and 5 feet 8 inches (0.64 equivalent duct diameters) upstream from a bend in the duct.

2.3.3 *Coal Sampling Location*

The coal sampling locations are located at the coal feeders immediately upstream of the coal pulverizers (P).

Figure 2-1
Description of sampling locations at W.H. Sammis Unit Number 1 Baghouse Inlet Duct

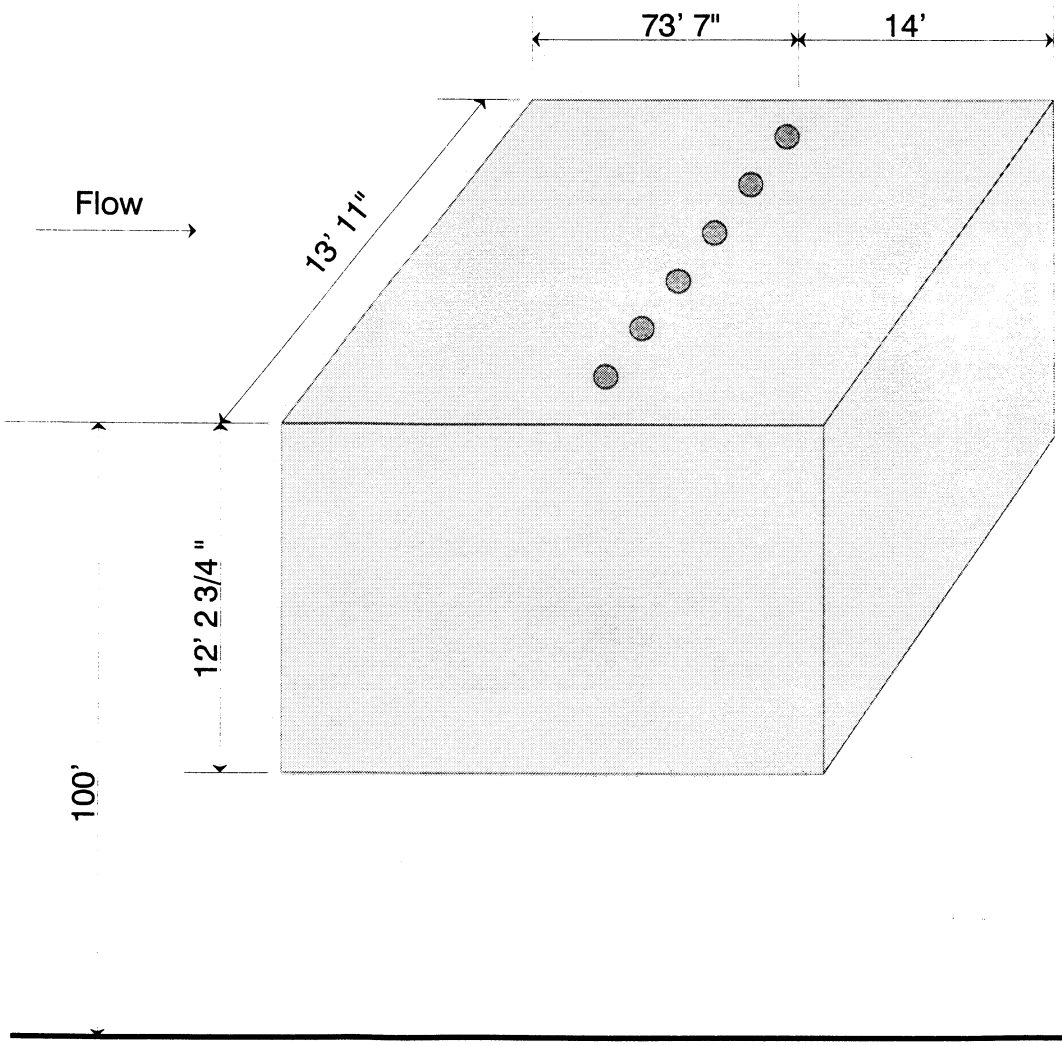


Figure 2-2
Description of sampling points at W.H. Sammis Unit Number 1 Baghouse Inlet Duct

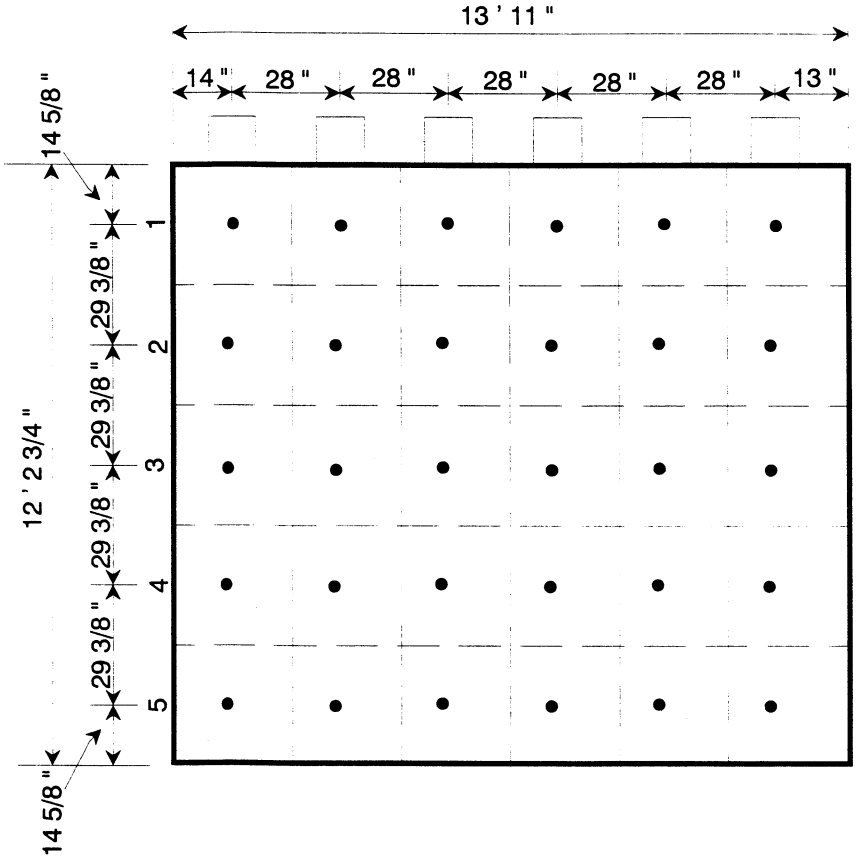


Figure 2-3
Description of sampling locations at W.H. Sammis Unit Number 1 Baghouse South Outlet Duct

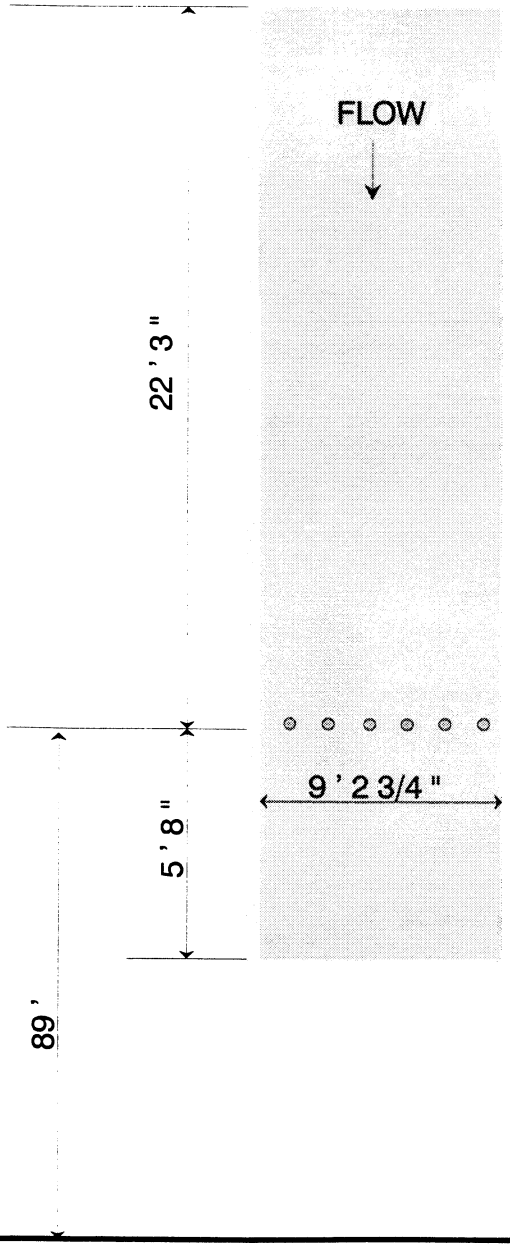


Figure 2-4
Description of sampling points at W.H. Sammis Unit Number 1 Baghouse South Outlet Duct

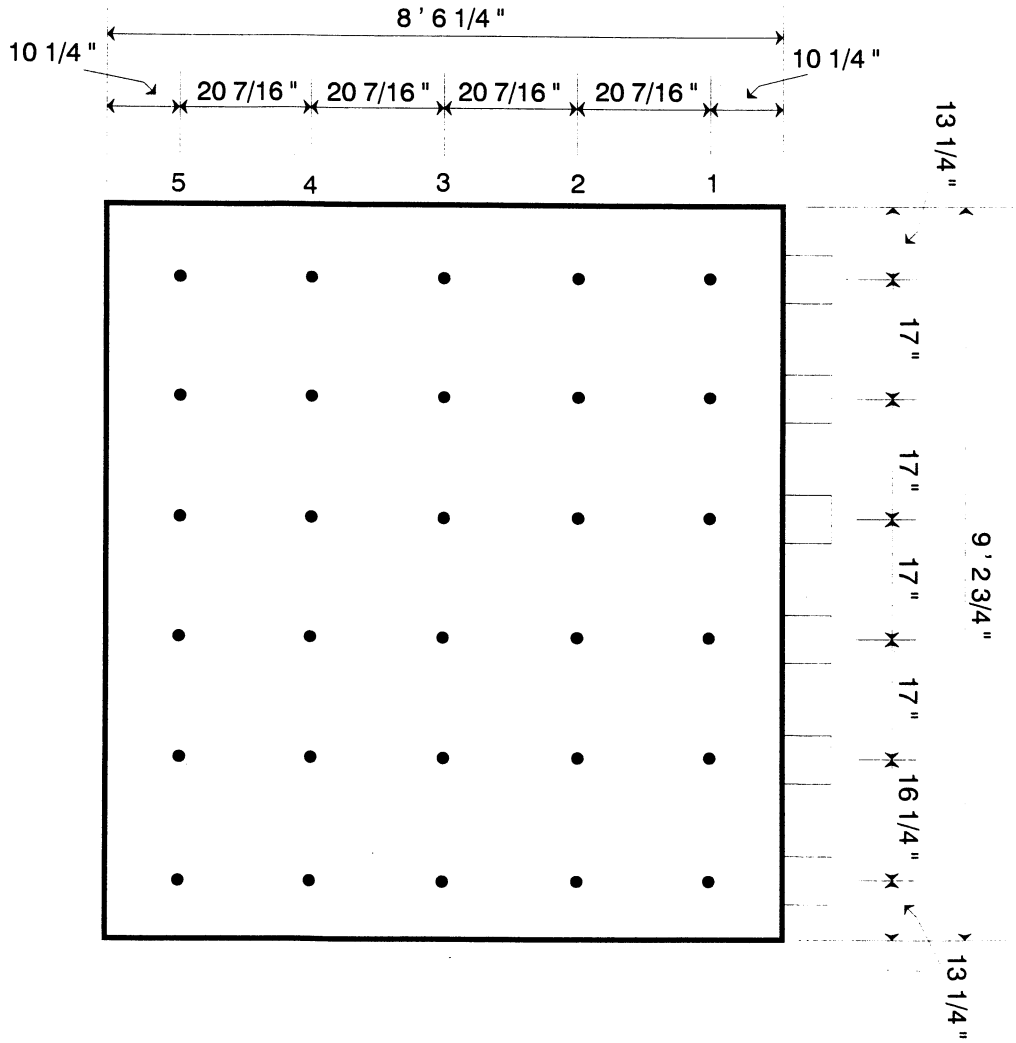
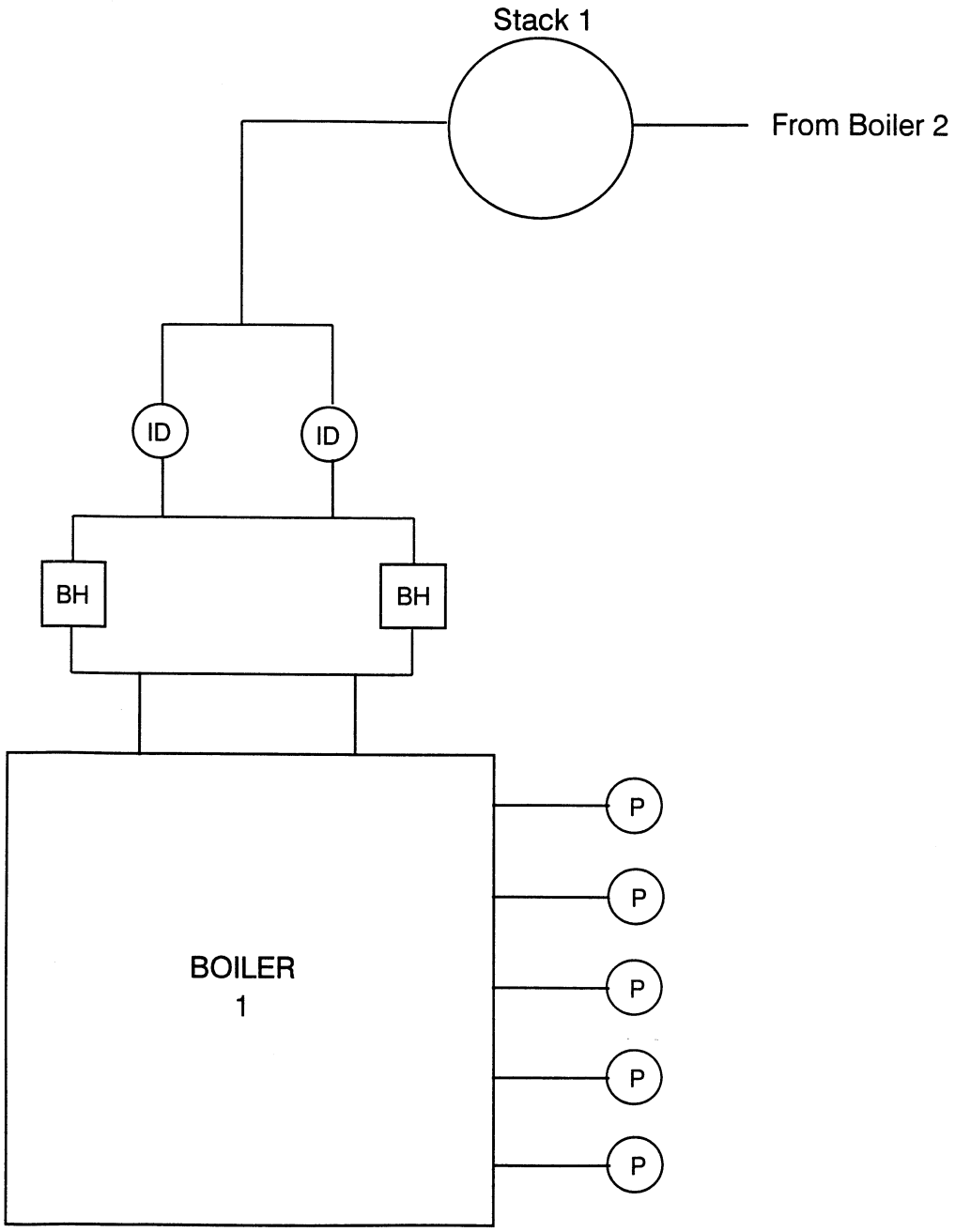


Figure 2-5
Description of coal sampling locations at W.H. Sammis Unit Number 1



3 SUMMARY AND DISCUSSION OF RESULTS

3.1 Objectives and Test Matrix

3.1.1 Objective

The objective of the tests was to collect the information and measurements required by the EPA Mercury ICR. Specific objectives listed in order of priority are:

1. Quantify speciated mercury emissions at the outlet.
2. Quantify speciated mercury concentrations in the flue gas at the inlet.
3. Quantify fuel mercury and chlorine content during the outlet and inlet tests.
4. Provide the above information for use in developing boiler, fuel, and specific control device mercury emission factors.

3.1.2 Test Matrix

The test matrix is presented in Table 1. The table includes a list of test methods to be used. In addition to speciated mercury, the flue gas measurements include moisture, flue gas flow rates, carbon dioxide, and oxygen.

Table 3-1
Test Matrix for Mercury ICR Tests at W.H. Sammis Unit Number 1

Sampling Location	No. of Runs	Species Measured	Sampling Method	Sample Run Time	Analytical Method	Analytical Laboratory
Outlet	3	Speciated Hg	Ontario Hydro	150 min	Ontario Hydro	TestAmerica
Outlet	3	Moisture	EPA 4	Concurrent	Gravimetric	METCO
Outlet	3	Flue Gas Flow	EPA 1 & 2	Concurrent	Pitot Traverse	METCO
Outlet	3	O_2 & CO_2	EPA 3B	Concurrent	Orsat	METCO
Inlet	3	Speciated Hg	Ontario Hydro	150 min	Ontario Hydro	TestAmerica
Inlet	3	Moisture	EPA 4	Concurrent	Gravimetric	METCO
Inlet	3	Flue Gas Flow	EPA 1 & 2	Concurrent	Pitot Traverse	METCO
Inlet	3	O_2 & CO_2	EPA 3B	Concurrent	Orsat	METCO
Coal Feeders	3	Hg, Cl, Sulfur, Ash, and Btu/lb in coal	Modified ASTM D2234	1 grab sample per mill per run	ASTM D6414-99 (Hg), ASTM D2361-95 (Cl), ASTM D-0516 (S), ASTM D-3174 (Ash), and ASTM D-3286 (Btu/lb)	TestAmerica and Philip Services

3.2 Field Test Changes and Problems

No deviations were made from the approved Sampling and Analytical Test Plan.

3.3 Summary of Results

The results of the tests performed at W.H. Sammis Unit Number 1 are listed in the following tables.

Table 3-3
W.H. Sammis Unit Number 1 Mercury Removal Efficiency

Run Number	1	2	3	Average
Test Date	09/23/99	09/24/99	09/24/99	
Test Time	1555-1904	0742-1017	1145-1427	
Total mercury				
Inlet - lb/10^{12} Btu	8.406	10.954	10.438	9.933
Outlet - lb/10^{12} Btu	0.006	0.008	0.014	0.009
Removal efficiency - %	99.9	99.9	99.9	99.9
Particulate mercury				
Inlet - lb/10^{12} Btu	8.406	10.954	10.438	9.933
Outlet - lb/10^{12} Btu	0.006	0.008	0.014	0.009
Removal efficiency - %	99.9	99.9	99.9	99.9
Oxidized mercury				
Inlet - lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
Outlet - lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
Removal efficiency - %	-----	-----	-----	-----
Elemental mercury				
Inlet - lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
Outlet - lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
Removal efficiency - %	-----	-----	-----	-----

N.D. - None detected.

Table 3-4 W.H. Sammis Unit Number 1 Mercury Speciation Results

Run Number	1	2	3	Average
Test Date	09/23/99	09/24/99	09/24/99	
Test Time	1555-1904	0742-1017	1145-1427	
Inlet Mercury Speciation				
Particulate mercury – ug	17.10	23.30	21.30	—
ug/dscm	9.814	12.788	12.186	11.596
lb/10^{12} Btu	8.406	10.954	10.438	9.933
% of total Hg	100.0	100.0	100.0	100.0
Oxidized mercury – ug	N.D.	N.D.	N.D.	N.D.
ug/dscm	N.D.	N.D.	N.D.	N.D.
lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
% of total Hg	—	—	—	—
Elemental mercury - ug	N.D.	N.D.	N.D.	N.D.
ug/dscm	N.D.	N.D.	N.D.	N.D.
lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
% of total Hg	—	—	—	—
Total mercury – ug	17.10	23.30	21.30	—
ug/dscm	9.814	12.788	12.186	11.596
lb/10^{12} Btu	8.406	10.954	10.438	9.933
Outlet Mercury Speciation				
Particulate mercury – ug	0.013	0.017	0.028	—
ug/dscm	0.007	0.009	0.016	0.011
lb/10^{12} Btu	0.006	0.008	0.014	0.009
% of total Hg	100.0	100.0	100.0	100.0
Oxidized mercury – ug	N.D.	N.D.	N.D.	N.D.
ug/dscm	N.D.	N.D.	N.D.	N.D.
lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
% of total Hg	—	—	—	—
Elemental mercury – ug	N.D.	N.D.	N.D.	N.D.
ug/dscm	N.D.	N.D.	N.D.	N.D.
lb/10^{12} Btu	N.D.	N.D.	N.D.	N.D.
% of total Hg	—	—	—	—
Total mercury – ug	0.013	0.017	0.028	—
ug/dscm	0.007	0.009	0.016	0.011
lb/10^{12} Btu	0.006	0.008	0.014	0.009
Coal Analysis				
Mercury - ppm dry	0.081	0.120	0.117	0.106
Mercury - lb/10^{12} Btu	7.36	8.98	9.07	8.47
Chlorine - ppm dry	1,300	1,200	1,200	1,233
Moisture - %	5.34	4.74	4.74	4.94
Sulfur - % dry	0.91	1.51	1.43	1.28
Ash - % dry	17.3	9.3	9.84	12.15
HHV - Btu/lb as fired	11,550	12,950	12,890	12,463
Coal flow - lb/hr as fired	117,600	111,800	111,200	113,533
Total Heat Input – 10^6 Btu/hr	1,358.3	1,447.8	1,433.4	1,413.2
Total Mercury Mass Rates				
lb/hr input in coal	0.010	0.013	0.013	0.012
lb/hr at Baghouse inlet	0.011	0.016	0.015	0.014
lb/hr emitted	8.15 E-06	1.16 E-05	2.01 E-05	1.33 E-05

N.D. - None detected.

Table 3-5
W.H. Sammis Unit Number 1 Process Data

Run Number	**1**	**2**	**3**
Test Date	09/23/99	09/24/99	09/24/99
Test Time	1555-1904	0742-1017	1145-1427
Unit Operation			
Unit Load - MW net	177	177	177
Coal Mills in Service	All	All	All
Coal Flow - tons/hr	58.8	55.9	55.6
Boiler CEMS data			
CO_2 - %	11.88	11.87	11.88
NO_x – lb/10^6 Btu	0.534	0.530	0.507
Fabric Filter data			
Baghouse Δ Pressure - "H_2O	5.97	6.01	5.91
Gas inlet temperature - °F	311	305	305
Gas outlet temperature - °F	301	290	290

4 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Emission Test Methods

The sampling followed the procedures set forth in the Code of Federal Regulations, Title 40, Chapter I, Part 60, Appendix A, Methods 1, 2, 3B, 4, 5, 17, and 19; in the Ontario Hydro Method, Revised July 7, 1999; and ASTM Methods Modified D2234, D6414-99, D2361-95, D-0516, D-3174, and D-3286.

A preliminary velocity traverse was made at each of the six ports at the inlet sampling location, in order to determine the uniformity and magnitude of the flow prior to testing. All traverse points were checked for cyclonic flow and the average angle was equal to 3.0 degrees. Alternate procedures would be required if the angle of cyclonic flow were greater than 20 degrees. Five traverse points were sampled from each of the six ports, for a total of thirty traverse points at both sampling locations.

A preliminary velocity traverse was made at each of the six ports at the outlet sampling locations, in order to determine the uniformity and magnitude of the flow prior to testing. All traverse points were checked for cyclonic flow and the average angle was equal to 14.5 degrees. Alternate procedures would be required if the angle of cyclonic flow were greater than 20 degrees. Five traverse points were sampled from each of the six ports, for a total of thirty traverse points at both sampling locations.

The sampling trains were leak-checked at the end of the nozzle at 15 inches of mercury vacuum before each test, and again after each test at the highest vacuum reading recorded during each test. This was done to predetermine the possibility of a diluted sample.

The pitot tube lines were checked for leaks before and after each test under both a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

Integrated orsat samples were collected and analyzed according to EPA Method 3B during each test.

4.1.1 Mercury

Triplicate samples for mercury were collected. The samples were taken according to EPA Methods 1, 2, 3B, 4, 5, and 17; and the Ontario Hydro Method, Revised July 7, 1999. For each run at both sampling locations, samples of five-minute duration were taken isokinetically at each of the thirty traverse points for a total sampling time of 150 minutes. Data was recorded at five-minute intervals. Reagent blanks were submitted.

The "front-half" of the sampling train at the inlet sampling location contained the following components:

Teflon Coated Nozzle
In-stack Quartz Fiber Thimble and Backup Filter and Teflon Coated Support
Heated Glass Probe @ > 248°F

The "front-half" of the sampling train at the outlet sampling location contained the following components:

Teflon Coated Nozzle
In-stack Quartz Fiber Filter and Teflon Coated Support
Heated Glass Probe @ > 248°F

The "back-half" of the sampling train at both sampling locations contained the following components:

Impinger Number	Impinger Type	Impinger Contents	Amount	Parameter Collected
1	Modified Design	1 mol/L KCL	100 ml	Oxidized Mercury and Moisture
2	Modified Design	1 mol/L KCL	100 ml	Oxidized Mercury and Moisture
3	Greenburg-Smith Design	1 mol/L KCL	100 ml	Oxidized Mercury and Moisture
4	Modified Design	5% HNO_3 and 10% H_2O_2	100 ml	Elemental Mercury and Moisture
5	Modified Design	4% $KMnO_4$ and 10% H_2SO_4	100 ml	Elemental Mercury and Moisture
6	Modified Design	4% $KMnO_4$ and 10% H_2SO_4	100 ml	Elemental Mercury and Moisture
7	Greenburg-Smith Design	4% $KMnO_4$ and 10% H_2SO_4	100 ml	Elemental Mercury and Moisture
8	Modified Design	Silica	200 g	Moisture

All glassware was cleaned prior to use according toe the guidelines outlined in EPA Method 29, Section 5.1.1 and the Ontario Hydro Method, Revised July 7, 1999, Section 13.2.15. All glassware connections were sealed with Teflon tape.

At the conclusion of each test, the filter and impinger contents were recovered according to procedures outlined in the Ontario Hydro Method, Revised July 7, 1999, Section 13.2.

Mercury samples were analyzed by Cold Vapor Atomic Absorption and Fluorescence Spectroscopy.

4.2 Process Test Methods

A modified ASTM D2234 method of coal sampling was followed. For each test run, a grab sample of coal was collected from each coal feeder immediately upstream of the coal pulverizers. One composite sample was prepared for analysis from the individual feeder samples. Each sample was analyzed for mercury, chlorine, sulfur, ash, and Btu content by ASTM Methods D6414-99, D2361-95, D-0516, D-3174, and D-3286 respectively.

4.3 Sample Tracking and Custody

Samples and reagents were maintained in limited access, locked storage at all times prior to the test dates. While on site, they were at an attended location or in an area with limited access. Off site, METCO and TestAmerica provided limited access, locked storage areas for maintaining custody.

Chain of custody forms are located in Appendix F. The chain of custody forms provide a detailed record of custody during sampling, with the initials noted of the individuals who loaded and recovered impinger contents and filters, and performed probe rinses.

All samples were packed and shipped in accordance with regulations for hazardous substances.

5 QA/QC ACTIVITIES

The major project quality control checks are listed in Table 5-1. Matrix Spike Summaries are listed in Table 5-2. Duplicate and Triplicate Analyses Summaries are listed in Table 5-3. Additional method-specific QC checks are presented in Table 5-4 (Methods 1 and 2), Table 5-5 (Method 5/17 sampling), and Table 5-6 (Ontario Hydro sample recovery and analysis). These tables also include calibration frequency and specifications.

Table 5-1 Major Project Quality Control Checks

QC Check	*Information Provided*	*Results*
Blanks		
Reagent blank	Bias from contaminated reagent	No Mercury was detected
Field blank	Bias from handling and glassware	No Mercury was detected
Spikes		
Matrix spike	Analytical bias	Results were 74% - 107% recovery
Replicates		
Duplicate analyses	Analytical precision	Results were < 10% RPD
Triplicate analyses	Analytical precision	Results were < 10% RPD

Table 5-2 Precipitator Matrix Spike Summary

Sampling Location	*Run Number*	*Container*	*Results*	*True Value*	*Recovery (%)*
Inlet Duct	1	2	0.446ug	0.600ug	74
Inlet Duct	3	4	3.10ug	2.90ug	107
Outlet Duct	Blank Train	3	4.84ug	4.70ug	103
Reagent Blank	——	7	0.994ug/l	1.0ug/l	99
Reagent Blank	——	10	10.3ug/l	10.0ug/l	103

Table 5-3
Duplicate and Triplicate Analyses Summary

Sampling Location	Run Number	Container	Results (ug)	Duplicate Results (ug)	RPD	Triplicate Results (ug)	RPD
A Inlet Duct	1	1A	17.1	17.2	1	17.5	2
		1B	<0.010	<0.010	0	----	----
		2	<0.120	<0.120	0	----	----
		3	<1.39	<1.39	0	----	----
		4	<0.600	<0.600	0	----	----
		5	<1.12	<1.12	0	----	----
	2	1A	23.3	22.2	5	----	----
		1B	<0.010	<0.010	0	----	----
		2	<0.160	<0.160	0	----	----
		3	<1.52	<1.52	0	<1.52	0
		4	<0.640	<0.640	0	----	----
		5	<1.00	<1.00	0	----	----
	3	1A	21.1	20.3	5	20.9	2
		1B	<0.010	<0.010	0	----	----
		2	<0.140	<0.140	0	----	----
		3	<1.49	<1.49	0	----	----
		4	<0.580	<0.580	0	<0.580	0
		5	<0.920	<0.920	0	----	----
A Outlet Duct	1	1A	0.013	0.014	7	----	----
		2	<0.094	<0.094	0	----	----
		3	<1.44	<1.44	0	----	----
		4	<0.720	<0.720	0	----	----
		5	<1.04	<1.04	0	----	----
	2	1A	0.017	0.017	0	----	----
		2	<0.166	<0.166	0	----	----
		3	<1.76	<1.76	0	----	----
		4	<0.620	<0.620	0	----	----
		5	<1.01	<1.01	0	----	----
	3	1A	0.028	0.028	0	----	----
		2	<0.076	<0.076	0	----	----
		3	<1.43	<1.43	0	----	----
		4	<0.560	<0.560	0	----	----
		5	<1.02	<1.02	0	----	----

Table 5-4
QC Checklist and Limits for Methods 1 and 2

Quality Control Activity	Acceptance Criteria and Frequency	Reference
Measurement site evaluation	>2 diameters downstream and 0.5 diameters upstream of disturbances	Method 1, Section 2.1
Pitot tube inspection	Inspect each use for damage, once per program for design tolerances	Method 2, Figures 2-2 and 2-3
Thermocouple	+/- 1.5% (°R) of ASTM thermometer, before and after each test mobilization	Method 2, Section 4.3
Barometer	Calibrate each program vs. mercury barometer or vs. weather station with altitude correction	Method 2, Section 4.4

Table 5-5
QC Checklist and Limits for Method 5/17 Sampling

Quality Control Activity	Acceptance Criteria and Frequency	Reference
Pre-mobilization checks		
Gas meter/orifice check	Before test series, Y_D +/- 5% (of original Y_D)	Method 5, Section 5.3
Probe heating system	Continuity and resistance check on element	
Nozzles	Note number, size, material	
Glassware	Inspect for cleanliness, compatibility	
Thermocouples	Same as Method 2	
On-site pre-test checks		
Nozzle	Measure inner diameter before first run	Method 5, Section 5.1
Probe heater	Confirm ability to reach temperature	
Pitot tube leak check	No leakage	Method 2, Section 3.1
Visible inspection of train	Confirm cleanliness, proper assembly	
Sample train leak check	≤0.02 cf at 15" Hg vacuum	Method 5, Section 4.1.4
During testing		
Probe and filter temperature	Monitor and confirm proper operation	
Manometer	Check level and zero periodically	
Nozzle	Inspect for damage or contamination after each traverse	Method 5, Section 5.1
Probe/nozzle orientation	Confirm at each point	
Post test checks		
Sample train leak check	≤0.02 cf at highest vacuum achieved during test	Method 5, Section 4.1.4
Pitot tube leak check	No leakage	Method 2, Section 3.1
Isokinetic ratio	Calculate, must be 90-110%	Method 5, Section 6
Dry gas meter calibration check	After test series, Y_D +/- 5%	Method 5, Section 5.3
Thermocouples	Same as Method 2	
Barometer	Compare w/ standard, +/- 0.1" Hg	

Table 5-6 QC Checklist and Limits for Ontario Hydro Mercury Speciation

Quality Control Activity	Acceptance Criteria and Frequency	Reference
Pre-mobilization activities		
Reagent grade	ACS reagent grade	Ontario Hydro Section 8.1
Water purity	ASTM Type II, Specification D 1193	Ontario Hydro Section 8.2
Sample filters	Quartz; analyze blank for Hg before test	Ontario Hydro Section 8.4.3
Glassware cleaning	As described in Method	Ontario Hydro Section 8.10
On-site pre-test activities		
Determine SO_2 concentration	If >2500 ppm, add more HNO_3-H_2O_2 solution	Ontario Hydro Section 13.1.13
Prepare KCl solution	Prepare batch as needed	Ontario Hydro Section 8.5
Prepare HNO_3-H_2O_2 solution	Prepare batch as needed	Ontario Hydro Section 8.5
Prepare H_2SO_4-$KMnO_4$ solution	Prepare daily	Ontario Hydro Section 8.5
Prepare HNO_3 rinse solution	Prepare batch as needed; can be purchased premixed	Ontario Hydro Section 8.6
Prepare hydroxylamine solution	Prepare batch as needed	Ontario Hydro Section 8.6
Sample recovery activities		
Brushes and recovery materials	No metallic material allowed	Ontario Hydro Section 13.2.6
Check for $KMnO_4$ Depletion	If purple color lost in first two impingers, repeat test with more HNO_3-H_2O_2 solution	Ontario Hydro Section 13.1.13
Probe cleaning	Move probe to clean area before cleaning	Ontario Hydro Section 13.2.1
Impinger 1,2,3 recovery.	After rinsing, add permanganate until purple color remains to assure Hg retention	Ontario Hydro Section 13.2.8
Impinger 5,6,7 recovery.	If deposits remain after HNO_3 rinse, rinse with hydroxylamine sulfate. If purple color disappears after hydroxylamine sulfate rinse, add more permangante until color returns	Ontario Hydro Section 13.2.10
Impinger 8	Note color of silica gel; if spent, regenerate or dispose.	Ontario Hydro Section 13.2.11
Blank samples		
0.1 N HNO_3 rinse solution	One reagent blank per batch.	Ontario Hydro Section 13.2.12
KCl solution	One reagent blank per batch.	Ontario Hydro Section 13.2.12
HNO_3-H_2O_2 solution	One reagent blank per batch.	Ontario Hydro Section 13.2.12
H_2SO_4-$KMnO_4$ solution	One reagent blank per batch.	Ontario Hydro Section 13.2.12
Hydroxylamine sulfate solution	One reagent blank per batch.	Ontario Hydro Section 13.2.12
Unused filters	Three from same lot.	Ontario Hydro Section 13.2.12
Field blanks	One per set of tests at each test location.	Ontario Hydro Section 13.4.1
Laboratory activities		
Assess reagent blank levels	Target <10% of sample value or <10x instrument detection limit. Subtract as allowed.	Ontario Hydro Section 13.4.1
Assess field blank levels	Compare to sample results. If greater than reagent blanks or greater than 30% of sample values, investigate. Subtraction of field blanks not allowed.	Ontario Hydro Section 13.4.1
Duplicate/triplicate samples	All CVAAS runs in duplicate; every tenth run in triplicate. All samples must be within 10% of each other; if not, recalibrate and reanalyze.	Ontario Hydro Section 13.4.1

6 DESCRIPTION OF TESTS

Personnel from METCO Environmental arrived at the plant at 4:30 p.m. on Wednesday, September 22, 1999. After meeting with plant personnel and attending a brief safety meeting, the equipment was moved onto the Unit Number 1 Baghouse Inlet Duct and South Outlet Duct. The equipment was secured for the night. All work was completed at 9:30 p.m.

On Thursday, September 23, work began at 6:00 a.m. The equipment was prepared for testing. The preliminary data was collected. Testing was delayed due to power problems at the sampling locations. The first set of tests for mercury began at 3:55 p.m. and was completed at 7:04 p.m. The samples were recovered. The equipment was secured for the night. All work was completed at 9:30 p.m.

On Friday, September 24, work began at 6:15 a.m. The equipment was prepared for testing. The second set of tests for mercury began at 7:42 a.m. Testing continued until the completion of the third set of tests at 2:27 p.m.

The samples were recovered. The equipment was moved off of the sampling locations and loaded into the sampling van. The samples and the data were transported to METCO Environmental's laboratory in Dallas, Texas, for analysis and evaluation.

Operation at FirstEnergy Corporation, Ohio Edison Company, W.H. Sammis Power Plant, Unit Number 1 Baghouse Inlet Duct and South Outlet Duct, located in Stratton, Ohio, for the Electric Power Research Institute, were completed at 5:15 p.m. on Friday, September 24, 1999.

Billy J. Mullins, Jr.

Billy J. Mullins, Jr. P.E.
President