Wisconsin Electric
A WISCONSIN ENERGY COMPANY

Wisconsin Electric
231 W. Michigan
P.O. Box 2046
Milwaukee, WI 53201-2046
Phone 414 221-2345

April 24, 2000

Mr. William Grimley / Ms Lara Autry
Emissions Measurement Center
Interstate 40 and Page Road
Room Number E-108 / E-128
Durham, NC 27711

RE: Mercury Flue Gas Measurements
Port Washington Power Plant, Unit-4

Dear Mr. Grimley and Ms Autry:

Enclosed are (3) copies of the test report for flue gas measurements performed on Unit 4 at the Port Washington Power Plant. As you may know, Unit-4 is equipped with a dry sorbent injection system to capture sulfur dioxide. Sodium bicarbonate is injected into the ductwork upstream of the ESP. The flue gas sampling was conducted by Mostardi-Platt, under contract to EPRI. The flue gas analytical work was performed by TEI Analytical, Inc. The coal and flyash samples were originally analyzed by Commercial Testing & Engineering. However, upon review of these analyses by ourselves and EPRI, we determined that the values were suspect in that they did not closely reflect the results of the one-year ICR coal analysis program that was conducted by the company at this facility. We subsequently decided to have the samples reanalyzed by the EERC. The EERC's analyses were then used to calculate the mass balance for mercury at this plant. The report was prepared by Mostardi-Platt.

Please contact me at (414) 221-2293 with any questions regarding this submittal.

Sincerely,

Terry Coughlin
Air Quality Team Leader

cc: Paul Chu, EPRI
Jim Platt, Mostardi-Platt

SPECIATED MERCURY EMISSIONS TESTING

Performed For
ELECTRIC POWER RESEARCH INSTITUTE

At The
Wisconsin Electric Power Company
Port Washington Power Plant
Unit 4 Air Heater Inlet and Precipitator Outlet
Port Washington, Wisconsin

November 17, 1999

Mostardi Platt

Mostardi-Platt Associates, Inc.
A Full-Service
Environmental Consulting
Company

945 Oaklawn Avenue
Elmhurst, Illinois 60126-1012
Phone 630-993-9000
Facsimile 630-993-9017

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Port Washington, Wisconsin
November 17, 1999

MOSTARDI PLATT PROJECT 94606
DATE SUBMITTED: APRIL 21, 2000

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CERTIFICATION SHEET

Having supervised and worked on the test program described in this report, and having written this report, I hereby certify the data, information, and results in this report to be accurate and true according to the methods and procedures used.

Data collected under the supervision of others is included in this report and is presumed to have been gathered in accordance with recognized standards.

MOSTARDI-PLATT ASSOCIATES, INC.

James R. Platt
Vice President, Emissions Services

Reviewed by:

Frank H. Jarke
Manager, Analytical and Quality Assurance

EXECUTIVE SUMMARY

This test report presents the results of the speciated mercury test program performed on Unit 4 at the Wisconsin Electric Power Company's (WEPCOs) Port Washington Power Plant.

The test program was sponsored by WEPCO and Electric Power Research Institute (EPRI). The test program was completed by MOSTARDI-PLATT ASSOCIATES, INC. (Mostardi Platt). The test program was performed on November 17, 1999.

The WEPCO Port Washington Power Plant was selected by the U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards (OAQPS) to satisfy the Information Collection Request (ICR) requirement. During the ICR test program, mercury speciation testing was performed on Unit 4. The results obtained during the ICR test program are provided in the Speciated Mercury Emissions Testing report dated April 2000. This data was collected to further validate the ICR measurements.

Mercury emissions testing using the Ontario Hydro method was performed on the air heater inlet and outlet of the ESP serving Unit 4. Representative samples of the coal, and ESP ash stream were sampled in conjunction with the emissions testing.

Table ES-1 presents a summary of the average speciated mercury concentrations and mass rate results for the Unit 4 test location. In addition, the average percent of particulate bound, oxidized, and elemental mercury in comparison to the total mercury are provided. Also presented on Table ES-1 are the measured mercury removal efficiencies and calculated mercury material balance for the tests performed on Unit 4.

Detailed discussions and presentations of all test data and data test results are provided in Sections 1 through 5 of this report.

TABLE ES-1
SUMMARY OF MERCURY SPECIATION TEST RESULTS
UNIT 4

PARAMETERS	Air Heater Inlet		ESP Outlet	
	Average of Test Runs	Average % of Total	Average of Test Runs	Average % of Total
PROCESS DATA:				
Megawatt Rate	74.2	—	74.2	—
Coal Feed Rate lb/hr	67,400		67,400	
Coal Btu content, Btu/lb (as received)	13,656		13,656	
Heat Input, 10^6 Btu/hr (F-Factor)	979.2		979.2	
Mercury Concentration, ug/g	0.14		0.14	
Mercury Emission rate, lbs/hr	9.21 E-03		9.21 E-03	
PARTICULATE BOUND MERCURY EMISSIONS:				
Concentration, ug/m^3	0.00	0.0	0.02	0.3
Concentration, ug /Nm^3	0.00		0.02	
Emission rate, lbs/10^{12} Btu	0.00		0.02	
Emission rate, lbs/hr	0.00		2.00 E-05	
OXIDIZED MERCURY EMISSIONS:				
Concentration, ug/m^3	5.70	36.2	5.22	67.1
Concentration, ug /Nm^3	6.12		5.60	
Emission rate, lbs/10^{12} Btu	4.36		4.43	
Emission rate, lbs/hr	4.29 E-03		3.93 E-03	
ELEMENTAL MERCURY EMISSIONS:				
Concentration, ug/m^3	10.04	63.8	2.54	32.6
Concentration, ug /Nm^3	10.77		2.73	
Emission rate, lbs/10^{12} Btu	7.69		2.16	
Emission rate, lbs/hr	7.57 E-03		1.91 E-03	
TOTAL MERCURY EMISSIONS:				
Concentration, ug/m^3	15.74	—	7.78	—
Concentration, ug /Nm^3	16.89		8.35	
Emission rate, lbs/10^{12} Btu	12.05		6.61	
Emission rate, lbs/hr	1.19 E-02		5.86 E-03	
TOTAL MERCURY REMOVAL EFFICIENCY:			50.8%	
MERCURY MATERIAL BALANCE(1):			88.4%	

(1) Based on total mercury in coal, compared to mercury in ESP ash and at ESP outlet.

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SPECIATED MERCURY EMISSIONS TESTING
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Unit 4 Air Heater Inlet and Precipitator Outlet
Port Washington, Wisconsin
November 17, 1999

1.0 INTRODUCTION

1.1 Summary of Test Program

The United States Environmental Protection Agency (USEPA), is using its authority under section 114 of the Clean Air Act, as amended, to require that selected coal-fired utility steam generating units provide certain information that will allow the USEPA to calculate the annual mercury emissions from each unit. This information will assist the USEPA Administrator in determining whether it is appropriate and necessary to regulate emissions of Hazardous Air Pollutants (HAPs) from electric utility steam generating units. The Emission Measurement Branch (EMB) of the Office of Air Quality Planning and Standards (OAQPS) oversees the emission measurement activities. Mostardi Platt conducted the mercury emission measurements.

The USEPA selected the Unit 4 of WEPCO in Port Washington, Wisconsin to be one of seventy-eight coal-fired utility steam generating units to conduct mercury emissions measurements. Testing was performed at Unit 4 on November 17, 1999, and was the only tested unit at this facility. Simultaneous measurements were conducted at the Air Heater Inlet and Precipitator Outlet duct. Mercury emissions were speciated into elemental, oxidized and particle-bound mercury using the Ontario-Hydro test method. Fuel samples were also collected concurrently with Ontario-Hydro samples in order to determine fuel mercury content.

1.2 Key Personnel

The key personnel who coordinated the test program and their telephone numbers are:

- James Platt, Mostardi Platt Vice President 630-993-9000
- Brenda Bergemann, WEPCO Plant Coordinator 414-221-2459
- Paul Chu, EPRI Program Manager 650-855-2812

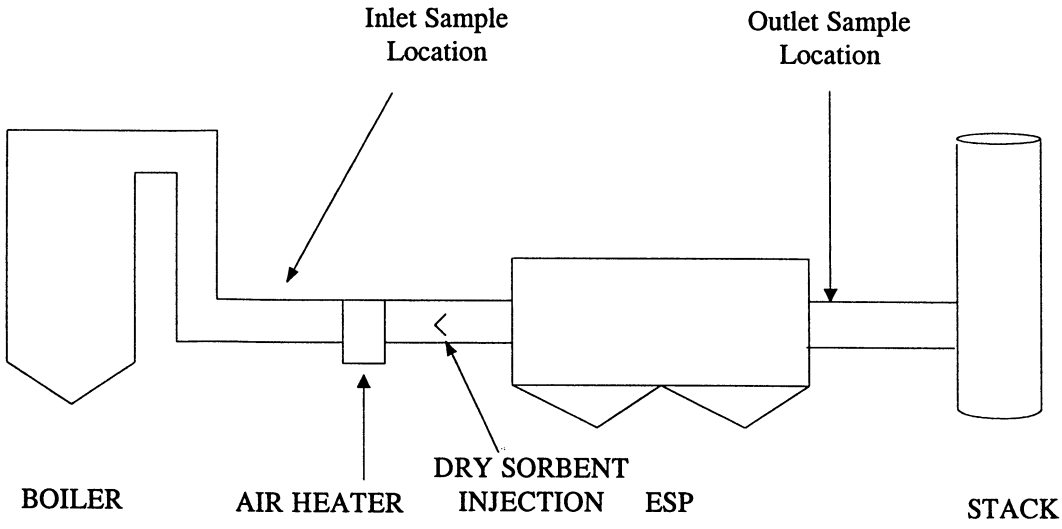
2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 Process Description

Port Washington Unit 4 is a pulverized coal-fired, balanced draft boiler with a name plate rating of 80 MW (gross). Figure 2-1 shows a schematic of the boiler and pollution control equipment, including sample points.

Unit 4 is a coal burning steam boiler. The steam is converted into mechanical energy by flowing through a turbine (generator) which produces electrical power. The unit was operated at or near full load during the tests. Fuel type, boiler operation and control device operation were maintained at normal operating conditions.

Figure 2-1 Facility Process Flow Diagram



The following is a list of operating components for this unit:

- Combustion Engineering boiler with Foster Wheeler superheats and reheats

- 80 MW gross capacity (Name plate rating)
- Fuel: Eastern bituminous, 1.6% sulfur
- SO_2 control: Dry Sorbent Injection
- NO_X control: None
- Research Cottrell Electrostatic Precipitator

2.2 Control Equipment Description

Particulate emissions from the boiler are controlled by a Research Cottrell electrostatic precipitator with an estimated collection efficiency of 99.7%. SO_2 emissions are controlled by a dry sorbent injection system prior to the precipitator.

The flue gas at the inlet was approximately 760°F. At the outlet, the gas temperature was approximately 400°F and contained approximately 7 percent (7%) moisture.

2.3 Flue Gas Sampling Locations

2.3.1 Inlet Location

Inlet samples were collected at the air heater inlet. A schematic and cross section of the inlet location is shown in Figure 2-2. This location does not meet the requirements of USEPA Method 1.

The flue gas exits the economizer through a 5-foot deep and 70 foot wide duct. Two (2) 6-inch test ports were installed at the only unobstructed points in the duct, five (5) feet above the floor level. Inlet traverses were performed for mercury concentration only. The outlet volumetric flow rates were used to calculate the inlet emission rates. The test location was prior to the sorbent injection system. Fly ash samples from the precipitator hoppers were analyzed to confirm if there was any particulate bound mercury. The inlet temperature was 760°F.

2.3.2 Outlet Location

Outlet samples were collected at the precipitator outlet sample ports. A schematic and cross section of the duct location is shown in Figure 2-3. This location does not meet the requirements of USEPA Method 1. Flow straighteners were in place in the duct, and allowed a relatively even flow at the test location. The test location was approved by the Wisconsin DNR as an acceptable compliance location.

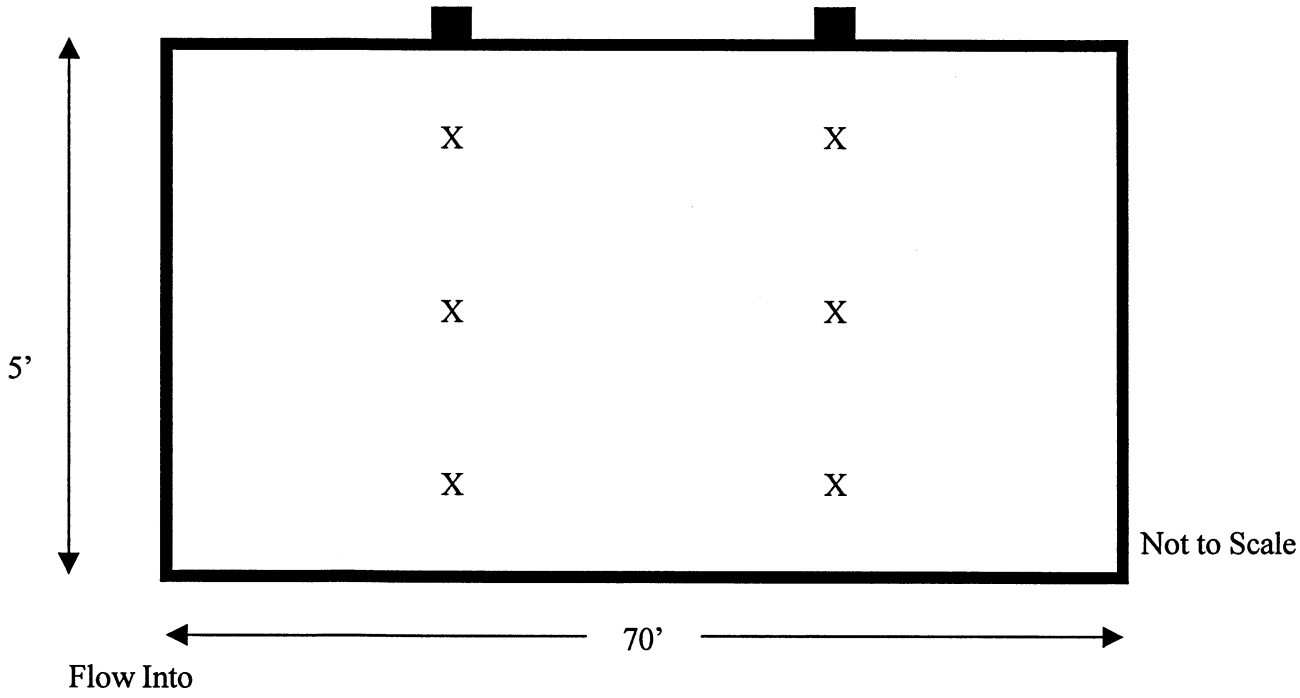
The flue gas at the outlet was above the method specification of a minimum filtration temperature of 120°C. Therefore, in duct filtration per Method 17 was used.

2.4 Fuel Sampling Location

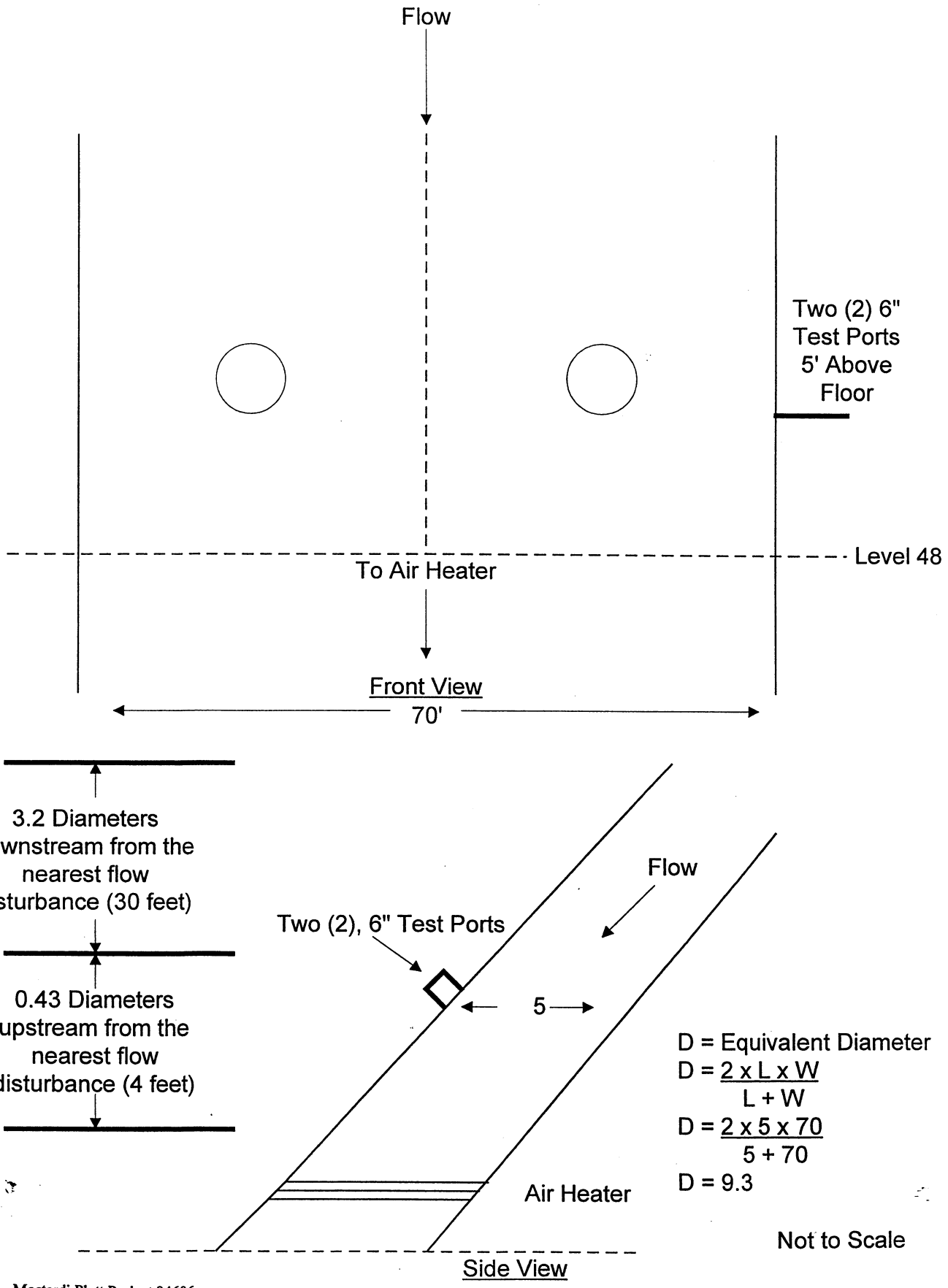
Fuel samples were collected at the Mill Fuel Pump 6 to 8 hours prior to the start of each test. One sample was collected for each test run. The Mostardi Platt test crew supervisor assisted plant personnel with the collection of fuel samples.

Figure 2-2 Schematic of the Unit 4 Air Heater Inlet Sampling Location

Equal Area Traverse For Rectangular Ducts (Inlet)



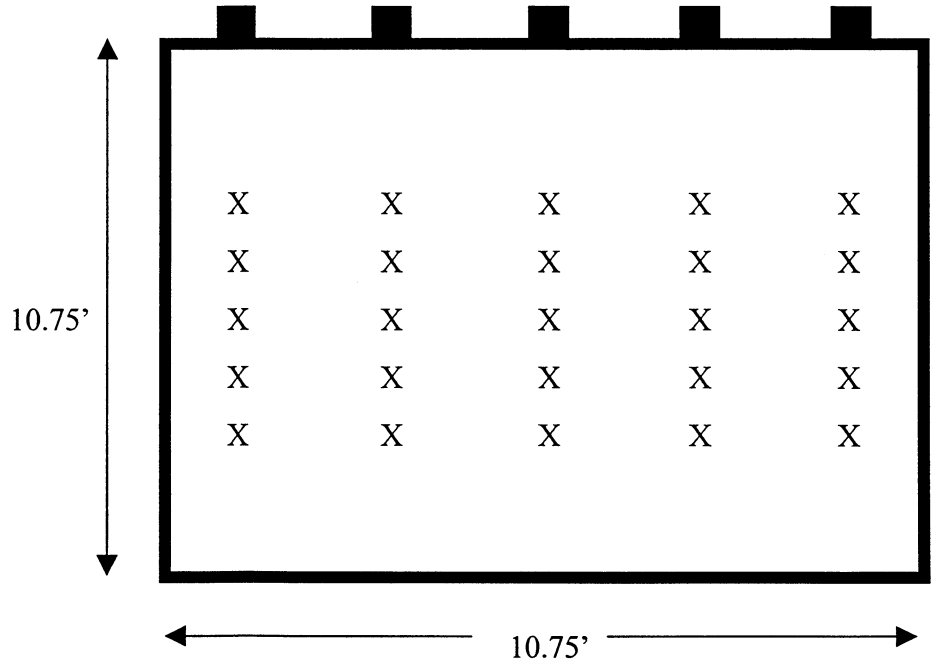
Job:	Wisconsin Electric Power Company Port Washington, Wisconsin		
Date:	November 17, 1999	Area:	350.00 ft^2
Unit No:	4	No. Test Ports:	2
Length:	5 Feet	Tests Points per Port:	3
Width:	70 Feet	Distance Between Ports:	Approx. 50 Feet
Duct No:	Air Heater Inlet	Distance Between Points:	1.67 Feet



Mostardi Platt Project 94606

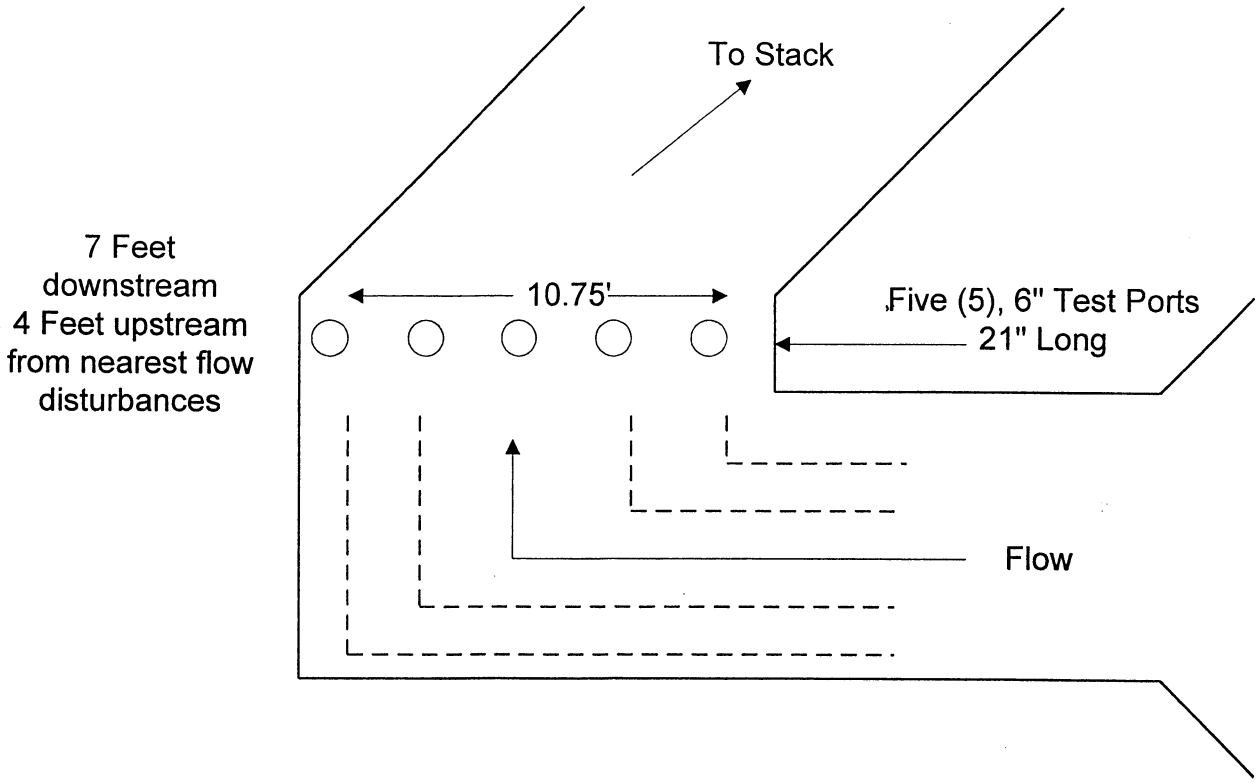
Figure 2-3 Schematic of the Unit 4 Precipitator Outlet Sampling Location

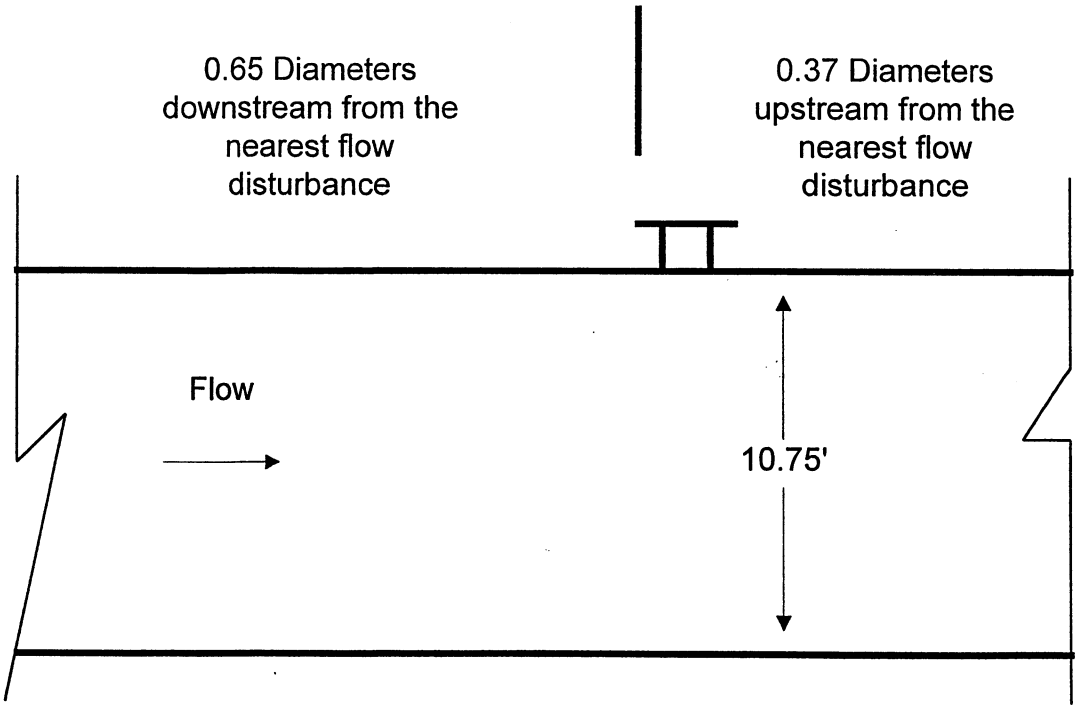
Equal Area Traverse For Rectangular Ducts (Outlet)



Not to Scale

Job:	Wisconsin Electric Power Company Port Washington, Wisconsin		
Date:	November 17, 1999	Area:	115.56 ft^2
Unit No:	4	No. Test Ports:	5
Length:	10.75 Feet	Tests Points per Port:	5
Width:	10.75 Feet	Distance Between Ports:	2.15 Feet
Duct No:	Outlet	Distance Between Points:	2.15 Feet





Side View

D = Equivalent Diameter

$$D = \frac{2 \times L \times W}{L + W}$$

$$D = \frac{2 \times 10.75 \times 10.75}{10.75 + 10.75}$$

$$D = 10.75$$

Not to Scale

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3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 Objectives and Test Matrix

The purpose of the test program was to quantify mercury emissions from this unit. This information will assist the USEPA Administrator in determining whether it is appropriate and necessary to regulate emissions of Hazardous Air Pollutants (HAPs) from electric utility steam generating units. The specific objectives, in order of priority were:

- Compare mass flow rates of mercury at the three sampling locations (fuel, air heater inlet, and precipitator outlet).
- Measure speciated mercury emissions at the outlet.
- Measure speciated mercury concentrations at the inlet of the last air pollution control device.
- Measure mercury and chlorine content from the fuel being used during the testing.
- Measure the oxygen and carbon dioxide concentrations at the inlet and the outlet.
- Measure the volumetric gas flow at the inlet and the outlet.
- Measure the moisture content of the flue gas at the inlet and the outlet.
- Provide the above information to the USEPA for use in establishing mercury emission factors for this type of unit.

The test matrix is presented in Table 3-1. The table shows the testing performed at each location, methodologies employed and responsible organization.

Table 3-1
TEST MATRIX FOR THE PORT WASHINGTON POWER PLANT – UNIT 4

Sampling Location	No. of Runs	Parameters	Sampling Method	Sample Run Time (min)	Analytical Method	Analytical Laboratory
Outlet	3	Speciated Hg	Ontario Hydro	120	EPA SW846 7470	TEI
Outlet	3	Moisture	EPA 4	120	Gravimetric	Mostardi Platt
Outlet	3	Flow	EPA 1 & 2	120	Pitot Traverse	Mostardi Platt
Outlet	3	O_2/CO_2	EPA 3	120	Orsat	Mostardi Platt
Inlet	3	Speciated Hg	Ontario Hydro	120	EPA SW846 7470	TEI
Inlet	3	Moisture	EPA 4	120	Gravimetric	Mostardi Platt
Inlet	3	Flow	EPA 1 & 2	120	Pitot Traverse	Mostardi Platt
Inlet	3	O_2/CO_2	EPA 3	120	Orsat	Mostardi Platt
Fuel Feeders	3	Hg, Cl in Fuel and Ash	Grab	1 Sample Per Feeder Per Run	ASTM D3684 (Hg) ASTM D4208 (Cl)	CTE
Fuel Feeders	3	Hg in Fuel	Grab	1 Sample Per Feeder Per Run	EPA 7473	EERC
Precipitator Hopper	3	Hg in Ash	Grab	1 Sample Per Run	EPA 7471a	EERC

3.2 Field Test Changes and Problems

There were no field test changes or problems encountered during this test program.

3.3 Presentation of Results

3.3.1 Mercury Mass Flow Rates

The mass flow rates of mercury determined at each sample location are presented in Table 3-2.

Table 3-2
SUMMARY OF RESULTS

Sample Location	Elemental Mercury (lb/hr)	Oxidized Mercury (lb/hr)	Particle-Bound Mercury (lb/hr)	Total Mercury (lb/hr)
Fuel				
Run 1				0.00918
Run 2				0.00931
Run 3				0.00915
Average				**0.00921**
Air Heater Inlet				
Run 1	0.00820	0.00306	0.00000	0.01126
Run 2	0.00768	0.00540	0.00000	0.01308
Run 3	0.00683	0.00440	0.00000	0.01123
Average	**0.00757**	**0.00429**	**0.00000**	**0.01185**
Precipitator Outlet				
Run 1	0.00194	0.00406	0.00000	0.00600
Run 2	0.00191	0.00366	0.00000	0.00557
Run 3	0.00189	0.00407	0.00005	0.00601
Average	**0.00191**	**0.00393**	**0.00002**	**0.00586**

3.3.2 Comparison of Volumetric Flow Rate

Volumetric flow rate is a critical factor in calculating mass flow rates. Ideally, the volumetric flow rate (corrected to standard pressure and temperature) measured at the inlet to the control device should be the same as that measured at the duct, which should be the same as that measured by the CEMS. A comparison of the flow rates of the three locations on a thousand standard cubic foot per minute basis (KSCFM) is given in Table 3-3.

Table 3-3
COMPARISON OF VOLUMETRIC FLOW RATE DATA

	Inlet			Outlet			CEMS
Run No.	**KACFM**	**KSCFM**	**KDSCFM**	**KACFM**	**KSCFM**	**KDSCFM**	**KSCFM**
Run 1	749.6	318.5	295.0	359.9	218.0	203.0	251.4
Run 2	724.9	306.6	281.4	356.9	215.4	200.6	247.6
Run 3	752.5	318.4	294.8	356.7	215.0	199.9	247.5
Average	742.3	314.5	290.4	357.9	216.1	201.2	248.8

The difference of the measured flowrate (KSCFM) at the outlet was within 13% of that determined by the continuous emissions monitoring system (CEMS). Both the inlet and outlet test locations did not meet the requirements of USEPA Method 1. Because the outlet volumetric flowrates were in agreement with the CEMS values measured at the duct, the inlet emission rates were calculated based on the outlet volumetric flowrates.

3.3.3 Individual Run Results

A detailed summary of results for each sample run at the air heater inlet and precipitator outlet test locations are presented in Tables 3-4 and 3-5, respectively.

3.3.4 Process Operating Data

The process operating data collected during the tests is included in Appendix A. A summary of the coal usage and mass emission rate of mercury available from coal are presented in Table 3-6.

A fly ash sample was collected during the tests and sent to EERC and CTE to be analyzed for mercury content. The results from EERC were used to report final ash content. All results are given in Appendix F.

Table 3-4
AIR HEATER INLET INDIVIDUAL RUN RESULTS

Test Run Number:	1	2	3	Average
Source Condition		Normal		
Fuel Factor, dscf/10^6 Btu	9672	9732	9710	
Date	11/17/99	11/17/99	11/17/99	
Start Time	8:00	11:10	14:30	
End Time	10:14	12:10	16:39	
Elemental Mercury:				
HNO_3-H_2O_2, ug detected	2.380	0.915	1.920	1.738
H_2SO_4-$KMnO_4$, ug detected	13.994	6.314	11.894	10.734
Reported, ug	16.374	7.229	13.814	12.472
ug/dscm	10.79	10.22	9.12	10.04
lb/hr	0.01192	0.01077	0.01007	0.01092
lb/hr (based on outlet dscfm)	0.00820	0.00768	0.00683	0.00757
lb/10^{12} Btu	8.20	7.81	7.04	7.69
Oxidized Mercury:				
KCl, ug detected	6.098	5.088	8.898	6.695
Reported, ug	6.098	5.088	8.898	6.695
ug/dscm	4.02	7.19	5.87	5.70
lb/hr	0.00444	0.00758	0.00649	0.00617
lb/hr (based on outlet dscfm)	0.00306	0.00540	0.00440	0.00429
lb/10^{12} Btu	3.05	5.50	4.54	4.36
Particle-bound Mercury:				
Filter, ug detected	ND <0.010	ND <0.010	ND <0.010	ND <0.010
HNO_3, ug detected	ND <0.003	ND <0.004	ND <0.004	ND <0.004
Reported, ug	0.000	0.000	0.000	0.000
ug/dscm	0.00	0.00	0.00	0.00
lb/hr	0.00000	0.00000	0.00000	0.00000
lb/hr (based on outlet dscfm)	0.00000	0.00000	0.00000	0.00000
lb/10^{12} Btu	0.00	0.00	0.00	0.00
Total Inlet Speciated Mercury:				
ug/dscm	14.81	17.41	14.99	15.74
lb/hr	0.01637	0.01835	0.01655	0.01709
lb/hr (based on outlet dscfm)	0.01126	0.01308	0.01123	0.01185
lb/10^{12} Btu	11.26	13.31	11.58	12.05
Average Gas Volumetric Flow Rate:				
@ Flue Conditions, acfm	749,609	724,888	752,508	742,335
@ Standard Conditions, dscfm	295,038	281,428	294,782	290,416
Average Gas Temperature, °F	758.8	764.0	763.5	762.1
Average Gas Velocity, ft/sec	35.70	34.52	35.83	35.35
Flue Gas Moisture, percent by volume	7.38	8.20	7.41	7.66
Average Flue Pressure, in. Hg	29.35	29.33	29.33	
Barometric Pressure, in. Hg	29.68	29.68	29.68	
Average %CO_2 by volume, dry basis	14.2	14.5	14.2	14.3
Average %O_2 by volume, dry basis	4.3	4.3	4.5	4.4
% Excess Air	24.98	25.09	26.53	25.53
Dry Molecular Wt. of Gas, lb/lb-mole	30.444	30.492	30.452	
Gas Sample Volume, dscf	53.582	24.984	53.491	
Isokinetic Variance	100.5	98.2	100.4	

Laboratory Analysis can be found in Appendix F.

Table 3-5
PRECIPITATOR OUTLET INDIVIDUAL RUN RESULTS

Test Run Number:	**1**	**2**	**3**	**Average**
Source Condition		Normal		
Fuel Factor, dscf/10^6 Btu	9672	9732	9710	
Date	11/17/99	11/17/99	11/17/99	
Start Time	8:01	11:20	14:38	
End Time	10:19	13:45	16:53	
Elemental Mercury:				
HNO_3-H_2O_2, ug detected	0.448	0.202	0.496	0.382
H_2SO_4-$KMnO_4$, ug detected	4.604	4.874	4.484	4.654
Reported, ug	5.052	5.076	4.980	5.036
ug/dscm	2.55	2.54	2.53	2.54
lb/hr	0.00194	0.00191	0.00189	0.00191
lb/10^{12} Btu	2.16	2.16	2.15	2.16
Oxidized Mercury:				
KCl, ug detected	10.598	9.748	10.698	10.348
Reported, ug	10.598	9.748	10.698	10.348
ug/dscm	5.34	4.87	5.43	5.22
lb/hr	0.00406	0.00366	0.00407	0.00393
lb/10^{12} Btu	4.52	4.15	4.62	4.43
Particle-bound Mercury:				
Filter, ug detected	ND <0.010	ND <0.010	0.122	ND <0.010
HNO_3, ug detected	ND <0.003	ND <0.003	ND <0.003	ND <0.003
Reported, ug	0.005	0.005	0.122	0.044
ug/dscm	0.00	0.00	0.06	0.02
lb/hr	0.00000	0.00000	0.00005	0.00002
lb/10^{12} Btu	0.00	0.00	0.05	0.02
Total Outlet Speciated Mercury:				
ug/dscm	7.89	7.42	8.02	7.78
lb/hr	0.00600	0.00557	0.00601	0.00586
lb/10^{12} Btu	6.68	6.32	6.82	6.61
Average Gas Volumetric Flow Rate:				
@ Flue Conditions, acfm	359,907	356,949	356,731	357,862
@ Standard Conditions, dscfm	202,968	200,584	199,910	201,154
Average Gas Temperature, °F	400.1	403.4	404.3	402.6
Average Gas Velocity, ft/sec	51.91	51.48	51.45	51.61
Flue Gas Moisture, percent by volume	6.90	6.89	7.04	6.95
Average Flue Pressure, in. Hg	29.53	29.53	29.53	
Barometric Pressure, in. Hg	29.68	29.68	29.68	
Average %CO_2 by volume, dry basis	13.0	13.0	13.0	13.0
Average %O_2 by volume, dry basis	6.0	6.0	6.0	6.0
% Excess Air	39.00	39.00	39.00	39.00
Dry Molecular Wt. of Gas, lb/lb-mole	30.320	30.320	30.320	
Gas Sample Volume, dscf	70.045	70.623	69.555	
Isokinetic Variance	97.5	99.5	98.3	

Laboratory Analysis can be found in Appendix F.

Table 3-6
COAL USAGE RESULTS

Test Run Number:	1	2	3	Average
Source Condition	Normal			
Date	11/17/99	11/17/99	11/17/99	
Start Time	8:01	11:20	14:38	
End Time	10:19	13:45	16:53	
Coal Properties:				
Carbon, % dry	77.89	77.94	78.20	78.01
Hydrogen, % dry	5.07	5.05	4.94	5.02
Nitrogen, % dry	1.54	1.52	1.55	1.54
Sulfur, % dry	1.49	1.55	1.50	1.51
Ash, % dry	7.40	7.42	7.44	7.42
Oxygen, % dry (by difference)	6.61	6.52	6.37	6.50
Volatile, % dry	33.07	35.65	35.56	34.76
Moisture, %	2.43	2.46	2.15	2.35
Heat Content, Btu/lb dry basis	14025	13947	13982	13985
F_d Factor O_2 basis, dscf/10^6 Btu	9672	9732	9710	9705
F_c Factor CO_2 basis, scf/10^6 Btu	1783	1794	1795	1791
Chloride, ug/g dry	1148.0	1241.0	1257.0	1215.3
Mercury, ug/g dry*	0.1400	0.1400	0.1400	0.1400
Coal Consumption:				
Total Raw Coal Input, ton/hr	33.6	34.1	33.4	33.7
Total Coal Input, lbs/hr dry	65567	66522	65364	65818
Total Mercury Available in Coal:				
Mercury, lbs/hr	0.00918	0.00931	0.00915	0.00921
Mercury, lbs/10^{12} Btu	9.98	10.04	10.01	10.01
Mercury Content in Fly Ash:				
Mercury, ug/g*	0.621	0.621	0.621	0.621

* Results were provided by EERC
Laboratory Analysis can be found in Appendix F.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Test Methods

4.1.1 Speciated mercury emissions

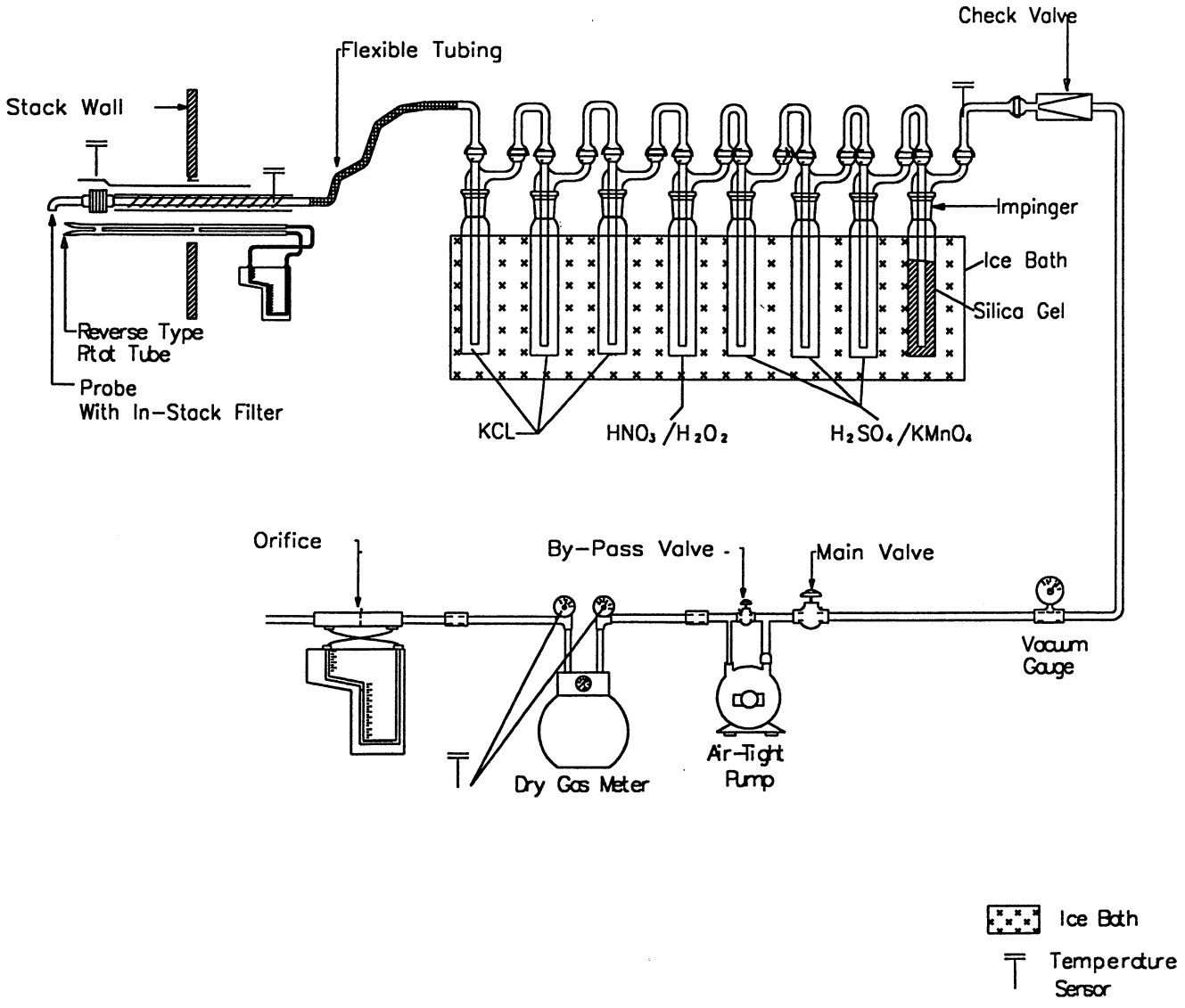
Speciated mercury emissions were determined via the draft "Standard Test Method for Elemental, Particle-Bound, and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario-Hydro Method)", dated May 12, 1999.

The in-duct filtration (Method 17) configuration was utilized at the inlet and outlet test locations. Figure 4-1 is a schematic of the Ontario-Hydro sampling trains.

Figure 4-2 illustrates the sample recovery procedure. The analytical scheme was per Section 13.3 of the Ontario-Hydro Method.

Speciated Mercury Sampling Train Equipped with In-Stack Filter

Ontario Hydro Method



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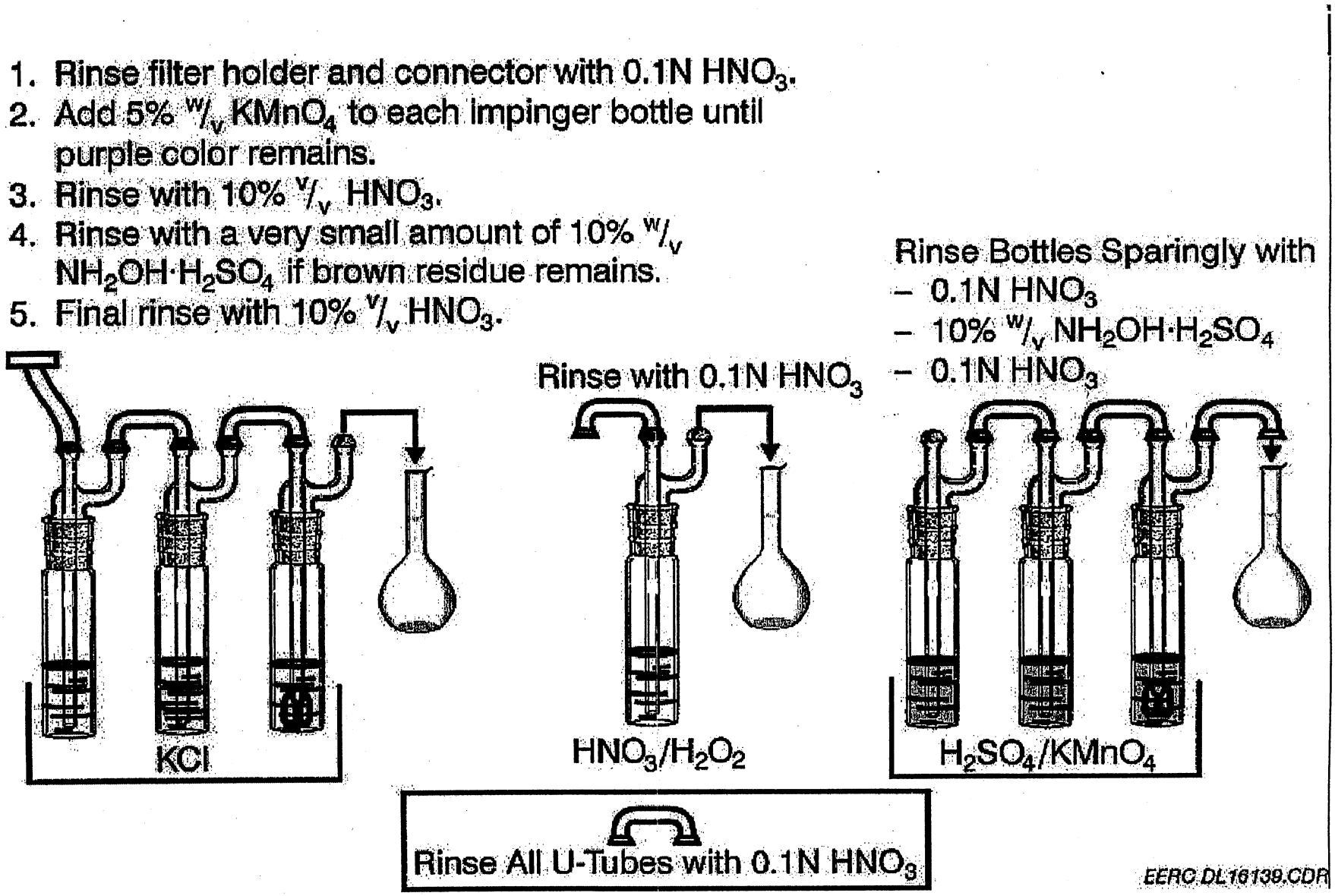

Figure 4-2 Sample Recovery Scheme for Ontario-Hydro Method Samples

4.1.2 Fuel samples

Fuel samples were collected by composite sampling. Two samples were collected during each speciated mercury sampling run. Sample analysis was conducted according to the procedures of ASTM D3684, EPA 7473, EPA 7471a and ASTM D4208. A split sample was sent to both CTE and EERC for mercury analysis. An EPRI study has indicated that the procedures of ASTM D3684, used by CTE, may yield highly variable mercury results. Therefore, the results from the EPA 7473 method used by EERC were used to determine the mercury concentrations. Ash analyses were also performed by EERC. All sample analysis can be found in Appendix F.

4.2 Procedures for Obtaining Process Data

Plant personnel were responsible for obtaining process-operating data. The process data presented in Table 3-6 was continuously monitored by the facility. Process data was averaged over the course of each sample run.

4.3 Sample Identification and Custody

The chain-of-custody for all samples obtained for analysis can be found in Appendix E.

5.0 INTERNAL QA/QC ACTIVITIES

All sampling, recovery and analytical procedures conform to those described in the site specific test plan. The precision and accuracy related to the speciated fractions are given in Appendix F. The accuracy of the results is given as CPI (recovery of an independent standard obtained from CPI) and the precision of the results is given as %RSD (relative standard deviation). All resultant data was reviewed by the laboratory and Mostardi Platt per the requirements listed in the QAPP and were determined to be valid.

5.1 QA/QC Problems

There were no QA/QC issues for the samples on this project.

5.2 QA Audits

5.2.1 Reagent Blanks

As required by the method, blanks were collected for all reagents utilized. The results of reagent blank analysis are presented in Table 5-1.

Table 5-1
REAGENT BLANK ANALYSIS

Sample ID #	Sample Fraction	Contents	Mercury (μg)	Detection Limit (μg)
040	Front-half	0.1N HNO_3/Filter	< 0.002	0.002
041	1 N KCl	1 N KCl	0.002	0.002
042	HNO_3/H_2O_2	HNO_3/H_2O_2	< 0.002	0.002
043	$KMnO_4/H_2SO_4$	$KMnO_4/H_2SO_4$	0.006	0.003

5.2.2 Blank Trains

As required by the method, blank trains were collected at both the inlet and duct sampling locations. These trains were collected on November 17, 1999. The results of blank train analysis are presented in Table 5-2.

Table 5-2 BLANK TRAIN ANALYSIS				
Sample ID #	**Sample Fraction**	**Contents**	**Mercury (μg)**	**Detection Limit (μg)**
037, 038, 039	Front-half	Filter	< 0.010	0.010
031	KCl impingers	Impingers/rinse	1.30	0.03
034	KCl impingers	Impingers/rinse	0.123	0.03
032	HNO_3-H_2O_2 impingers	Impingers/rinse	< 0.04	0.04
035	HNO_3-H_2O_2 impingers	Impingers/rinse	< 0.04	0.04
033	$KMnO_4/H_2SO_4$ impingers	Impingers/rinse	0.211	0.03
036	$KMnO_4/H_2SO_4$ impingers	Impingers/rinse	0.290	0.03

5.2.3 Field Dry Test Meter Audit

The field dry test meter audit described in Section 4.4.1 of Method 5 was completed prior to the test. The results of the audit are presented in Appendix C.