Test Report
For
SCU2 T-601
at the
ExxonMobil Baytown Refinery
For
EPA Clean Air Act (CAA) 114 Testing for Petroleum Refineries
Performed July 7 Through July 8, 2011

Prepared for:

ExxonMobil

Baytown, Texas

Prepared by:

TRC

Austin, Texas

Report Issued September 2011

TRC Report No. 184380.0000.0000

Test Report
For
SCU2 T-601
At the
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For
EPA Clean Air Act (CAA) 114 Testing for Petroleum Refineries
Performed July 7 Through July 8, 2011

Prepared for:

ExxonMobil

5000 Bayway Drive
Baytown, TX 77520

Prepared by:

TRC

9225 US 183 South
Austin, TX 78747
(512) 684-3414

TRC Report No. 184380.0000.0000

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REPORT CERTIFICATION

I certify that to the best of my knowledge:

- Testing data and all corresponding information have been checked for accuracy and completeness.
- Sampling and analysis have been conducted in accordance with the approved protocol and applicable reference methods (as applicable).
- All deviations, method modifications, or sampling and analytical anomalies are summarized in the appropriate report narrative(s).
- Total number of pages in this report _____.

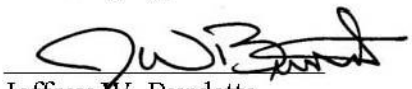
_____

Michael J Krall
TRC Project Manager

_____

Date

TRC was operating in conformance with the requirements of ASTM D7036-04 during this test program.



Jeffrey W. Burdette
TRC Air Measurements Technical Director

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1.0 EXECUTIVE SUMMARY

ExxonMobil owns and operates a petroleum refinery in Baytown, Texas. On March 31, 2011, USEPA issued a Section 114 Clean Air Act (CAA) information collection request (ICR) to ExxonMobil. In the ICR, the EPA requested that ExxonMobil conduct emissions testing on one of its sulfur recovery units. ExxonMobil collected emissions data from Sulfur Conversion Unit (SCU-2) Tower (T-601) to generate information to compare to a data base from like units and sources within the U.S. Based on U.S. EPA's guidance for the test procedures, methods, and reporting requirements relevant to the petroleum refining industry, a test program was designed to conduct emissions sampling at SCU2 T-601. This document presents the results for this testing. This report presents the results of the test program conducted July 7 and 8, 2011.

TRC of Austin, Texas was contracted by ExxonMobil to conduct the testing program. TRC performed the sampling, Enthalpy Analytical, Inc. (Enthalpy) and Test America performed the analyses of the samples. Tables 1-1 through 1-5 present a summary of the test results.

Table 1-1A. Volatile Organic HAPs by Bag Sampling Summary of Results

Average Flow Rate: 4,284,967 dscfh	Average Emissions	
Compound	**Gas Conc. (ug/dscm)**	**Emission Rate (lb/hr)**
Acetone	<0.508	<0.33
Acrolein	<0.404	<0.25
Benzene	<0.279	<0.24
1,3-Butadiene	<0.268	<0.16
Carbon disulfide	<0.041	<0.03
1,2-Dibromoethane	<0.257	<0.54
Hexane	<0.256	<0.25
Methylene chloride	<1.050	<0.99
Pentane	<0.425	<0.34
Tetrachloroethene	<0.291	<0.54
Toluene	<0.315	<0.32
Trichloroethene	<0.438	<0.64

< = Sample result was less than detection limit

Note: During shipment from the field to the laboratory, the Run 3 Tedlar bag was damaged and the sample was not recoverable, thus, the concentration and emission rate averages were calculated from Runs 1 and 2.

Table 1-1B. Volatile Organic HAPs by Tube Sampling Summary of Results

Average Flow Rate: 4,284,967 dscfh	Average Emissions	
Compound	**Gas Conc. (ug/dscm)**	**Emission Rate (lb/hr)**
Acetonitrile	<8.02E-05	<2.15E-08
Acrylonitrile	<8.02E-05	<2.15E-08
Chlorobenzene	<1.60E-05	<4.29E-09
Cumene (isoproylbenze)	<1.25E-05	<3.35E-09
Ethylbenezene	<1.23E-05	<3.28E-09
Methy1 isobuty1 ketone	<1.15E-05	<3.08E-09
Methy1 t-buty1 ether	<1.07E-05	<2.87E-09
Nitrobenzene	<1.73E-05	<4.64E-09
2-Nitropropane	<9.86E-05	<2.64E-08
Styrene	<1.31E-05	<3.50E-09
2,4-Trimethylpentane	<9.98E-06	<2.67E-09
m,p-Xylene	<1.24E-05	<3.31E-09
o-Xylene	<1.27E-05	<3.41E-09
Methanol[a]	<1.70E-04	<4.52E-08

< = Sample result was less than detection limit

[a] Methanol collected by EPA Method 308 sampling train.

Sample volumes (dsl): Run 1 46.614
Run 2 29.015
Run 3 26.744

Table 1-2. Semi-Volatile Organic HAPs Summary of Results

Average Flow Rate: 4,284,967 dscfh	Average Emissions	
Compound	**Gas Conc. (ug/dscm)**	**Emission Rate (lb/hr)**
Acenaphthene	<3.56	<9.53E-04
Acenaphthylene	<3.56	<9.53E-04
Aniline	<3.56	<9.53E-04
Anthracene	<3.56	<9.53E-04
Benz(a)anthracene	3.20	8.58E-04
Benzidine	<35.64	<9.53E-03
Benzo(b)fluoranthene	<3.56	<9.53E-04
Benzo(k)fluoranthene	<3.56	<9.53E-04
Benzo(g,h,i)perylene	<3.56	<9.53E-04
Benzo(a)pyrene	<3.56	<9.53E-04
Benzo(e)pyrene	<3.56	<9.53E-04
Biphenyl	1.71	4.58E-04
Chrysene	<3.56	<9.53E-04
Cresols	<3.56	<9.53E-04
Dibenz(a,h)anthracene	<3.56	<9.53E-04
Dibenzofuran	<3.56	<9.53E-04
Dibenzo(a,e)pyrene	<3.56	<9.53E-04
3,3'-Dimethoxybenzidine	<35.64	<9.53E-03
p-Dimethylaminoazobenzene	<3.56	<9.53E-04
7,12-Dimethylbenz(a)anthracene	<3.56	<9.53E-04
3,3'-Dimethylphenol	<35.64	<9.53E-03
Alpha, alpha-Dimethylphenethylamine	<8.91	<2.38E-03
2,4-Dimethylphenol	<3.56	<9.53E-04
Fluoranthene	<3.56	<9.53E-04
Fluorene	<3.56	<9.53E-04
Indeno-1,2,3-cd-pyrene	<3.56	<9.53E-04
Isophorone	<3.56	<9.53E-04
3-Methylcholanthrene	<3.56	<9.53E-04
2-Methylnaphthalene	<3.56	<9.53E-04
Naphthalene	2.79	7.48E-04
Nitrobenzene	<3.56	<9.53E-04
Perylene	<3.56	<9.53E-04
Phenanthrene	1.31	3.49E-04
Phenol	<2.84	<7.60E-04
1,4-Phenylenediamine	<35.64	<9.53E-03
Pyrene	<2.02	5.40E-04
o-Toluidine	<3.56	<9.53E-04

< = Sample result was less than detection limit

Table 1-3. Aldehydes Summary of Results

Average Flow Rate: 4,324,604 dscfh	Average Emissions	
Compound	**Gas Conc. (ug/dscm)**	**Emission Rate (lb/hr)**
Formaldehyde	16.5	4.47E-03
Acetaldehyde	100	2.71E-02
Propionaldehyde	<0.30	<8.22E-05

< = Sample result was less than detection limit

Table 1-4. Other Gaseous Compounds Summary of Results

Average Flow Rate: 4,284,967 dscfh	Average Emissions	
Compound	**Gas Conc. (ppmvd)**	**Emission Rate (lb/hr)**
Methane	18.11	3.25
Ethane	<0.799	<0.270
Carbon Monoxide	355	111
Total Hydrocarbons	38.0	18.6
Hydrogen Sulfide	1.43	0.542
Carbonyl Sulfide	9.89	6.60
Carbon Disulfide	<0.108	<0.0911
Total Reduced Sulfur	10.6	7.24

< = Sample result was less than detection limit

Table 1-5. General Sampling Data Summary of Results

Stack Gas Parameter	Average Measured Value	Units
Oxygen	<0.01	**Vol. %, dry**
Carbon Dioxide	8.04	**Vol. %, dry**
Moisture	7.57	**Vol. %, dry**
Flow Rate	82,904	**acfm**
Flow Rate	77,276	**scfm**
Flow Rate	71,416	**dscfm**

< = Sample result was less than detection limit

2.0 INTRODUCTION

ExxonMobil owns and operates a petroleum refinery in Baytown, Texas. On March 31, 2011, USEPA issued a Section 114 Clean Air Act (CAA) information collection request (ICR) to ExxonMobil. In the ICR, the EPA requested that ExxonMobil conduct emissions testing on one of its sulfur recovery units. ExxonMobil collected emissions data from Sulfur Conversion Unit (SCU-2) Tower (T-601) to generate information to compare to a data base from like units and sources within the U.S. Based on U.S. EPA's guidance for the test procedures, methods, and reporting requirements relevant to the petroleum refining industry, a test program was designed to conduct emissions sampling at SCU2 T-601. This document presents the results for this testing. This report presents the results of the test program conducted July 7 and 8, 2011.

TRC of Austin, Texas was contracted by ExxonMobil to conduct the testing program. TRC performed the sampling, Enthalpy Analytical, Inc. (Enthalpy) and Test America performed the analyses of the samples. Table 2-1 presents the general facility and testing information for this test program.

Section 3.0 presents the complete findings of the test results. Section 4.0 presents the sampling and analytical procedures followed during the test program. Section 5.0 specifies the description of the Quality Assurance/Quality Control (QA/QC) procedures followed throughout the test program.

Table 2-1. General Facility and Testing Information

Facility Name and Address	ExxonMobil 5000 Bayway Drive Baytown, Texas 77520
Contact Person	Ms. Diane Otto
Contact Telephone No.	(281) 834-1169
Testing Company Name and Address	TRC Environmental Corporation 9225 US Hwy 183 South Austin, Texas 78747
Contact Person	Mr. Michael J Krall
Contact Information	(512) 809-8507/ mkrall@trcsolutions.com
Report Number	184380.0000.0000
Persons Conducting Test	Michael J Krall Kevin Johnson Arthur Nava Randy Monson Clayton Elliott Dave Williams Ken Allmendinger Stuart Lockwood Steve Bell Greg Wallentine Marc Christal
Source(s) Tested	SCU2 T-601 Stack
Applicable Regulation	U.S EPA Clean Air Act (CAA) Section 114 Refinery ICR
Date of Test	July 7-8, 2011
Test Parameters	EPA Method 18 - Speciated volatile organic HAPs SW-846 Method 0010 - Speciated semi-volatile organic HAPs SW-846 Method 0011 with SW-846 Method 8315A - Aldehydes EPA Method 25A - Total hydrocarbons (THC) EPA Method 18 - Methane/ethane EPA Method 10 - Carbon monoxide (CO) EPA Method 15 - Hydrogen sulfide (H2S)/carbonyl sulfide (COS)/carbon disulfide (CS2) EPA Method 16 B - Total reduced sulfur (TRS) EPA Method 2 - Gas flow rate EPA Method 3A - Oxygen (O2) and carbon monoxide (CO) EPA Method 4 - Moisture content

3.0 DETAILED RESULTS

The test results are presented in this section. Tables 3-1 through 3-8 present the run-by-run detailed test results conducted on SCU2 T-601. Detailed data are located in the appendices along with field data and the analytical reports.

Table 3-1A. Volatile Organic HAPs Results by Bag Sampling

Run No.:	1		2		3		Average	
Date:	7/7/2011		7/8/2011		7/8/2011			
Time:	1132 – 1232		1130 – 1209		1400 – 1440			
Gas Volume Collected (dsl):	14.123		7.053		7.851			
Volumetric Flow Rate (dscfh):	4,312,852		4,252,262		4,289,786			
Compound	Gas Conc. (ppmv)	Emission Rate (lb/hr)	Gas Conc. (ppmv)	Emission Rate (lb/hr)	Gas Conc. (ppmv)	Emission Rate (lb/hr)	Gas Conc. (ppmv)	Emission Rate (lb/hr)
Acetone	0.568	0.37	<0.448	<0.29	-	-	<0.508	<0.33
Acrolein	<0.404	<0.25	<0.404	<0.25	-	-	<0.404	<0.25
Benzene	<0.279	<0.24	<0.279	<0.24	-	-	<0.279	<0.24
1,3-Butadiene	<0.268	<0.16	<0.268	<0.16	-	-	<0.268	<0.16
Carbon disulfide	<0.041	<0.04	<0.041	<0.03	-	-	<0.041	<0.03
1,2-Dibromoethane	<0.257	<0.54	<0.257	<0.53	-	-	<0.257	<0.54
Hexane	0.272	0.26	<0.240	<0.23	-	-	<0.256	<0.25
Methylene chloride	<1.050	<1.00	<1.050	<0.98	-	-	<1.050	<0.99
Pentane	0.593	0.48	<0.257	<0.20	-	-	<0.425	<0.34
Tetrachloroethene	<0.291	<0.54	<0.291	<0.53	-	-	<0.291	<0.54
Toluene	0.322	0.33	<0.308	<0.31	-	-	<0.315	<0.32
Trichloroethene	<0.438	<0.64	<0.438	<0.64	-	-	<0.438	<0.64

< = Sample result was less than detection limit

Note: During shipment from the field to the laboratory, the Run 3 tedlar bag was damaged and the sample was not recoverable, thus, the concentration and emission rate averages were calculated from Runs 1 and 2.

Table 3-1B. Volatile Organic HAPs Results by Tube Sampling

Run No.:	1			2			3			Average	
Date:	7/7/2011			7/8/2011			7/8/2011				
Gas Volume (dsl):	1430 – 1600			0900 – 1030			1624 – 1754				
Volumetric Flow Rate (dscfh):	4,312,852			4,252,262			4,289,786				
Compound	Mass Detected (µg)	Gas Conc. (µg/dscm)	Emission Rate (lb/hr)	Mass Detected (µg)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Mass Detected (µg)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Gas Conc. (µg/dscm)	Emission Rate (lb/hr)
Acetonitrile	<6.8	<7.91E-05	<2.13E-08	<6.8	<7.92E-05	<2.10E-08	<6.8	<8.23E-05	<2.21E-08	<8.02E-05	<2.15E-08
Acrylonitrile	<6.8	<7.91E-05	<2.13E-08	<6.8	<7.92E-05	<2.10E-08	<6.8	<8.23E-05	<2.21E-08	<8.02E-05	<2.15E-08
Chlorobenzene	<1.36	<1.58E-05	<4.26E-09	<1.36	<1.58E-05	<4.21E-09	<1.36	<1.65E-05	<4.41E-09	<1.60E-05	<4.29E-09
Cumene (isoproylbenze)	<1.06	<1.23E-05	<3.32E-09	<1.06	<1.23E-05	<3.28E-09	<1.06	<1.28E-05	<3.44E-09	<1.25E-05	<3.35E-09
Ethylbenezene	0.996	1.16E-05	3.12E-09	<1.06	<1.23E-05	<3.28E-09	<1.06	<1.28E-05	<3.44E-09	<1.23E-05	<3.28E-09
Methy1 isobuty1 ketone	<0.975	<1.13E-05	<3.05E-09	<0.975	<1.14E-05	<3.02E-09	<0.975	<1.18E-05	<3.16E-09	<1.15E-05	<3.08E-09
Methy1 t-buty1 ether	<0.908	<1.06E-05	<2.84E-09	<0.908	<1.06E-05	<2.81E-09	<0.908	<1.10E-05	<2.94E-09	<1.07E-05	<2.87E-09
Nitrobenzene	<1.47	<1.71E-05	<4.60E-09	<1.47	<1.71E-05	<4.55E-09	<1.47	<1.78E-05	<4.77E-09	<1.73E-05	<4.64E-09
2-Nitropropane	<8.36	<9.72E-05	<2.62E-08	<8.36	<9.74E-05	<2.59E-08	<8.36	<1.01E-04	<2.71E-08	<9.86E-05	<2.64E-08
Styrene	<1.11	<1.29E-05	<3.48E-09	<1.11	<1.29E-05	<3.43E-09	<1.11	<1.34E-05	<3.60E-09	<1.31E-05	<3.50E-09
2,4-Trimethylpentane	<0.846	<9.84E-06	<2.65E-08	<0.846	<9.86E-06	<2.62E-09	<0.846	<1.02E-05	<2.74E-09	<9.98E-06	<2.67E-09
m,p-Xylene	<1.05	<1.22E-05	<3.29E-09	<1.05	<1.22E-05	<3.25E-09	<1.05	<1.27E-05	<3.40E-09	<1.24E-05	<3.31E-09
o-Xylene	<1.08	<1.26E-05	<3.38-09	<1.08	<1.26E-05	<3.34E-09	<1.08	<1.31E-05	<3.50E-09	<1.27E-05	<3.41E-09
Methanol[a]	0.871	1.87E-05	5.03E-09	<6.81	<2.35E-04	<6.23E-08	<6.81	<2.55E-04	<6.82E-08	<1.70E-04	<4.52E-08

< = Sample result was less than detection limit

a Methanol collected by EPA Method 308 sampling train.

Sample volumes (dsl): Run 1 46.614
Run 2 29.015
Run 3 26.744

Table 3-2a. Semi-Volatile Organic HAPs Results

Run No.:	1			2			3			Average	
Date:	7/7/2011			7/8/2011			7/8/2011				
Time:	1134 – 1629			0900 - 1326			1355 – 1824				
Gas Volume Collected (dscf):	197.906			196.590			199.998				
Volumetric Flow Rate (dscfh):	4,312,852			4,252,262			4,289,786				
Compound	Mass Detected (µg)	Gas Conc. (µg/dscm)	Emission Rate (lb/hr)	Mass Detected (µg)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Mass Detected (µg	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)
Acenaphthene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Acenaphthylene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Aniline	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Anthracene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Benz(a)anthracene	17	3.03	8.17E-04	17	3.05	8.11E-04	20	3.53	9.46E-04	3.20	8.58E-04
Benzidine	<200	<35.70	<9.61E-03	<200	<35.92	<9.54E-03	<200	<35.31	<9.46E-03	<35.64	<9.53E-03
Benzo(b)fluoranthene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Benzo(k)fluoranthene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Benzo(g,h,i)perylene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Benzo(a)pyrene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Benzo(e)pyrene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Biphenyl	12	2.14	5.77E-04	8.3	1.49	3.96E-04	8.5	1.50	4.02E-04	1.71	4.58E-04
Chrysene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Cresols	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Dibenz(a,h)anthracene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Dibenzofuran	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Dibenzo(a,e)pyrene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
3,3'-Dimethoxybenzidine	<200	<35.70	<9.61E-03	<200	<35.92	<9.54E-03	<200	<35.31	<9.46E-03	<35.64	<9.53E-03
p-Dimethylaminoazobenzene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
7,12-Dimethylbenz(a)anthracene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<250	<3.53	<9.46E-04	<3.56	<9.53E-04
3,3'-Dimethylphenol	<200	<35.70	<9.61E-03	<200	<35.92	<9.54E-03	<200	<35.31	<9.46E-03	<35.64	<9.53E-03
Alpha, alpha-Dimethylphenethylamine	<50	<8.92	<2.40E-03	<50	<8.98	<2.38E-03	<50	<8.83	<2.36E-03	<8.91	<2.38E-03
2,4-Dimethylphenol	<20	<3.57	<9.61E04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Fluoranthene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Fluorene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Indeno-1,2,3-cd-pyrene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Isophorone	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
3-Methylcholanthrene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
2-Methylnaphthalene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Naphthalene	22	3.93	1.06E-03	11	1.98	5.25-E04	14	2.47	6.62E-04	2.79	7.48E-04

Table 3-2b. Semi-Volatile Organic HAPs Results Continued

Run No.:	1			2			3			Average	
Date:	7/7/2011			7/8/2011			7/8/2011				
Time:	1134 – 1629			0900 - 1326			1355 – 1824				
Gas Volume Collected (dscf):	197.906			196.590			199.998				
Volumetric Flow Rate (dscfh):	4,312,852			4,252,262			4,289,786				
Compound	Mass Detected (µg)	Gas Conc. (µg/dscm)	Emission Rate (lb/hr)	Mass Detected (µg)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Mass Detected (µg	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)
Nitrobenzene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Perylene	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04
Phenanthrene	6.6	1.18	3.17E-04	7.2	1.29	3.43E-04	8.2	1.45	3.88E-04	1.31	3.49E-04
Phenol	7.9	1.41	3.80E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<2.84	<7.60E-04
1,4-Phenylenediamine	<200	<35.70	<9.61E-03	<200	<35.92	<9.54E-03	<200	<35.31	<9.46E-03	<35.64	<9.53E-03
Pyrene	11	1.96	5.28E-04	11	1.98	5.25E-04	12	2.12	5.67E-04	<2.02	5.40E-04
o-Toluidine	<20	<3.57	<9.61E-04	<20	<3.59	<9.54E-04	<20	<3.53	<9.46E-04	<3.56	<9.53E-04

< = Sample result was less than detection limit

Table 3-3. Aldehydes Results

Run No.:	1			2			3			Average	
Date:	7/7/2011			7/8/2011			7/8/2011				
Time:	1134 – 1529			0900 - 1226			1355 – 1724				
Gas Volume Collected (dscf):	102.076			103.758			103.060				
Volumetric Flow Rate (dscfh):	4,324,764			4,339,278			4,309,770				
Compound	Mass Detected (µg)	Gas Conc. (µg/dscm)	Emission Rate (lb/hr)	Mass Detected (µg)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Mass Detected (µg	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)	Gas Conc. (ug/dscm)	Emission Rate (lb/hr)
Formaldehyde	50.8	17.6	4.75E-03	75.2	25.6	6.93E-03	18.7	6.4	1.72E-03	16.5	4.47E-03
Acetaldehyde	205	70.9	1.92E-02	222	75.5	2.05E-02	450	154	4.15E-02	100	2.71E-02
Propionaldehyde	<0.667	<0.23	<6.23E-05	<0.829	<0.28	<7.64E-05	<1.175	<0.40	<1.08E-04	<0.30	<8.22E-05

< = Sample result was less than detection limit

Table 3-4. Methane and Ethane Results

Run	Date	Flow Rate	Methane Conc. (ppmv)	Methane Emission Rate (lb/hr)	Ethane Conc. (ppmv)	Ethane Emission Rate (lb/hr)
1	7/7/2011	4,312,852	33.6	6.03	1.31	0.44
2	7/8/2011	4,252,262	2.62	0.46	<0.288	<0.10
3	7/8/2011	4,289,786	-	-	-	-
Averages for Runs 1 and 2			18.11	3.25	<0.799	<0.270

< = Sample result was less than detection limit

Note: During shipment from the field to the laboratory, the Run 3 Tedlar bag was damaged and the sample was not recoverable, thus, the concentration and emission rate averages were calculated from Runs 1 and 2.

Table 3-5. Carbon Monoxide and Total Hydrocarbons Results

Run	Date	Flow Rate	CO Conc. (ppmvd)	CO Emission Rate (lb/hr)	THC[a] Conc. (ppmvd)	THC[a] Emission Rate (lb/hr)
1	7/7/2011	4,312,852	348	109	36.4	18.0
2	7/8/2011	4,252,262	350	108	38.6	18.8
3	7/8/2011	4,289,786	367	115	39.0	19.2
Averages			355	111	38.0	18.6

[a] THC was measured and reported as wet, propane equivalents. The THC analyzer was calibrated using EPA protocol gas standards.

Table 3-6. Speciated Sulfur Compounds and Total Reduced Sulfur Results

Run	Date	Flow Rate	H_2S Conc. (ppmvd)	H_2S Emission Rate (lb/hr)	COS Conc. (ppmvd)	COS Emission Rate (lb/hr)	CS_2 Conc. (ppmvd)	CS_2 Emission Rate (lb/hr)	TRS Conc. (ppmvd)	TRS Emission Rate (lb/hr)
1	7/7/2011	4,312,852	1.26	0.482	7.04	4.73	<0.10	< 0.107	7.88	5.30
2	7/8/2011	4,252,262	1.51	0.569	10.7	7.11	<0.10	< 0.107	11.5	7.77
3	7/8/2011	4,289,786	1.52	0.577	11.9	7.96	<0.10	< 0.109	12.4	8.63
Averages			1.43	0.542	1.43	6.60	<0.10	<0.108	10.6	7.24

< = Sample result was less than detection limit

Table 3-7. Detailed Summary of Flowrate and Other Components Results

Test Date	**7/7/11**	**7/8/11**	**7/8/11**	
Parameter	**Run 1**	**Run 2**	**Run 3**	**Average**
Flow Rate (SCFM)	77,071	76,278	78,479	77,276
Flow Rate (DSCFM)	71,881	70,871	71,496	71,416
Flow Rate (ACFM)	82,662	81,769	84,281	82,904
Water (Vol. %)	6.73	7.09	8.90	7.57
Oxygen (Vol. % Dry)	0.00	0.03	0.00	0.00883
Nitrogen (Vol. % Dry)	92.1	91.9	91.8	92.0
Carbon Monoxide (ppmv, Dry)	348	350	367	355
Carbon Dioxide (Vol. % Dry)	7.93	8.04	8.15	8.04

4.0 SAMPLING AND ANALYTICAL PROCEDURES

To ensure accurate results, method-specific quality assurance and control measures were followed. All testing will be performed following standard EPA protocols as outlined in the EPA's Information Collection Request (ICR), Component 4, Part VIII. "Test Procedures, Methods and Reporting Requirements for the Information Collection Request for Petroleum Refineries" and 40 CFR Part 60 unless detailed in the respective sections of this test plan.

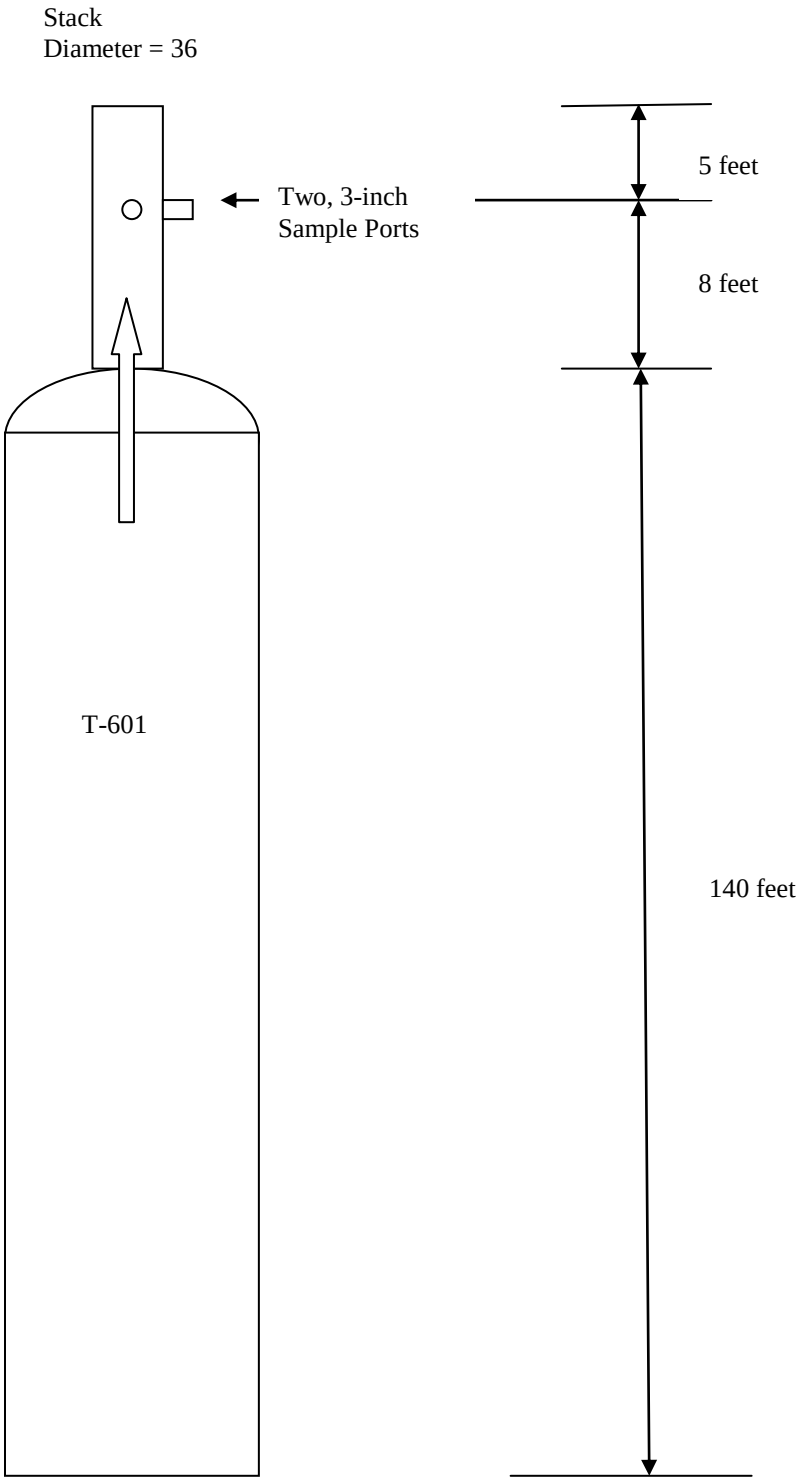
This section briefly presents the following sampling and analysis methods that were followed during the SCU2 CAA 114 MACT test as well as any method deviations and/or problems encountered. A test plan was developed in May 2011 that included details specific to this test program. The testing was performed per the CAA 114 request to perform simultaneous sampling within each group. The parameters were as follows:

- Speciated volatile organic HAPs
- Speciated semi-volatile organic HAPs
- Aldehydes
- Total hydrocarbons (THC)
- Methane/ethane
- Carbon monoxide (CO)
- Hydrogen sulfide (H2S)/carbonyl sulfide (COS)/carbon disulfide (CS2)
- Total reduced sulfur (TRS)

In addition, during each group test, the SCU2 T-601 stack gas flow rate, composition (oxygen (O2) and carbon dioxide (CO2)), and moisture content was measured. Figure 4-1 presents a schematic drawing of the T-601 tower and stack sampling location.

During the test, SCU2 was operated at normal conditions.

Figure 4-1. SCU-2 T-601 Schematic Drawing



3 test runs were performed that were at least 1 hour in duration. Each sample was collected non-isokinetically at a single point in the centroid of the stack.

During shipment of the sample from the field to the laboratory, the Run 3 Tedlar bag sample was damaged and the sample could not be recovered, thus, the results for Runs 1 and 2 were reported and used to calculate the test average.

4.1 ICR Test

Three test runs for each parameter were performed to generate the emissions data required by the USEPA request. Three test runs were successfully completed on July 7 and 8, 2011. ExxonMobil personnel continuously monitor acid gas rates (1000 x standard cubic feet per hour (KSCF/HR)) process data during the testing. The rates presented in the Appendix D of the report.

During the test, the SRU was operated at normal conditions. Figure 2-1 illustrates the stack sampling/port locations.

4.2 Sampling and Analysis

The following describes the sampling and analysis procedures that were used during the SCU2 CAA 114 MACT test.

Enthalpy Analytical, Inc. located in Raleigh, North Carolina performed the analyses for the speciated volatile HAPs and aldehydes. Test America located in Knoxville, Tennessee performed the analyses for the semi-volatile HAPs. TRC performed all other sampling and analyses.

As a general statement concerning the volatile HAPs measurements, it should be noted that there are significant differences in the concentrations and emission rates for compounds within the volatile HAPs group due to the different collection and analysis procedures employed (bags versus tubes).

4.2.1 Speciated Volatile HAPs and Methane/Ethane

Volatile organic compounds from Table 1.3 of the ICR were collected and analyzed following the procedures of EPA Method 18 from 40 CFR Part 60, Appendix A.

Figure 4-2 presents a schematic drawing of the volatiles sampling train. Due to the types of compounds included in this table, samples were collected on three separate trains:

1) Train 1: EPA Method 18 Tedlar Bag
2) Train 2: EPA Method 18 XAD Adsorbent Tubes
3) Train 3: EPA Method 308

4.2.2 Speciated Semi-volatile Organic HAPs

The Method 0010 Modified Method 5 (MM5) sampling protocol from SW-846, "Test Methods for Evaluating Solid Waste," Third Edition; Volume One was used during the testing to collect samples of the SRU 28 stack gas for quantification of semi-volatile organic HAPs (analysis by SW-846 Method 8270C). The sampling train consisted of a flexible, heated probe, heated filter, Teflon transfer line, XAD-2 sorbent module, and pumping and metering unit. Figure 4-2 presents a schematic drawing of the MM5 train.

3 isokinetic test runs were performed at least 4 hours in duration with at least 4 cubic meters of sample.

No problems or deviations were encountered.

4.2.3 Aldehydes (Acetaldehyde, Formaldehyde, Propanal)

SCU T-601 stack gas samples for determination of aldehydes were collected using SW-846 Method 0011 from SW-846, "Test Methods for Evaluating Solid Waste," Third Edition; Volume One. The Method 0011 impingers were filled with a carbonyl-specific derivatizing agent: 2,4-dinitro-phenylhydrazine (2,4-DNPH). 2,4-DNPH reacted with aldehydes to form a nonvolatile derivative which was measured by high performance liquid chromatography (HPLC, SW-846 Method 8315A).

3 isokinetic test runs were performed at least 4 hours in duration with at least 4 cubic meters of sample. No problems or deviations were encountered.

4.2.4 Total Hydrocarbons (THC)

During each test run sampling was conducted for THC following EPA Method 25A from 40 CFR Part 60 Appendix A. A total hydrocarbon analyzer measured the stack

Figure 4-2. Volatiles Sampling Train Schematic Drawing

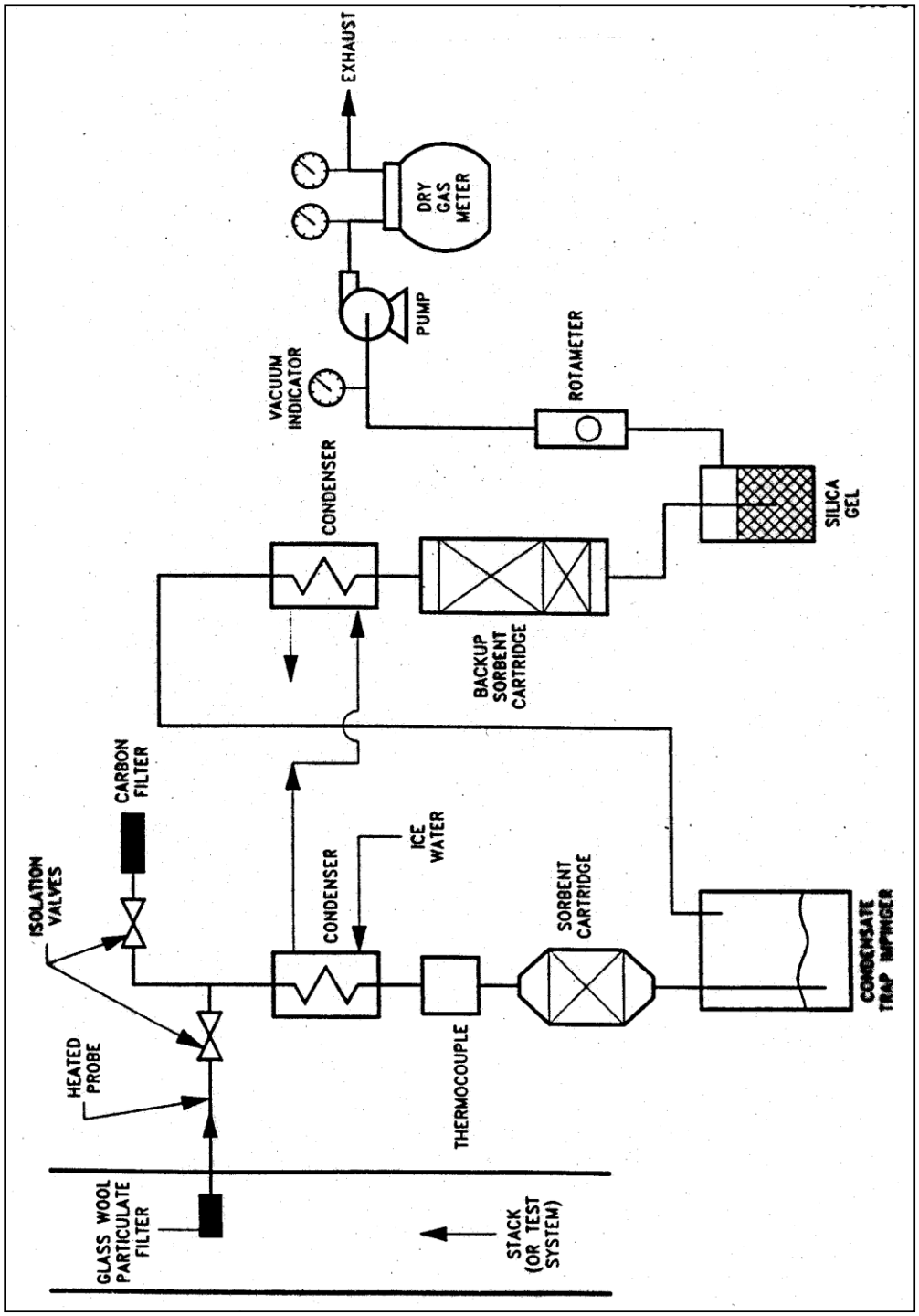
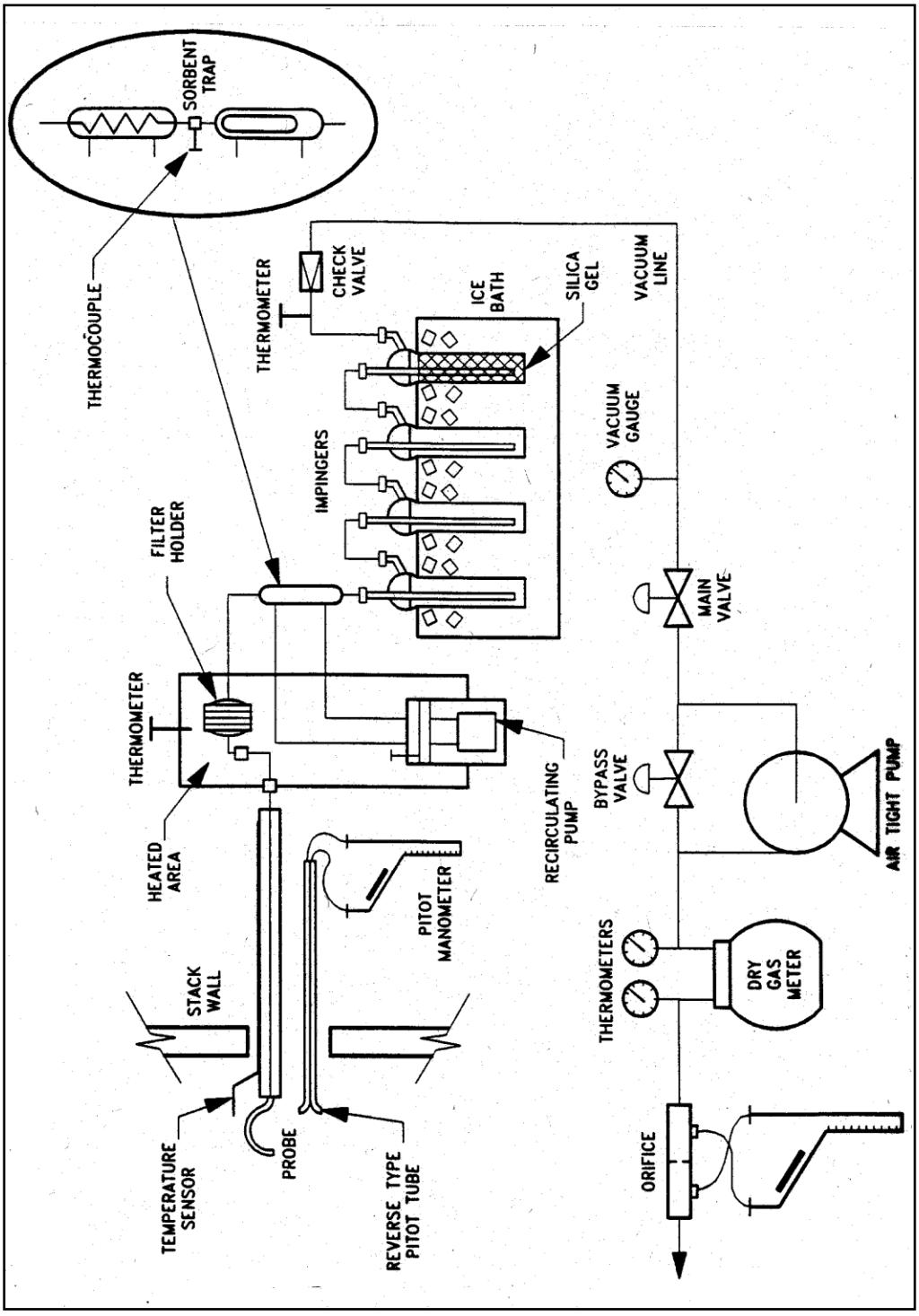


Figure 4-2. MM5 Sampling Train Schematic Drawing



gas continuously in propane equivalents. The analyzer was calibrated with propane standards following the requirements in the method.

3 test runs were performed that were at least 1 hour in duration. Each sample was collected non-isokinetically at a single point in the centroid of the stack.

No problems or deviations were encountered.

4.2.5 Carbon Monoxide (CO)

During each test run sampling was conducted for CO following EPA Method 10 from 40 CFR Part 60 Appendix A. A CO analyzer measured the vent gas continuously. The analyzer was calibrated with EPA protocol CO gas standards following the requirements in the method.

3 test runs were performed that were at least 1 hour in duration. Each sample was collected non-isokinetically at a single point in the centroid of the stack.

No problems or deviations were encountered.

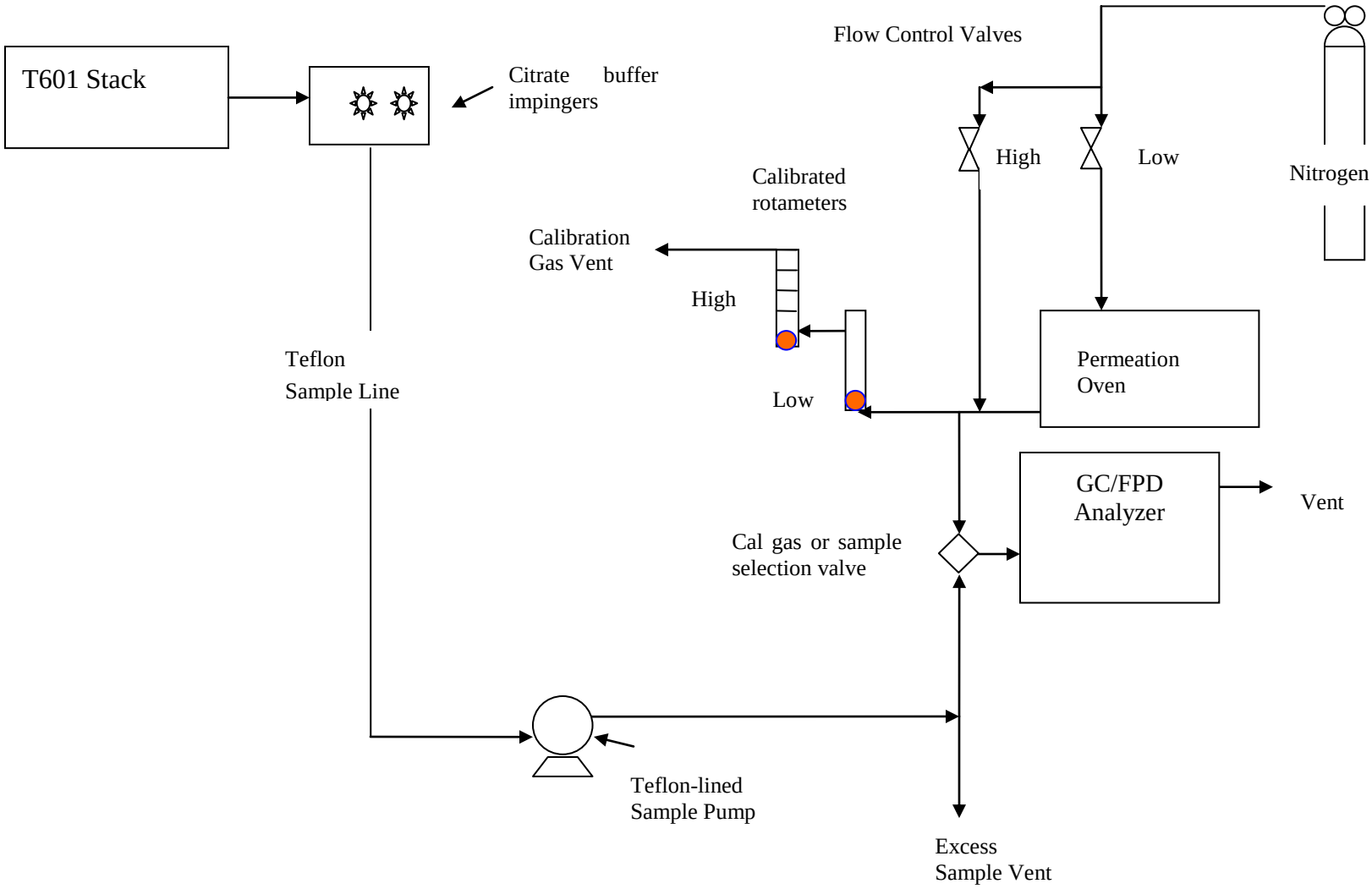
4.2.6 H_2S/COS/CS_2/TRS

During each test run, sampling was conducted for H_2S/COS/CS_2/TRS following a combination of EPA Methods 15 and 16B from 40 CFR Part 60 Appendix A. A gas chromatograph (GC) equipped with a flame photometric detector (FPD) measured the stack gas semi-continuously every 15 minutes. The GC was calibrated with H_2S/COS/CS_2 gas standards following the requirements in the method. TRS was determined as the total amount of the 3 reduced sulfur compounds.

3 test runs were performed that were at least 1 hour in duration. Each sample was collected non-isokinetically at a single point in the centroid of the stack.

No problems or deviations were encountered.

Figure 4-3. Method 15 TRS Sample System Diagram



5.0 QUALITY ASSURANCE/QUALITY CONTROL

To ensure accurate results, strict quality assurance and control measures were followed. All testing was performed following standard EPA protocol. The test criteria was thoroughly documented and checked for completeness.

5.1 Sample System QA/QC

Before and after each test run, all isokinetic sampling trains were leaked checked. The non-isokinetic sampling trains were likewise leak checked prior to and after each run. CEMS bias checks were performed per the test methods.

- S-type pitot tubes meeting the specifications in EPA Method 2 were used to measure the velocity head pressures. At the completion of testing, the pitot tubes were inspected for damage following the procedures in EPA Method 2.
- The pitot tube/manometer systems were leak checked after each run at a pressure higher than 3 in.H_2O and the results were stable for at least 15 seconds.
- The manometer was leveled and zeroed prior to each run.
- At the completion of testing, the K-type thermocouple systems used were checked for proper calibration following the procedures in EPA Method 2 and the results were acceptable at $\leq \pm 1.5\%$ of the reference value.
- At the completion of testing, the onsite barometer was checked for proper calibration following the procedures in EPA Method 2.
- During each run, emission gas was collected over a period required of the ICR at specific rates.
- During each isokinetic run, the average impinger exit temperature did not exceed 68ºF.
- The metering system used to determine the sample volumes was leak checked after each run at a vacuum higher than the operating vacuum observed during the run.

At the completion of testing, the dry gas meter's calibration was checked for proper calibration at a single orifice setting and the results were acceptable at $\leq \pm 5$ % of the yearly calibration factor.

The non-isokinetic methods followed the QA procedures set out in their respective methods with the exception of the speciated volatile HAPs that employed specific spike cocktails (per ICR guidance) to assess laboratory collection and analysis efficiencies.

5.2 Analytical QA/QC

Enthalpy Analytical, Inc. and Test America performed the analysis of the samples and was responsible for providing pertinent QA/QC. The analytical reports, which also contain their QA/QC are provided in the appendix.

5.3 Data Reduction QA/QC

Data was checked for completeness and accuracy. The review is documented in the appendix.

5.4 External QA/QC

No test method performance audit samples were received from the administrator for this test program. No system audits were performed by the administrator onsite during the testing to determine the quality of instrument calibration, data validation, and field activities.

APPENDIX A: PRELIMINARY TEST DATA

APPENDIX B: EPA METHOD 18 SPECIATED VOLATILE ORGANIC HAPS

APPENDIX C: SW-846 METHOD 0100 SPECIATED SEMI-VOLS ORGANIC HAPS

APPENDIX D: CEMS DATA CO, THC, O2, CO2

APPENDIX E: EPA METHODS 15 AND 16B SPECIATED SULFUR COMPOUNDS AND TRS DATA

APPENDIX F: PROCESS DATA (CONFIDENTIAL BUSINESS INFORMATION)

APPENDIX G: ANALYTICAL DATA