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HORIZON

Air Measurement Services, Inc.

W09-001-FR

EMISSIONS TESTING FROM A GAS-FIRED COGENERATION FACILITY TO DETERMINE BENZENE CONCENTRATION

Prepared for:

WILLAMETTE INDUSTRIES
5936 Perkins Road
Oxnard, California 93033

Andrew D. Pecaut

Richard J. Vacherot

HORIZON
Air Measurement Services, Inc.
(805) 498-8781

January 16, 1992

Mr. Mike Marsh
Willamette Industries
5936 Perkins Road
Oxnard, California 93033

Dear Mr. Marsh:

Please find enclosed three copies of the final report entitled, "Emissions Testing from a Gas-Fired Cogeneration Facility to Determine Benzene Concentration" for submittal. Please call me at (805) 498-8781 if you have any questions.

Sincerely,

HORIZON AIR MEASUREMENT SERVICES, INC.

Andrew D. Pecaut
Air Quality Technician

AP:lmg

Enclosures

TABLE OF CONTENTS

1. INTRODUCTION

Under the requirements of AB 2588 "Air Toxics 'Hot Spots' Information and Assessment Act of 1987", WILLAMETTE INDUSTRIES is required to conduct an emissions testing program on its cogeneration facility located in Oxnard, California.

On January 7, 1992 testing was conducted at the exhaust stack to quantify emissions of benzene using modified CARB Method 410A.

Three, replicate test runs were conducted under prevalent operating conditions by Mr. Andrew Pecaut of HORIZON AIR MEASUREMENT SERVICES, INC. An ambient sample was also collected at a location near the combustion air inlet. Mr. Mike Marsh of WILLAMETTE INDUSTRIES and Mr. Reese Martin of WEST COAST ENVIRONMENTAL were on site January 7, 1992 to observe the testing.

A summary of results is provided in Section 2. A process description of sampling procedures is included in Section 3. Standard HORIZON QA/QC statement is in Section 4. All pertinent documentation can be found in the appendices.

2. SUMMARY OF RESULTS

Three, replicate 30-minute test runs were performed on January 7, 1992 for benzene (modified CARB Method 410) concentration determination. One, 30-minute ambient test run was performed near the combustion air inlet to determine the benzene concentration in ambient air. A field blank was also taken as a QA/QC measure.

The results are summarized in Table 2-1. Field blank concentration values are also provided in Table 2-1. All benzene concentrations were at 0.4 ppb. The ambient benzene concentration was at 2.3 ppb. The field blank and all pre-test equipment blanks were less than 0.1 ppb benzene (see Appendix A).

TABLE 2-1

Summary of Benzene Concentrations
Willamette Industries
January 7, 1992

RUN I.D.	SAMPLE I.D.	BENZENE (Concentration in ppb,v/v)
Run #1	S-1	0.4
Run #2	S-3	0.4
Run #3	S-4	0.4
Ambient	S-10	2.3
Field Blank	S-8	<0.1

3. SOURCE TEST PROCEDURE

Benzene emissions are determined in accordance with a modified CARB Method 410A entitled "Determination of Benzene form Stationary Sources". The modification of CARB Method 410A includes the use of SUMMA-polished canisters rather than the Tedlar bag - evacuated canister system called for by the method.

Each 6-liter SUMMA polished stainless steel canisters are evacuated to less than 10 mm Hg absolute. The tanks are then heated, pressurized, and evacuated three times with ultrapure nitrogen and leak checked prior to use. A gas flow metering device (glass and stainless rotometer with a needle valve) and stainless steel shutoff valve are located just upstream of the canister. Representative, integrated samples are collected through a heat-conditioned 1/4" O.D. stainless steel probe. The gas samples are metered into the canisters through glass and viton rotometers maintaining a constant flow rate throughout each 30-minute sampling period.

The sampling apparatus is checked for leaks prior to field sampling by attaching the probe end to an absolute pressure gauge and vacuum pump in series. The sample lines are evacuated to less than 10 mm Hg and the gauge shutoff valve is then closed. The sample lines are deemed to be leak-free if no loss of vacuum occurs as indicated by the vacuum gauge. During sampling the tank pressures are monitored with a 0-30 inch vacuum gauge to ensure integrated sampling.

The final vacuum of each sample is measured using an absolute pressure gauge. The samples are then pressurized to 800 mm Hg absolute with ultrapure Nitrogen equipped with a molecular sieve. Each sample is subsequently analyzed using the CARB 410A procedure for benzene concentration.

4. QUALITY ASSURANCE/QUALITY CONTROL

A strict quality assurance program is adhered to throughout the source sampling and analytical phases of the program.

The quality assurance program entails the calibration of all sampling and analytical apparatus where applicable and the use of control samples and replicate analyses where feasible.

4.1 Equipment Calibration

The sampling equipment is calibrated at the HORIZON office before transport. The sampling equipment is calibrated according to the EPA procedures specified in APTD-0576 and 40 CRF 60, Appendix A, and manufacturer's specifications. Calibration sheets are available prior to the initiation of the sampling program. Calibration procedures include:

- Dry Gas Meter and Orifice Meter Method 5. The dry gas meters are calibrated against a GCA/Precision wet test meter or a dry gas meter which has been calibrated against a spirometer. The orifice meters in the particulate trains are checked against the dry gas meter to which it is attached.

- Balance. The analytical balance is calibrated against Class M weights by the Mettler Corporation. It is checked daily against a Class S weight.

- Thermocouples. The K-type thermocouples in the meter control box, heated sample box, impinger umbilical connector and the one attached to the probe are calibrated against ASTM mercury in glass thermometers at two points. The first point is in an ice bath and the second at the boiling point of water.

- Kurz Anemometer. The Kurz anemometer has been factory calibrated within four months against a NBS traceable standard.

4.2 Field Custody Procedures

In addition to identification labels or tags, chain of custody seals are used on samples collected by field personnel. These self-sticking seals are placed across the sample container cover/lid in such a way that the container cannot be opened without breaking the seal.

The chain of custody of a sample is initiated and maintained as follows:

- A sample is collected, labeled, and sealed on appropriate samples.
- The sample is recorded on the Chain-of-Custody sheet.
- All samples are accounted for, packed, and returned to the laboratory.

4.3 Laboratory Custody Procedures

Upon return to the laboratory the samples and the Chain-of-Custody record are turned over to the Sample Bank Manager (SBM) who:

- Logs the sample into a large bound Master Log.
- Notes the condition and the container type.
- Assigns and affixed a Control Number to the sample container.
- After necessary preservation and/or subdivision, stored the samples in the refrigerated or nonrefrigerated section of the Sample Bank as appropriate.

4.4 QA Objectives for Precision, Accuracy and Completeness

The collection of data that can be used to successfully accomplish the goals outlined in this report required that the sampling and analytical procedures were conducted with properly operated and calibrated equipment by trained, experience personnel.

It is recognized that the usefulness of the data is contingent upon meeting criteria for representatives and comparability. Every effort was made to assure representatives by adhering strictly to the sampling and analytical protocols outlined. The QA objective is that all measurements be representative of the streams sampled and of the process being tested.

4.5 Data Validation

Data validation is the process of filtering data and accepting or rejecting it on the basis of sound criteria. HORIZON supervisory and QC personnel use validation methods and criteria appropriate to the type of data and the purpose of the measurement. Records of all data are maintained, even that judged to be an "outlying" or spurious value. The persons validating the data have sufficient knowledge of the technical work to identify questionable values.

4.5.1 Field Data

The following criteria are used to evaluate sampling data:

- Use of approved test procedures.
- Steady-state operation of the process being tested.
- Use of properly operating and calibrated equipment.
- Use of reagents that have passed QC checks.
- Leak checks conducted before and after tests.
- Proper chain of custody maintained.

4.5.2 Laboratory Data

The following criteria are used to validate laboratory data:

- Use of approved analytical procedure.
- Use of properly operating and calibrated instrumentation.
- Precision and accuracy achieved comparable to that achieved in similar analytical programs.

4.6 Internal Quality Control Checks

Quality Control checks are performed to ensure the collection of representative samples by using the proper sampling techniques and the generation of valid analytical results from these samples. These checks are performed by project participants throughout the program under the guidance of the Project Manager. HORIZON'S QC program from the sampling portion of this program include the following:

- Equipment Calibration - All sampling equipment (dry gas meters, pitot tubes, thermocouples, etc.) are calibrated as previously described in this QA Plan.

- Use of Designated Sampling Forms - Sample data forms are developed for all methods and are completed by personnel collecting the sample to ensure that all pertinent information was recorded.

HORIZON quality control program for laboratory analysis make use of a number of different types of QC samples to document the validity of the generated data. The following types of QC samples will be used:

- Blank Samples

  1. Field-Biased Blanks - Blank samples which have been exposed to field and sampling conditions in order to assess possible contamination from the field. One field biased blank is analyzed.

  2. Calibration Blanks - Blanks used in instrument calibration; these blanks contain the reagents used in preparing instrument calibration standards except the parameters of interest.

- Ambient Sample - An ambient sample was taken to determine background levels of the compounds of interest.

- Duplicate Samples - A second aliquot of some samples were carried through all sample preparation and analysis procedures to verify the precision of the analytical method.

APPENDIX A

Laboratory Data

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Benzene Analysis in Summa Canister Samples

Samp. Date
Jan/2/91

Report Date:	January 8, 1992
Client:	Horizon/Williametta Industries
P.O. No.:	Verbal
Source Location:	Oxnard, CA
Source Test Date:	January 2, 1992
Source I.D.:	Not Given
Date Received:	January 3, 1992
Date Analyzed:	January 3, 1992

ANALYSIS DESCRIPTION

Benzene was analyzed by photoionization detection/gas chromatography (PID/GC).

AtmAA Lab No.	Sample ID	Benzene (Conc. in ppb, v/v)
90032-1	S-1	<0.1
90032-2	S-3	<0.1
90032-3	S-4	<0.1
90032-4	S-10	<0.1

Michael L. Porter
Laboratory Director

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Benzene Analysis in Summa Canister Samples

Sampling date 1/7/91

Report Date: January 8, 1992
Client: Horizon/Williametta Industries
P.O. No.: Verbal
Source Location: Oxnard, CA
Source Test Date: January 7, 1992
Source I.D.: Not Given

Date Received: January 8, 1992
Date Analyzed: January 8, 1992

ANALYSIS DESCRIPTION

Benzene was analyzed by photoionization detection/gas chromatography (PID/GC).

by my own calc. for their RF

AtmAA Lab No.	Sample ID	Benzene (Conc. in ppb, v/v)	
90082-3	S-1	0.41	
90082-4	S-3	0.38	
90082-5	S-4	0.41	
90082-6	S-10	2.30	Amb → 2.29
90082-7	S-8	<0.1	

① Sample	② Sample ID	③ Area	④ Vol. of sample	⑤ RF	⑥ P_2	⑦ P_1	ppb Conc = ⑤ × ③ / ④ × ⑥ / ⑦
S-1	90082-3	1451	19	0.00434	851	639	0.44
S-3	90082-4	1264	18	0.00434	858	643	0.41
S-4	90082-5	1308 1336	17 18	0.00434 0.00434	846	635	0.44 0.43
S-10	90082-6	23582	50	0.00434	853	715	2.3
S-8	90082-7	208	50	0.00434			0.01

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analysis)

P.O. No.: Verbal
AtmAA Proj. No.: 9071
Client Proj. No.: W09-001
Site: Oxnard, CA

Component	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppb, v/v)			
Benzene	S-4	0.42	0.40	0.41	2.4

A set of 5 Summa canister samples laboratory numbers, 90082-(3-7) was analyzed for benzene. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean." Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 1 repeat measurement from the sample set of 5 Summa canister samples is 2.4%.

CHAIN OF CUSTODY RECORD

Client/Project Name: Wilamet

Project Location: Horizon

Project No.: W09-001

Field Logbook No.:

Sampler: (Signature) [signature]

Chain of Custody Tape No.:

ANALYSES: 1 PPB Detection Limit Req. Benzene; Pi; 24; 25

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	Benzene			Pi	24	25	REMARKS: B & E w/ N_2 @ 110°C
S-1	1-2-92		90032-1	6 l Summa	✓			0.1			Blank Check
S-3			-2		✓			0.1			
S-4			-3		✓			0.1			
S-10			-4		✓			0.1			
S-12			-5		→			0.1		*	
S-2			-6		→			0.1		*	

* Analyze only if previous blanks < 2 ppb

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	1-2-92	16:35	[signature]	1-2-92	1635
[signature]	1-2-92	1633	[signature]	1-3-92	750
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) Karen Porter	1/3/92	7:50
Sample Disposal Method:			Disposed of by: (Signature)	Date	Time

SAMPLE COLLECTOR

HORIZON AIR MEASUREMENT SERVICES
996 Lawrence Drive, Suite 108
Newbury Park, CA 91320 (805) 498-8781

ANALYTICAL LABORATORY

AtmAA
Chatsworth, CA

№ 1267

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
WILLIAMETTA INDUSTRIES	OXNARD, CA
Project No.	**Field Logbook No.**
W09-001	
Sampler: (Signature)	**Chain of Custody Tape No.**

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	ANALYSES: Benzene			2,4	2,6	2,5	REMARKS
S-1	1/7/91		90082-3	6L Summa Canister	✓			0.1			COGEN OUT # 1
~~S-2~~ TAP			~~90082-4~~								
S-3			90082-4		✓			0.1			COGEN OUT # 2
S-4			90082-5		✓			0.1			COGEN OUT # 3
S-10			90082-6		✓			0.1			Ambient @ COGEN INLET
S-8			90082-7		✓			0.1			FIELD BLANK

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	1/7/92	1700		1/7/92	1700
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	1-7-92	1800		1-7-92	1800
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature)	Date	Time
	1-8-92	810		1/8/92	8:10
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR

HORIZON AIR MEASUREMENT SERVICES
996 Lawrence Drive, Suite 108
Newbury Park, CA 91320 (805) 498-8781

ANALYTICAL LABORATORY

Atm. A.A.
Chatsworth, CA

Nº 0913

APPENDIX B

Field Data Sheets

TOTAL COMBUSTION ANALYSIS
SCAQMD METHOD 25
FIELD SAMPLING DATA SHEET

Job #: W09-001

Facility : Williamette Ind.

Location : Oxnard, CA

Date: 1/7/92

Operator: AP

Control Device: CoGen

Sample Location: O-LET

Ambient Temperature: 49°

Barometric Pressure: _____

SAMPLE A

Tank #: S1 Trap #: _____

Initial Vacuum: 0.1

Final Vacuum: _____

SAMPLE B

Tank #: S3 Trap #: _____

Initial Vacuum: 0.1

Final Vacuum: _____

Run# 1

TIME	VACUUM ("Hg)	FLOW (cc/min)
1034	28.5	150 cc/—
1044	21.0	
1054	14	
~~STOP~~ 1104	8	
STOP 1108	5	

Run#2

TIME	VACUUM ("Hg)	FLOW (cc/min)
1109	28.5	150 cc/...
1119	21	
1129	14	
1139	8	
STOP 1143	5	

Leak Rate Pre Test: ok / ok

Post Test: ok / ok

HORIZON

TOTAL COMBUSTION ANALYSIS
SCAQMD METHOD 25
FIELD SAMPLING DATA SHEET

Job #: Williamette Ind.

Facility : W09-001

Location : Oxnard, CA

Date: 1/7/91

Operator: AP

Control Device: Co Generator

Sample Location: OUTLET

Ambient Temperature: _____

Barometric Pressure: _____

SAMPLE A

Tank #: S-4 Trap #: _____

Initial Vacuum: 0.1

Final Vacuum: _____

SAMPLE B

Tank #: _____ Trap #: _____

Initial Vacuum: _____

Final Vacuum: _____

Run #3

TIME	VACUUM ("Hg)	FLOW (cc/min)
1144	28.5	150cc/m
1154	21	
1204	13.5	
1214	<7.5	
STOP 1217	5	

TIME	VACUUM ("Hg)	FLOW (cc/min)

Leak Rate Pre Test: ok

Post Test: ok

HORIZON

TOTAL COMBUSTION ANALYSIS
SCAQMD METHOD 25
FIELD SAMPLING DATA SHEET

Job #: W09-001

Facility : Williamette Ind.

Location : Oxnard, CA

Date: 1/7/02

Operator: AP

Control Device: Ambient (@ Inlet)

Sample Location: ↙

Ambient Temperature: _____

Barometric Pressure: _____

SAMPLE A

Tank #: S10 Trap #: _____

Initial Vacuum: 0.1 torr

Final Vacuum: _____

SAMPLE B

Tank #: _____ Trap #: _____

Initial Vacuum: _____

Final Vacuum: _____

	TIME	VACUUM ("Hg)	FLOW (cc/min)
Begin	0907	30	AP ~~30~~ 150cc/min
	0917	22	AP ~~22~~
	0927	15	AP ~~15~~
Stop	0937	3	AP ~~3~~

TIME	VACUUM ("Hg)	FLOW (cc/min)

Leak Rate Pre Test: ok

Post Test: ok

HORIZON

RTUID	Willamette											
Date/Time	1/07/92	10:00										
Meter IDs	NC08-R	NC08-T30										
Meter IDs												
SET1&2	61.49	0	64.8	0								
GCData	0.07	1.29	0.19	0.31	0	0.07	0.05	0.89	93.46	0.95	2.71	1054
Volume	3.05	58.44	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	58.6	60.7	0	0	0	0	0	0				
Pres	237	239.2	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	1	1.9	0	0	0	0	0	0				
Date/Time	1/07/92	10:15										
Meter IDs	NC08-R	NC08-T30										
Meter IDs												
SET1&2	61.25	0	64.56	0								
GCData	0.07	1.29	0.19	0.32	0	0.07	0.05	0.89	93.43	0.96	2.72	1054.4
Volume	2.97	58.28	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	58.6	60.8	0	0	0	0	0	0				
Pres	238.3	240.5	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	1	1.9	0	0	0	0	0	0				

AVE GAS FLOW
FROM 10:00 A.M - 12:00 NOON

232.36 MCF/HR = 0.23236 MMCF/HR

Date/Time	1/07/92	10:30										
Meter IDs	NC08-R	NC08-T30										
Meter IDs												
SET1&2	60.59	0	63.89	0								
GCData	0.07	1.3	0.2	0.32	0	0.08	0.06	0.89	93.41	0.96	2.71	1054.6
Volume	2.36	58.24	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	58.7	60.9	0	0	0	0	0	0				
Pres	240.3	242.4	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	0.8	1.9	0	0	0	0	0	0				
Date/Time	1/07/92	10:45										
Meter IDs	NC08-R	NC08-T30										
Meter IDs												
SET1&2	60.21	0	63.51	0								
GCData	0.07	1.31	0.2	0.32	0	0.08	0.06	0.89	93.4	0.96	2.72	1054.9
Volume	2.24	57.96	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	58.7	60.9	0	0	0	0	0	0				
Pres	238.5	240.5	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	0.7	1.9	0	0	0	0	0	0				

Date/Time 1/07/92		11:00									
Meter IDsNC08-R		NC08-T30									
Meter IDs											
SET1&2	60.11	0	63.42	0							
GCData	0.07	1.31	0.2	0.32	0	0.08	0.06	0.89	93.38	0.96	2.73	1055.2
Volume	2.23	57.88	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	58.8	61	0	0	0	0	0	0				
Pres	239.6	241.4	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	0.7	1.9	0	0	0	0	0	0				
Date/Time 1/07/92		11:15									
Meter IDsNC08-R		NC08-T30									
Meter IDs											
SET1&2	60.45	0	63.8	0							
GCData	0.07	1.32	0.2	0.33	0	0.08	0.06	0.89	93.36	0.96	2.73	1055.4
Volume	2.41	58.05	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	58.6	60.8	0	0	0	0	0	0				
Pres	238.6	240.5	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	0.8	1.9	0	0	0	0	0	0				

Date/Time 1/07/92		11:30									
Meter IDsNC08-R		NC08-T30									
Meter IDs											
SET1&2	60.34	0	63.68	0							
GCData	0.07	1.32	0.2	0.33	0	0.08	0.06	0.89	93.36	0.97	2.72	1055.3
Volume	2.39	57.95	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	57.7	60.6	0	0	0	0	0	0				
Pres	237.7	239.7	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	0.8	1.9	0	0	0	0	0	0				
Date/Time 1/07/92		11:45									
Meter IDsNC08-R		NC08-T30									
Meter IDs											
SET1&2	60.1	0	63.43	0							
GCData	0.07	1.32	0.2	0.33	0	0.08	0.06	0.9	93.33	0.97	2.74	1055.5
Volume	2.18	57.92	0	0	0	0	0	0				
%Flow	100	100	0	0	0	0	0	0				
Temp	57.3	60.4	0	0	0	0	0	0				
Pres	237	239.1	0	0	0	0	0	0				
DP	0	0	0	0	0	0	0	0				
Freq	0.7	1.9	0	0	0	0	0	0				