COMPLIANCE TEST REPORT
FOR A
SOURCE SAMPLING PROGRAM
UNDER 40 CFR PART 63, SUBPART ZZZZZ

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FROM IRON AND STEEL FOUNDRIES AREA SOURCES

EAST JORDAN FOUNDRY, LLC
PTI No. 185-16
State Registration No. N6052

Test Dates: April 28, 2019 – May 2, 2019

Test Report Date: June 17, 2019

Prepared for:
Michigan Department of Environmental Quality
And
East Jordan Foundry, LLC

Prepared by:
AIR ANALYSIS, LLC
189 Hausman Road
Lenhartsville, PA 19534
Phone (610) 756-3490
Fax (610) 756-3491

PADEP Laboratory Accreditation No. 06-01087

SUMMARY OF TEST PROGRAM

East Jordan Foundry, LLC (EJF) operates a new gray and ductile iron foundry in Antrim County, Elmira, Michigan. The facility is considered to be a "Large" area source foundry under the rules of 40 CFR Part 63, Subpart ZZZZZ, National Emission Standards for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries Area Sources. All Sources at the foundry have been installed and are being operated in accordance with the terms of Michigan Department of Environmental Quality (MDEQ) Permit to Install (PTI) No. 185-16.

The testing program documented in this report was performed for the determination of compliance with air emission limits cited in Subpart ZZZZZ and PTI 185-16 for all applicable sources. Air Analysis, LLC of Lenhartsville, PA was responsible for the performance of the testing program that was completed between April 28, 2019 and May 2, 2019. A total of nine (9) sources were tested while on-site. The test procedures utilized complied with the requirements of the MDEQ and promulgated test methods of Environmental Protection Agency (EPA) 40 CFR 60, Appendices. Representatives of the MDEQ were on-site April 29, 2019 through May 1, 2019 to witness the testing procedures and facility operations.

A Testing Protocol was submitted and subsequently reviewed by the MDEQ, prior to the performance of the testing program. All of the testing was conducted in accordance with the proposed methodology of the protocol, except for Vent ID SVHJ-BH. Test Methods 5 and 202 were originally proposed for this Source, however the preliminary flow traverse resulted in a stack temperature below 85° F. As per Test Method 202, "if the gas filtration temperature never exceeds 30°C (85°F), then use of this method is not required to measure total primary Particulate Matter (PM)". For this reason, Air Analysis, LLC only performed Test Method 17 on this Source for the measurement of Filterable PM.

A few testing and operational issues arose during the program that required changes to the original testing schedule. Air Analysis, LLC was set up to perform the testing of Vent ID's SVC-BH and SVE-BH simultaneously on April 30, 2019. During the preliminary flow traverse conducted on SVC-BH, it was determined that the cyclonic flow angle within the exhaust stack exceed the allowable 20° requirement of Test Method 1. Following discussion with EJF and the MDEQ representative, it was determined that testing would be performed on Vent ID's SVF-BH and SVG-BH that day while the issue on SVC-BH was resolved. Due to the delay however, Air Analysis, LLC was only able to complete two (2) test runs on Vent ID's SVF-BH and SVG-BH before the end of first shift. The final test run on each of these Sources was required to be performed during second shift operations on that same day. Similarly, additional flow traverses were required to be performed on SVC-BH the following day (i.e. May 1, 2019) in order to resolve the cyclonic flow issue, and only two (2) test runs were able to be performed on SVC-BH and SVE-BH during first shift operations. Air Analysis, LLC was again able to conduct the final test run on each of these Sources during second shift operations that same day. The correction of the cyclonic flow issue of SVC-BH was made through changes to the exhaust fan damper position.

Unexpected variations in measured stack gas velocity and the corresponding stack gas volume between the first one-hour test run and the second one-hour test run were noted during the testing of SVD-BH (Baghouse D). Rather than terminate the test at the time, the decision was made to complete the second and third test runs and then review all pertinent information to determine if there was an identifiable explanation for the unexpected variation. Following review of the test results EJF and Air Analysis, LLC have been unable to identify an explanation for the difference in the first one-hour test stack gas volume as well as the substantially different condensable catch weight in comparison to the

2nd and 3rd one-hour test runs. In the absence of an explanation, Air Analysis, LLC considers the results for SVD-BH to be questionable and are noted as such.

During the performance of the gaseous testing, multiple test runs demonstrated minute averages and final emission concentrations as negative values for different parameters. This results when concentrations of zero are measured by the analyzer within the applicable exhaust stack and the initial calibration of the analyzer is biased low. In all cases, analyzer calibrations met with acceptable criteria for cal error, bias and drift, but negative values appear for minute averages and, in some cases, as the final emission result for the test run. For these applicable test runs and as per the MDEQ, the minute averages of each test run printout display the negative value as recorded by the analyzer during the test run. However, if the post test calibration drift test did not correct the measured concentration or value to zero or a positive number, Air Analysis, LLC manually changed the final concentration to zero in their spreadsheet for proper calculation and reporting of emissions. When the final result was changed, a "corrected" notation has been made next to the parameters final result on the test run printout.

Summary tables of the results generated from the testing program are presented in Tables 1 through 10 of this report. As applicable for the purpose of PM result reporting; Test Method 5 results have been compared to the Filterable PM and Filterable PM-10 emission limits, Test Method 17 results have been compared to the Filterable PM and Filterable PM-10 emission limits, combined Test Method 5 and 202 results have been compared to the PM/PM-10/PM-2.5 emission limits and Test Method 202 results have been compared to the PM-2.5 emission limits.

SUMMARY TABLES OF INDIVIDUAL TEST RESULTS

TABLE 2
SUMMARY OF TEST RESULTS
Vent ID SVAB-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	4/29/2019	4/29/2019	4/29/2019	
Start Time:	7:55	10:15	12:20	
End Time:	8:58	11:18	13:22	
A - Stack Area, SQ.FT:	53.73	53.73	53.73	
CP - Pitot Coefficient:	0.84	0.84	0.84	**0.84**
Y - Meter Calibration Factor:	0.9824	0.9824	0.9824	**0.98**
DN - Nozzle Diameter:	0.260	0.260	0.260	**0.260**
Pbar - Barometric Pressure:	28.81	28.8	28.79	**28.80**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	66.396	67.346	66.123	**66.622**
VMSTD - Std. Gas Volume (SCF):	65.843	66.472	65.653	**65.989**
PIT - Avg. Delta P (in. of H2O):	0.784	0.802	0.773	**0.786**
PM - Avg. Delta H (in. of H2O):	3.829	3.914	3.773	**3.84**
TS - Stack Temp. (F):	87	88	86	**87**
TM - Avg. Meter Temp(F):	48	51	47	**49**
Vlc - Volume Water Collected:	13	15	20	**16**
VWSTD - Std. Water Volume (SCF):	0.612	0.707	0.942	**0.754**
%M - Percent Moisture:	0.92	1.05	1.41	**1.13**
Bws - Mole Fraction, Dry:	0.009	0.011	0.014	**0.0113**
%CO2 - Carbon Dioxide, Dry:	0.11	0.11	0.11	**0.11**
%O2 - Oxygen, Dry:	20.88	20.91	20.81	**20.87**
MD - Dry Molecular Weight:	28.85	28.85	28.85	**28.85**
MS - Wet Molecular Weight:	28.75	28.74	28.70	**28.73**
PS - Stack Press. (in. of Hg):	28.77	28.76	28.75	**28.76**
VS - Stack Gas Velocity (AFPS):	51.7	52.3	51.3	**51.77**
Qstd - Stack Gas Volume (DSCFM):	153,187	154,540	151,473	**153,067**
QA - Stack Gas Volume (ACFM):	166,585	168,624	165,458	**166,889**
QS - Stack Gas Velocity (SCFM):	154,612	156,183	153,647	**154,814**
%I - Isokinetic Ratio:	104.4	104.5	105.3	**104.8**
Production Data				
Tons of Metal Melted (Tons/Hr):	25.37	22.59	23.04	**23.67**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	3.20	2.50	2.00	**2.57**
Emission Concentration, Gr./DSCF:	0.0007	0.0006	0.0005	**0.0006**
Emission Rate, Lbs./Hr:	0.98	0.77	0.61	**0.79**
Emission Rate, Lbs./Ton:	0.039	0.034	0.026	**0.033**
Condensable PM, mg - Catch weight:	9.60	2.90	1.60	**4.70**
Emission Concentration, Gr./DSCF:	0.0022	0.0007	0.0004	**0.0011**
Emission Rate, Lbs./Hr:	2.95	0.89	0.49	**1.44**
Total PM, mg - Catch weight:	12.80	5.40	3.60	**7.27**
Emission Concentration, Gr./DSCF:	0.0030	0.0013	0.0008	**0.0017**
Emission Rate, Lbs./Hr:	3.94	1.66	1.10	**2.23**

TABLE 3
SUMMARY OF TEST RESULTS
Vent ID SVAB-BH –NO_x, SO_2, CO & VOC Emission Testing

				Averages
Run Number:	1	2	3	
Date:	4/29/2019	4/29/2019	4/29/2019	
Start Time:	7:55	10:15	12:20	
End Time:	8:59	11:15	13:20	
TT - Sampling Time:	64	60	60	
%M - Percent Moisture:	0.92	1.05	1.41	**1.13**
%CO2 - Carbon Dioxide, Dry:	0.11	0.11	0.11	**0.11**
%O2 - Oxygen, Dry:	20.88	20.91	20.81	**20.87**
Qa - Stack Gas Volume (ACFM):	166,585	168,624	165,458	**166,889**
Qstd - Stack Gas Volume (DSCFM):	153,187	154,540	151,473	**153,067**
Qstd - Stack Gas Volume (DSCFH):	9,191,248	9,272,412	9,088,410	**9,184,023**
Production Data				
Tons of Metal Melted (Tons/Hr):	25.37	22.59	23.04	**23.67**
Emission Results				
NOx, ppm =	0.36	0.37	0.22	**0.32**
NOx, lbs./hr =	0.40	0.41	0.24	**0.35**
SO2, ppm =	1.03	3.09	1.92	**2.01**
SO2, lbs./hr =	1.10	3.34	2.03	**2.16**
CO, ppm =	103.31	102.32	86.12	**97.25**
CO, lbs./hr =	69.07	69.01	56.93	**65.01**
CO, lbs./Ton=	2.72	3.05	2.47	**2.75**
THC, ppm =	8.67	9.95	7.40	**8.67**
THC, lbs./hr =	9.12	10.56	7.70	**9.13**
THC, lbs./Ton =	0.36	0.47	0.33	**0.39**

TABLE 4
SUMMARY OF TEST RESULTS
Vent ID SVC-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	5/1/2019	5/1/2019	5/1/2019	
Start Time:	11:10	13:55	18:47	
End Time:	12:29	15:13	19:50	
A - Stack Area, SQ.FT:	34.04	34.04	34.04	
CP - Pitot Coefficient:	0.84	0.84	0.84	**0.84**
Y - Meter Calibration Factor:	1.0050	1.0050	1.0050	**1.01**
DN - Nozzle Diameter:	0.233	0.233	0.233	**0.233**
Pbar - Barometric Pressure:	28.6	28.6	28.6	**28.60**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	47.989	47.300	47.646	**47.645**
VMSTD - Std. Gas Volume (SCF):	44.920	43.935	44.457	**44.437**
PIT - Avg. Delta P (in. of H2O):	0.634	0.623	0.632	**0.629**
PM - Avg. Delta H (in. of H2O):	2.007	1.969	1.997	**1.99**
TS - Stack Temp. (F):	87	83	74	**81**
TM - Avg. Meter Temp(F):	84	89	86	**86**
Vlc - Volume Water Collected:	18	16	14	**16**
VWSTD - Std. Water Volume (SCF):	0.848	0.754	0.659	**0.754**
%M - Percent Moisture:	1.85	1.69	1.46	**1.67**
Bws - Mole Fraction, Dry:	0.019	0.017	0.015	**0.0167**
%CO2 - Carbon Dioxide, Dry:	0.00	0.00	0.00	**0.00**
%O2 - Oxygen, Dry:	20.62	20.76	20.76	**20.71**
MD - Dry Molecular Weight:	28.82	28.83	28.83	**28.83**
MS - Wet Molecular Weight:	28.62	28.65	28.67	**28.65**
PS - Stack Press. (in. of Hg):	28.56	28.56	28.56	**28.56**
VS - Stack Gas Velocity (AFPS):	46.6	46.0	45.9	**46.15**
Qstd - Stack Gas Volume (DSCFM):	86,099	85,689	87,160	**86,316**
QA - Stack Gas Volume (ACFM):	95,176	93,902	93,715	**94,264**
QS - Stack Gas Velocity (SCFM):	87,724	87,159	88,452	**87,778**
%I - Isokinetic Ratio:	100.0	98.3	97.8	**98.7**
Production Data				
Tons of Metal Melted (Tons/Hr):	20.55	22.32	22.12	**21.66**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	2.30	3.70	3.40	**3.13**
Emission Concentration, Gr./DSCF:	0.00079	0.0013	0.0012	**0.0011**
Emission Rate, Lbs./Hr:	0.58	0.95	0.88	**0.81**
Condensable PM, mg - Catch weight:	2.20	0.00	0.10	**0.77**
Emission Concentration, Gr./DSCF:	0.0008	0.0000	0.00003	**0.00026**
Emission Rate, Lbs./Hr:	0.56	0.00	0.03	**0.19**
Total PM, mg - Catch weight:	4.50	3.70	3.50	**3.90**
Emission Concentration, Gr./DSCF:	0.00155	0.0013	0.00121	**0.0014**
Emission Rate, Lbs./Hr:	1.14	0.95	0.91	**1.00**

TABLE 5
SUMMARY OF TEST RESULTS
Vent ID SVC-BH –NO_x, CO & VOC Emission Testing

				Averages
Run Number:	1	2	3	
Date:	5/1/2019	5/1/2019	5/1/2019	
Start Time:	11:10	13:55	18:47	
End Time:	12:13	15:06	19:47	
TT - Sampling Time:	63	60	60	
%M - Percent Moisture:	1.85	1.69	1.46	**1.67**
%CO2 - Carbon Dioxide, Dry:	0.00	0.00	0.00	**0.00**
%O2 - Oxygen, Dry:	20.62	20.76	20.76	**20.71**
Qa - Stack Gas Volume (ACFM):	95,176	93,902	93,715	**94,264**
Qstd - Stack Gas Volume (DSCFM):	86,099	85,689	87,160	**86,316**
Qstd - Stack Gas Volume (DSCFH):	5,165,913	5,141,337	5,229,571	**5,178,940**
Production Data				
Tons of Metal Melted (Tons/Hr):	20.55	22.32	22.12	**21.66**
Emission Results				
NOx, ppm =	0.00	0.00	0.00	**0.00**
NOx, lbs./hr =	0.00	0.00	0.00	**0.00**
CO, ppm =	15.61	7.99	2.76	**8.79**
CO, lbs./hr =	5.87	2.99	1.05	**3.30**
CO, lbs./Ton=	0.29	0.13	0.05	**0.16**
THC, ppm =	2.45	2.31	1.77	**2.18**
THC, lbs./hr =	1.45	1.36	1.06	**1.29**
THC, lbs./Ton =	0.07	0.06	0.05	**0.06**

TABLE 6
SUMMARY OF TEST RESULTS
Vent ID SVD-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	4/29/2019	4/29/2019	4/29/2019	
Start Time:	7:55	10:15	12:20	
End Time:	9:06	11:18	13:23	
A - Stack Area, SQ.FT:	25.97	25.97	25.97	
CP - Pitot Coefficient:	0.84	0.84	0.84	**0.84**
Y - Meter Calibration Factor:	0.9998	0.9998	0.9998	**1.00**
DN - Nozzle Diameter:	0.213	0.213	0.213	**0.213**
Pbar - Barometric Pressure:	28.7	28.7	28.7	**28.70**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	46.748	39.460	39.580	**41.929**
VMSTD - Std. Gas Volume (SCF):	46.805	39.330	39.617	**41.917**
PIT - Avg. Delta P (in. of H2O):	0.937	0.656	0.664	**0.752**
PM - Avg. Delta H (in. of H2O):	1.965	1.390	1.395	**1.58**
TS - Stack Temp. (F):	90	95	97	**94**
TM - Avg. Meter Temp(F):	48	50	48	**48**
Vlc - Volume Water Collected:	23	16.5	17	**19**
VWSTD - Std. Water Volume (SCF):	1.083	0.777	0.801	**0.887**
%M - Percent Moisture:	2.26	1.94	1.98	**2.06**
Bws - Mole Fraction, Dry:	0.023	0.019	0.020	**0.0206**
%CO2 - Carbon Dioxide, Dry:	0.07	0.04	0.08	**0.06**
%O2 - Oxygen, Dry:	20.73	20.80	20.82	**20.78**
MD - Dry Molecular Weight:	28.84	28.84	28.85	**28.84**
MS - Wet Molecular Weight:	28.60	28.63	28.63	**28.62**
PS - Stack Press. (in. of Hg):	28.66	28.66	28.66	**28.66**
VS - Stack Gas Velocity (AFPS):	56.9	47.7	48.1	**50.91**
Qstd - Stack Gas Volume (DSCFM):	79,647	66,499	66,760	**70,968**
QA - Stack Gas Volume (ACFM):	88,600	74,358	75,015	**79,324**
QS - Stack Gas Velocity (SCFM):	81,491	67,813	68,109	**72,471**
%I - Isokinetic Ratio:	102.8	103.5	103.9	**103.4**
Production Data				
Tons of Metal Melted (Tons/Hr):	25.37	22.59	23.04	**23.67**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	3.70	3.60	2.10	**3.13**
Emission Concentration, Gr./DSCF:	0.0012	0.0014	0.0008	**0.0012**
Emission Rate, Lbs./Hr:	0.83	0.80	0.47	**0.70**
Condensable PM, mg - Catch weight:	18.40	3.60	0.80	**7.60**
Emission Concentration, Gr./DSCF:	0.0061	0.0014	0.0003	**0.0026**
Emission Rate, Lbs./Hr:	4.14	0.80	0.18	**1.71**
Total PM, mg - Catch weight:	22.10	7.20	2.90	**10.73**
Emission Concentration, Gr./DSCF:	0.0073	0.0028	0.0011	**0.0037**
Emission Rate, Lbs./Hr:	4.97	1.61	0.65	**2.41**

TABLE 7
SUMMARY OF TEST RESULTS
Vent ID SVD-BH –NO_x, SO_2, CO & VOC Emission Testing

				Averages
Run Number:	1	2	3	
Date:	4/29/2019	4/29/2019	4/29/2019	
Start Time:	7:55	10:15	12:20	
End Time:	9:01	11:15	13:20	
TT - Sampling Time:	66	60	60	
%M - Percent Moisture:	2.26	1.94	1.98	**2.06**
%CO2 - Carbon Dioxide, Dry:	0.07	0.04	0.08	**0.06**
%O2 - Oxygen, Dry:	20.73	20.80	20.82	**20.78**
Qa - Stack Gas Volume (ACFM):	88,600	74,358	75,015	**79,324**
Qstd - Stack Gas Volume (DSCFM):	79,647	66,499	66,760	**70,968**
Qstd - Stack Gas Volume (DSCFH):	4,778,834	3,989,921	4,005,574	**4,258,110**
Production Data				
Tons of Metal Melted (Tons/Hr):	25.37	22.59	23.04	**23.67**
Emission Results				
NOx, ppm =	0.00	0.00	0.00	**0.00**
NOx, lbs./hr =	0.00	0.00	0.00	**0.00**
SO2, ppm =	5.45	3.66	3.90	**4.34**
SO2, lbs./hr =	3.04	1.70	1.82	**2.19**
CO, ppm =	55.50	61.95	60.00	**59.15**
CO, lbs./hr =	19.29	17.98	17.48	**18.25**
CO, lbs./Ton=	0.76	0.80	0.76	**0.77**
THC, ppm =	16.76	16.45	14.61	**15.94**
THC, lbs./hr =	9.17	7.52	6.70	**7.80**
THC, lbs./Ton =	0.36	0.33	0.29	**0.33**

TABLE 8
SUMMARY OF TEST RESULTS
Vent ID SVE-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	5/1/2019	5/1/2019	5/1/2019	
Start Time:	11:10	13:55	9:40	
End Time:	12:30	15:12	10:45	
A - Stack Area, SQ.FT:	18.99	18.99	18.99	
CP - Pitot Coefficient:	0.83	0.83	0.83	**0.83**
Y - Meter Calibration Factor:	0.9824	0.9824	0.9824	**0.98**
DN - Nozzle Diameter:	0.216	0.216	0.216	**0.216**
Pbar - Barometric Pressure:	28.45	28.45	28.61	**28.50**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	55.042	59.512	54.249	**56.268**
VMSTD - Std. Gas Volume (SCF):	50.003	53.800	49.616	**51.140**
PIT - Avg. Delta P (in. of H2O):	1.050	1.202	1.055	**1.103**
PM - Avg. Delta H (in. of H2O):	2.513	2.883	2.531	**2.64**
TS - Stack Temp. (F):	95	94	88	**92**
TM - Avg. Meter Temp(F):	86	89	86	**87**
Vlc - Volume Water Collected:	23	26	23	**24**
VWSTD - Std. Water Volume (SCF):	1.083	1.225	1.083	**1.130**
%M - Percent Moisture:	2.12	2.23	2.14	**2.16**
Bws - Mole Fraction, Dry:	0.021	0.022	0.021	**0.0216**
%CO2 - Carbon Dioxide, Dry:	0.00	0.00	0.00	**0.00**
%O2 - Oxygen, Dry:	20.87	20.86	20.93	**20.89**
MD - Dry Molecular Weight:	28.83	28.83	28.84	**28.84**
MS - Wet Molecular Weight:	28.61	28.59	28.61	**28.60**
PS - Stack Press. (in. of Hg):	28.40	28.40	28.58	**28.46**
VS - Stack Gas Velocity (AFPS):	59.6	64.1	58.5	**60.71**
Qstd - Stack Gas Volume (DSCFM):	59,967	64,589	59,990	**61,515**
QA - Stack Gas Volume (ACFM):	67,887	72,979	66,621	**69,162**
QS - Stack Gas Velocity (SCFM):	61,266	66,059	61,300	**62,875**
%I - Isokinetic Ratio:	103.7	103.6	102.9	**103.4**
Production Data				
Tons of Metal Melted (Tons/Hr):	20.55	22.32	22.12	**21.66**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	1.40	1.10	1.60	**1.37**
Emission Concentration, Gr./DSCF:	0.0004	0.0003	0.0005	**0.0004**
Emission Rate, Lbs./Hr:	0.22	0.17	0.26	**0.22**
Condensable PM, mg - Catch weight:	0.70	0.30	0.70	**0.57**
Emission Concentration, Gr./DSCF:	0.0002	0.0001	0.0002	**0.0002**
Emission Rate, Lbs./Hr:	0.11	0.05	0.11	**0.09**
Total PM, mg - Catch weight:	2.10	1.40	2.30	**1.93**
Emission Concentration, Gr./DSCF:	0.00065	0.0004	0.00072	**0.0006**
Emission Rate, Lbs./Hr:	0.33	0.22	0.37	**0.31**

TABLE 9
SUMMARY OF TEST RESULTS
Vent ID SVE-BH –NO_x, CO & VOC Emission Testing

				Averages
Run Number:	1	2	3	
Date:	5/1/2019	5/1/2019	5/1/2019	
Start Time:	11:10	13:55	18:47	
End Time:	12:13	14:55	19:47	
TT - Sampling Time:	63	60	60	
%M - Percent Moisture:	2.12	2.23	2.14	**2.16**
%CO2 - Carbon Dioxide, Dry:	0.00	0.00	0.00	**0.00**
%O2 - Oxygen, Dry:	20.87	20.86	20.93	**20.89**
Qa - Stack Gas Volume (ACFM):	67,887	72,979	66,621	**69,162**
Qstd - Stack Gas Volume (DSCFM):	59,967	64,589	59,990	**61,515**
Qstd - Stack Gas Volume (DSCFH):	3,598,028	3,875,322	3,599,409	**3,690,920**
Production Data				
Tons of Metal Melted (Tons/Hr):	20.55	22.32	22.12	**21.66**
Emission Results				
NOx, ppm =	0.00	0.00	0.00	**0.00**
NOx, lbs./hr =	0.00	0.00	0.00	**0.00**
CO, ppm =	9.34	7.73	2.64	**6.57**
CO, lbs./hr =	2.44	2.18	0.69	**1.77**
CO, lbs./Ton=	0.12	0.10	0.03	**0.08**
THC, ppm =	7.16	5.52	3.19	**5.29**
THC, lbs./hr =	2.95	2.45	1.32	**2.24**
THC, lbs./Ton =	0.14	0.11	0.06	**0.10**

TABLE 10
SUMMARY OF TEST RESULTS
Vent ID SVF-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	4/30/2019	4/30/2019	4/30/2019	
Start Time:	9:00	13:07	19:53	
End Time:	10:03	14:09	20:55	
A - Stack Area, SQ.FT:	18.99	18.99	18.99	
CP - Pitot Coefficient:	0.83	0.83	0.83	**0.83**
Y - Meter Calibration Factor:	0.9998	0.9998	0.9998	**1.00**
DN - Nozzle Diameter:	0.216	0.216	0.216	**0.216**
Pbar - Barometric Pressure:	28.75	28.75	28.82	**28.77**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	51.190	47.557	49.649	**49.465**
VMSTD - Std. Gas Volume (SCF):	51.351	47.028	49.742	**49.374**
PIT - Avg. Delta P (in. of H2O):	1.138	0.968	1.057	**1.054**
PM - Avg. Delta H (in. of H2O):	2.388	2.031	2.220	**2.21**
TS - Stack Temp. (F):	101	95	94	**97**
TM - Avg. Meter Temp(F):	49	55	50	**51**
Vlc - Volume Water Collected:	36	16.5	25	**26**
VWSTD - Std. Water Volume (SCF):	1.696	0.777	1.178	**1.217**
%M - Percent Moisture:	3.20	1.63	2.31	**2.38**
Bws - Mole Fraction, Dry:	0.032	0.016	0.023	**0.0238**
%CO2 - Carbon Dioxide, Dry:	0.08	0.04	0.00	**0.04**
%O2 - Oxygen, Dry:	20.81	20.77	20.90	**20.83**
MD - Dry Molecular Weight:	28.85	28.84	28.84	**28.84**
MS - Wet Molecular Weight:	28.50	28.66	28.59	**28.58**
PS - Stack Press. (in. of Hg):	28.68	28.68	28.77	**28.71**
VS - Stack Gas Velocity (AFPS):	62.3	56.9	59.4	**59.53**
Qstd - Stack Gas Volume (DSCFM):	61,986	58,111	60,612	**60,236**
QA - Stack Gas Volume (ACFM):	70,987	64,769	67,674	**67,810**
QS - Stack Gas Velocity (SCFM):	64,033	59,071	62,047	**61,717**
%I - Isokinetic Ratio:	103.1	100.7	102.1	**102.0**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	1.90	0.90	1.20	**1.33**
Emission Concentration, Gr./DSCF:	0.0006	0.0003	0.0004	**0.0004**
Emission Rate, Lbs./Hr:	0.30	0.15	0.19	**0.21**
Condensable PM, mg - Catch weight:	1.50	0.30	0.40	**0.73**
Emission Concentration, Gr./DSCF:	0.00045	0.00010	0.00012	**0.00022**
Emission Rate, Lbs./Hr:	0.24	0.05	0.06	**0.12**
Total PM, mg - Catch weight:	3.40	1.20	1.60	**2.07**
Emission Concentration, Gr./DSCF:	0.00102	0.00039	0.00050	**0.00064**
Emission Rate, Lbs./Hr:	0.54	0.20	0.26	**0.33**

TABLE 11
SUMMARY OF TEST RESULTS
Vent ID SVG-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	4/30/2019	4/30/2019	4/30/2019	
Start Time:	9:00	13:07	19:53	
End Time:	10:02	14:08	20:55	
A - Stack Area, SQ.FT:	13.10	13.10	13.10	
CP - Pitot Coefficient:	0.84	0.84	0.84	**0.84**
Y - Meter Calibration Factor:	1.0050	1.0050	1.0050	**1.01**
DN - Nozzle Diameter:	0.213	0.213	0.213	**0.213**
Pbar - Barometric Pressure:	28.81	28.87	28.82	**28.83**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	44.890	44.420	46.404	**45.238**
VMSTD - Std. Gas Volume (SCF):	46.009	44.682	46.906	**45.866**
PIT - Avg. Delta P (in. of H2O):	0.949	0.922	0.988	**0.953**
PM - Avg. Delta H (in. of H2O):	1.904	1.843	2.011	**1.92**
TS - Stack Temp. (F):	93	100	95	**96**
TM - Avg. Meter Temp(F):	41	51	48	**47**
Vlc - Volume Water Collected:	28	40	30	**33**
VWSTD - Std. Water Volume (SCF):	1.319	1.884	1.413	**1.539**
%M - Percent Moisture:	2.79	4.05	2.92	**3.25**
Bws - Mole Fraction, Dry:	0.028	0.040	0.029	**0.0325**
%CO2 - Carbon Dioxide, Dry:	0.00	0.03	0.00	**0.01**
%O2 - Oxygen, Dry:	20.74	20.73	20.90	**20.79**
MD - Dry Molecular Weight:	28.83	28.83	28.84	**28.83**
MS - Wet Molecular Weight:	28.53	28.40	28.52	**28.48**
PS - Stack Press. (in. of Hg):	28.77	28.84	28.78	**28.79**
VS - Stack Gas Velocity (AFPS):	57.3	56.9	58.6	**57.59**
Qstd - Stack Gas Volume (DSCFM):	40,167	38,979	40,893	**40,013**
QA - Stack Gas Volume (ACFM):	45,004	44,694	46,042	**45,247**
QS - Stack Gas Velocity (SCFM):	41,318	40,623	42,125	**41,355**
%I - Isokinetic Ratio:	101.1	101.2	101.2	**101.2**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	3.80	2.70	1.60	**2.70**
Emission Concentration, Gr./DSCF:	0.0013	0.0009	0.0005	**0.0009**
Emission Rate, Lbs./Hr:	0.44	0.31	0.18	**0.31**
Condensable PM, mg - Catch weight:	0.60	0.30	0.90	**0.60**
Emission Concentration, Gr./DSCF:	0.0002	0.0001	0.0003	**0.0002**
Emission Rate, Lbs./Hr:	0.07	0.03	0.10	**0.07**
Total PM, mg - Catch weight:	4.40	3.00	2.50	**3.30**
Emission Concentration, Gr./DSCF:	0.0015	0.0010	0.0008	**0.0011**
Emission Rate, Lbs./Hr:	0.51	0.35	0.29	**0.38**

TABLE 12
SUMMARY OF TEST RESULTS
Vent ID SVHJ-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	5/2/2019	5/2/2019	5/2/2019	
Start Time:	7:55	9:24	10:52	
End Time:	9:01	10:28	12:18	
A - Stack Area, SQ.FT:	69.64	69.64	69.64	
CP - Pitot Coefficient:	0.83	0.83	0.83	**0.83**
Y - Meter Calibration Factor:	1.0050	1.0050	1.0050	**1.01**
DN - Nozzle Diameter:	0.233	0.218	0.218	**0.223**
Pbar - Barometric Pressure:	28.65	28.65	28.65	**28.65**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	50.035	44.098	43.872	**46.002**
VMSTD - Std. Gas Volume (SCF):	50.948	44.715	43.945	**46.536**
PIT - Avg. Delta P (in. of H2O):	0.778	0.782	0.768	**0.776**
PM - Avg. Delta H (in. of H2O):	2.344	1.800	1.769	**1.97**
TS - Stack Temp. (F):	70	70	70	**70**
TM - Avg. Meter Temp(F):	42	43	49	**45**
Vlc - Volume Water Collected:	12	8	8	**9**
VWSTD - Std. Water Volume (SCF):	0.565	0.377	0.377	**0.440**
%M - Percent Moisture:	1.10	0.84	0.85	**0.93**
Bws - Mole Fraction, Dry:	0.011	0.008	0.009	**0.0093**
%CO2 - Carbon Dioxide, Dry:	0.00	0.00	0.00	**0.00**
%O2 - Oxygen, Dry:	20.90	20.90	20.90	**20.90**
MD - Dry Molecular Weight:	28.84	28.84	28.84	**28.84**
MS - Wet Molecular Weight:	28.72	28.75	28.74	**28.74**
PS - Stack Press. (in. of Hg):	28.61	28.61	28.61	**28.61**
VS - Stack Gas Velocity (AFPS):	50.2	50.3	49.9	**50.11**
Qstd - Stack Gas Volume (DSCFM):	197,551	198,606	196,819	**197,659**
QA - Stack Gas Volume (ACFM):	209,625	210,170	208,384	**209,393**
QS - Stack Gas Velocity (SCFM):	199,743	200,280	198,507	**199,510**
%I - Isokinetic Ratio:	101.2	100.9	100.0	**100.7**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	0.30	0.10	0.20	**0.20**
Emission Concentration, Gr./DSCF:	0.00009	0.00003	0.00007	**0.00007**
Emission Rate, Lbs./Hr:	0.15	0.06	0.12	**0.11**

TABLE 13
SUMMARY OF TEST RESULTS
Vent ID SVK-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	4/28/2019	4/28/2019	4/28/2019	
Start Time:	13:50	15:05	16:27	
End Time:	14:51	16:07	17:24	
A - Stack Area, SQ.FT:	6.31	6.31	6.31	
CP - Pitot Coefficient:	0.84	0.84	0.84	**0.84**
Y - Meter Calibration Factor:	0.9824	0.9824	0.9824	**0.98**
DN - Nozzle Diameter:	0.210	0.213	0.210	**0.211**
Pbar - Barometric Pressure:	28.82	28.8	28.81	**28.81**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	57.004	59.062	56.641	**57.569**
VMSTD - Std. Gas Volume (SCF):	54.960	56.471	53.879	**55.104**
PIT - Avg. Delta P (in. of H2O):	1.296	1.283	1.238	**1.272**
PM - Avg. Delta H (in. of H2O):	2.796	2.949	2.723	**2.82**
TS - Stack Temp. (F):	74	72	69	**72**
TM - Avg. Meter Temp(F):	62	66	69	**65**
Vlc - Volume Water Collected:	12	7	5	**8**
VWSTD - Std. Water Volume (SCF):	0.565	0.330	0.236	**0.377**
%M - Percent Moisture:	1.02	0.58	0.44	**0.68**
Bws - Mole Fraction, Dry:	0.010	0.006	0.004	**0.0068**
%CO2 - Carbon Dioxide, Dry:	0.00	0.00	0.00	**0.00**
%O2 - Oxygen, Dry:	20.90	20.90	20.90	**20.90**
MD - Dry Molecular Weight:	28.84	28.84	28.84	**28.84**
MS - Wet Molecular Weight:	28.73	28.77	28.79	**28.76**
PS - Stack Press. (in. of Hg):	28.78	28.76	28.77	**28.77**
VS - Stack Gas Velocity (AFPS):	65.6	65.2	63.8	**64.87**
Qstd - Stack Gas Volume (DSCFM):	23,389	23,374	23,057	**23,273**
QA - Stack Gas Volume (ACFM):	24,822	24,664	24,137	**24,541**
QS - Stack Gas Velocity (SCFM):	23,630	23,511	23,158	**23,433**
%I - Isokinetic Ratio:	102.7	102.7	102.2	**102.5**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	0.80	0.10	0.10	**0.33**
Emission Concentration, Gr./DSCF:	0.00022	0.00003	0.00003	**0.00009**
Emission Rate, Lbs./Hr:	0.05	0.01	0.01	**0.02**

TABLE 14
SUMMARY OF TEST RESULTS
Vent ID SVL-BH – Particulate Emission Testing

				Averages
Run Number:	1	2	3	
Date:	5/2/2019	5/2/2019	5/2/2019	
Start Time:	11:42	12:55	14:07	
End Time:	12:43	13:56	15:08	
A - Stack Area, SQ.FT:	6.31	6.31	6.31	
CP - Pitot Coefficient:	0.84	0.84	0.84	**0.84**
Y - Meter Calibration Factor:	0.9824	0.9824	0.9824	**0.98**
DN - Nozzle Diameter:	0.213	0.213	0.213	**0.213**
Pbar - Barometric Pressure:	28.77	28.77	28.79	**28.78**
TT - Sampling Time:	60	60	60	**60**
VM - Meter Volume:	55.578	55.617	56.014	**55.736**
VMSTD - Std. Gas Volume (SCF):	54.383	53.929	54.201	**54.171**
PIT - Avg. Delta P (in. of H2O):	1.217	1.225	1.221	**1.221**
PM - Avg. Delta H (in. of H2O):	2.667	2.653	2.644	**2.65**
TS - Stack Temp. (F):	81	83	83	**82**
TM - Avg. Meter Temp(F):	53	58	59	**57**
Vlc - Volume Water Collected:	7	9	12	**9**
VWSTD - Std. Water Volume (SCF):	0.330	0.424	0.565	**0.440**
%M - Percent Moisture:	0.60	0.78	1.03	**0.80**
Bws - Mole Fraction, Dry:	0.006	0.008	0.010	**0.0080**
%CO2 - Carbon Dioxide, Dry:	0.00	0.00	0.00	**0.00**
%O2 - Oxygen, Dry:	20.90	20.90	20.90	**20.90**
MD - Dry Molecular Weight:	28.84	28.84	28.84	**28.84**
MS - Wet Molecular Weight:	28.77	28.75	28.72	**28.75**
PS - Stack Press. (in. of Hg):	28.73	28.73	28.75	**28.73**
VS - Stack Gas Velocity (AFPS):	64.0	64.3	64.2	**64.19**
Qstd - Stack Gas Volume (DSCFM):	22,537	22,558	22,473	**22,523**
QA - Stack Gas Volume (ACFM):	24,214	24,343	24,297	**24,285**
QS - Stack Gas Velocity (SCFM):	22,674	22,735	22,707	**22,705**
%I - Isokinetic Ratio:	102.5	101.6	102.5	**102.2**
Filterable Particulate Emissions				
Total Filterable PM, mg - Catch weight:	0.10	0.10	0.10	**0.10**
Emission Concentration, Gr./DSCF:	0.00003	0.00003	0.00003	**0.00003**
Emission Rate, Lbs./Hr:	0.01	0.01	0.01	**0.01**

TABLE 15
SUMMARY OF TEST RESULTS
Facility Visible Emission Testing

TEST RUN 1

Date: 4/29/19
Start Time: 7:55
End Time: 9:07

	Average
Minutes	**% Opacity**
1-6	0.21
7-12	0.42
13-18	0.21
19-24	0.21
25-30	0.21

	Average
Minutes	**% Opacity**
31-36	0.42
37-42	0.21
43-48	0.42
49-54	0.21
55-60	0.21

TEST RUN 2

Date: 4/29/19
Start Time: 10:15
End Time: 11:19

	Average
Minutes	**% Opacity**
1-6	0.42
7-12	0.63
13-18	0.63
19-24	1.04
25-30	0.63

	Average
Minutes	**% Opacity**
31-36	0.21
37-42	0.63
43-48	0.42
49-54	0.21
55-60	0.63

TEST RUN 3

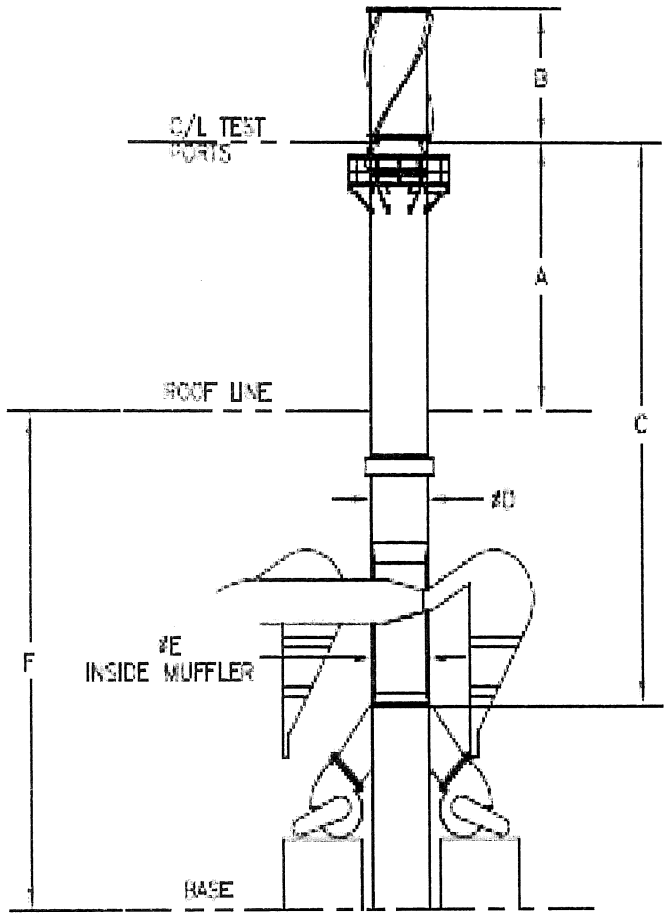
Date: 4/29/19
Start Time: 12:20
End Time: 13:24

	Average
Minutes	**% Opacity**
1-6	0.42
7-12	0.42
13-18	0.21
19-24	0.42
25-30	0.21

	Average
Minutes	**% Opacity**
31-36	0.21
37-42	0.21
43-48	0.21
49-54	0.63
55-60	0.21

SOURCE DIAGRAMS AND TRAVERSE POINT IDENTIFICATION

FIGURE 1
VENT IDs SVAB-BH & SVHJ-BH
Exhaust Stack Dimensions

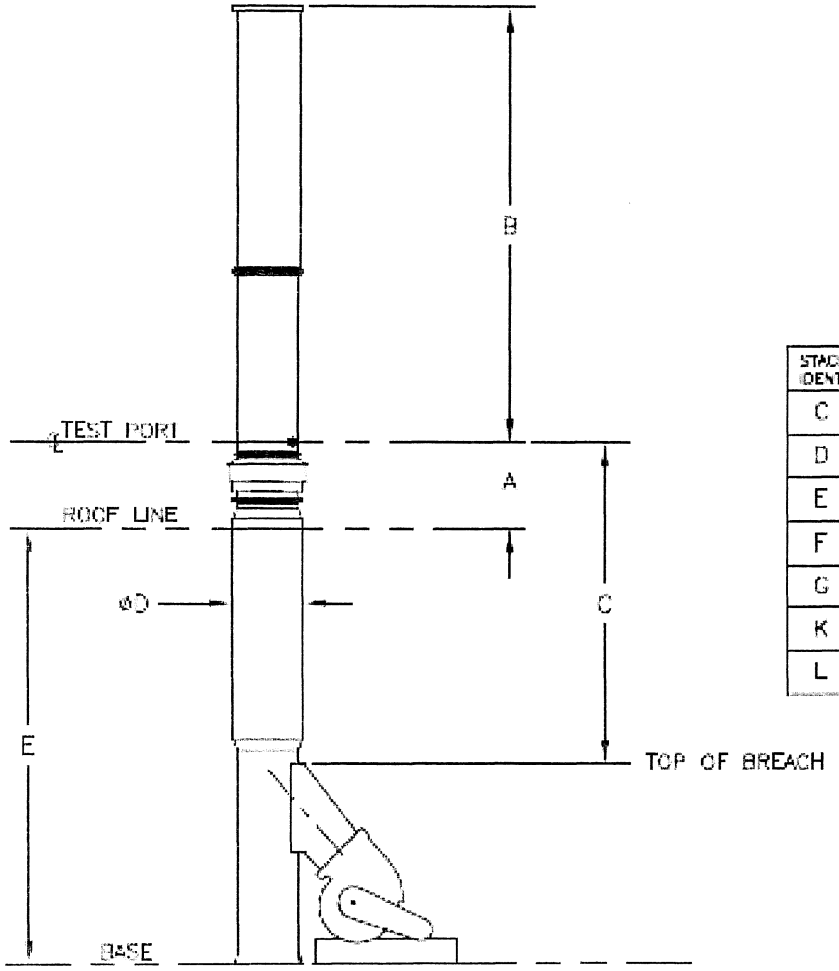


Vent ID	Unit No.	A	B	C	D	E	F	DESIGNED FLOW RATE (CFM)
A/B	B100	32'–9¼"	16'–2½"	68'–11⅛"	ø6'–3¼"	ø7'–8⅜"	60'–11½"	168,000
H/J	B700	49'–3"	16'–3"	67'–9¼"	ø8'–5"	ø8'–8⅜"	44'–5"	202,950

FIGURE 2

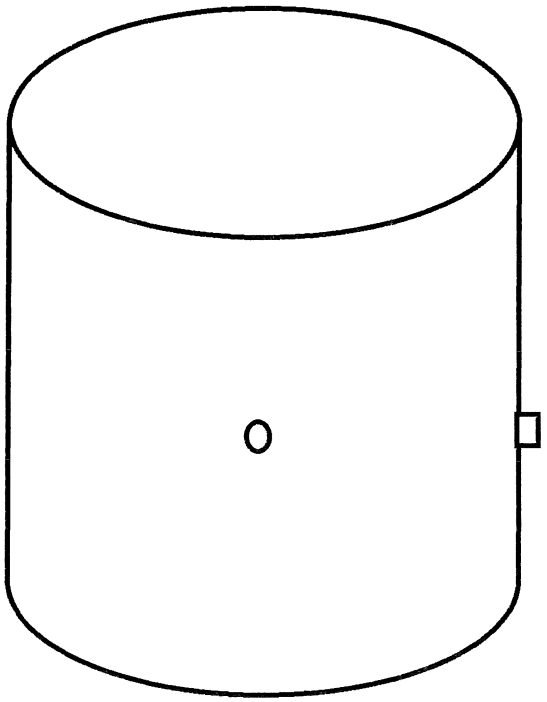
VENT IDs SVC-BH, SVD-BH, SVE-BH, SVF-BH, SVG-BH, SVK-BH & SVL-BH

Exhaust Stack Dimensions



STACK IDENT.	UNIT NO.	A	B	C	D	E	DESIGNED FLOW RATE (CFM)
C	6600	3'–9"	40'–2"	28'–1 1/16"	ø6'–7"	111'–1"	105,000
D	6200	3'–9 1/8"	40'–2"	29'–9 1/4"	ø5'–9"	111'–1"	84,000
E	6300	3'–5 1/4"	41'–8 1/4"	15'–5 3/8"	4'–11"	110'–6"	63,550
F	6400	3'–6 3/4"	41'–8 1/4"	19'–5 3/8"	4'–11"	110'–6"	64,000
G	6500	3'–7 1/4"	41'–0"	20'–11 5/8"	ø4'–1"	110'–4"	42,000
K	6800	2'–0"	22'–4 1/4"	20'–8 3/8"	ø2'–10"	161'–1"	21,000
L	6900	2'–1"	21'–2 3/4"	23'–3 3/8"	ø2'–10"	148'–2"	21,000

FIGURE 3
VENT ID SVAB-BH
Traverse Point Identification



Exhaust Stack Specifications

99.25" Diameter
Two test Ports

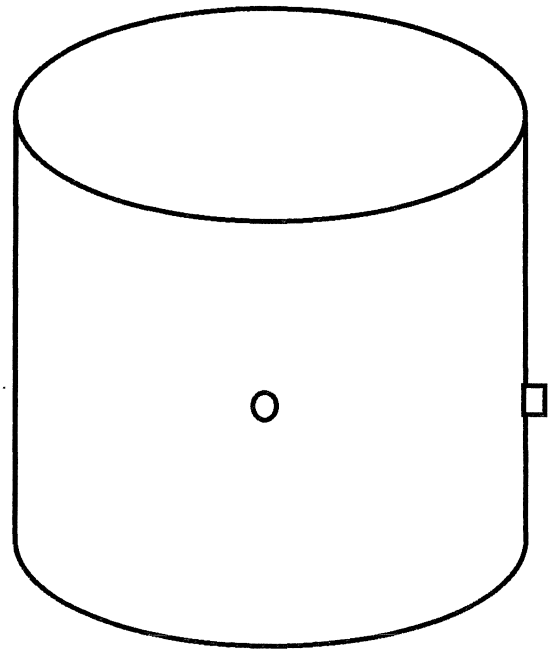
Disturbance to Ports Distance

Upstream = 1.96 Diameters
Downstream = 8.33 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	4.36"
2	14.49"
3	29.38"
4	69.87"
5	84.76"
6	94.88"

Instrumental Sampling	
Traverse Points	Measurements
1	16.57"
2	49.62"
3	82.67"

FIGURE 4
VENT ID SVC-BH
Traverse Point Identification



Exhaust Stack Specifications

79" Diameter
Two test Ports

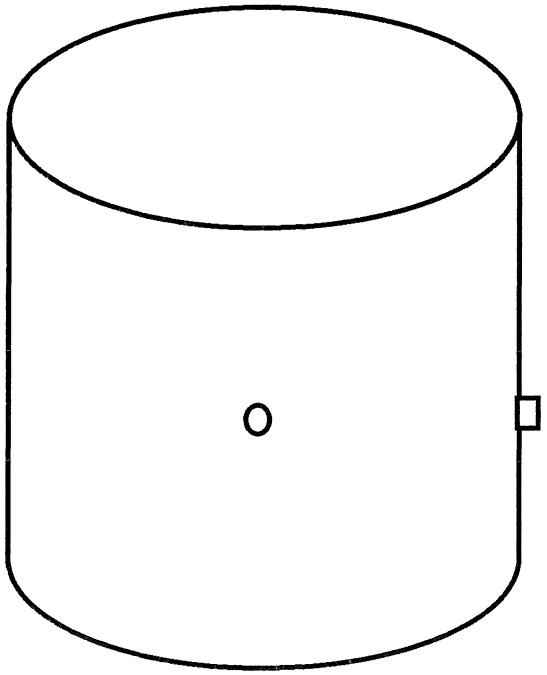
Disturbance to Ports Distance

Upstream = 6.10 Diameters
Downstream = 4.27 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	1.66"
2	5.29"
3	9.32"
4	13.98"
5	19.75"
6	28.12"
7	50.88"
8	59.25"
9	65.02"
10	69.68"
11	73.71"
12	77.34"

Instrumental Sampling	
Traverse Points	Measurements
1	13.19"
2	39.5"
3	65.80"

FIGURE 5
VENT ID SVD-BH
Traverse Point Identification



Exhaust Stack Specifications

69" Diameter
Two test Ports

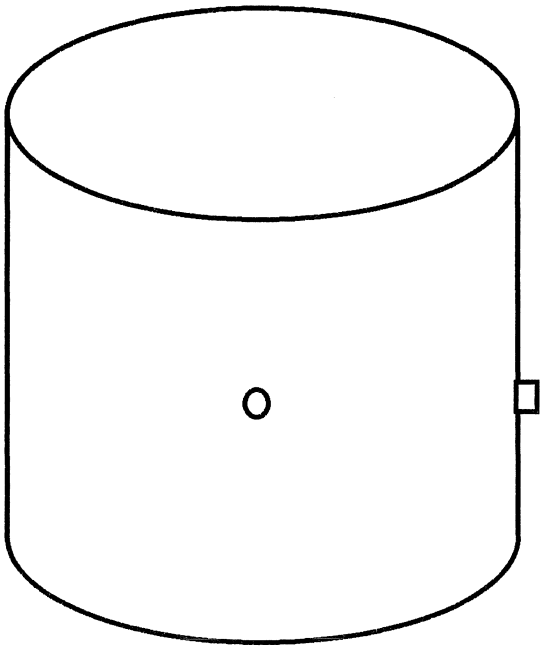
Disturbance to Ports Distance

Upstream = 6.99 Diameters
Downstream = 5.18 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	1.79"
2	5.66"
3	10.07"
4	15.59"
5	23.60"
6	45.40"
7	53.41"
8	58.93"
9	63.34"
10	67.21"

Instrumental Sampling	
Traverse Points	Measurements
1	11.52"
2	34.5"
3	57.47"

FIGURE 6
VENT ID SVE-BH
Traverse Point Identification



Exhaust Stack Specifications

59" Diameter
Two test Ports

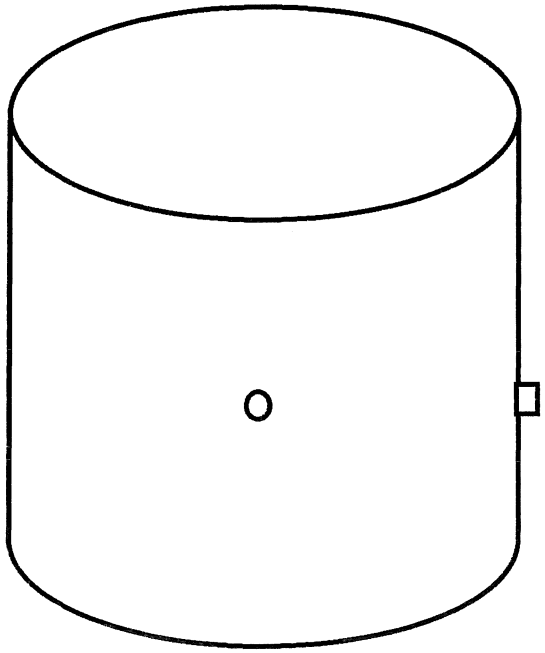
Disturbance to Ports Distance

Upstream = 8.48 Diameters
Downstream = 3.96 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	1.24"
2	3.95"
3	6.96"
4	10.44"
5	14.75"
6	21.00"
7	38.00"
8	44.25"
9	48.56"
10	52.04"
11	55.05"
12	57.76"

Instrumental Sampling	
Traverse Points	Measurements
1	9.85"
2	29.5"
3	49.14"

FIGURE 7
VENT ID SVF-BH
Traverse Point Identification



Exhaust Stack Specifications

59" Diameter
Two test Ports

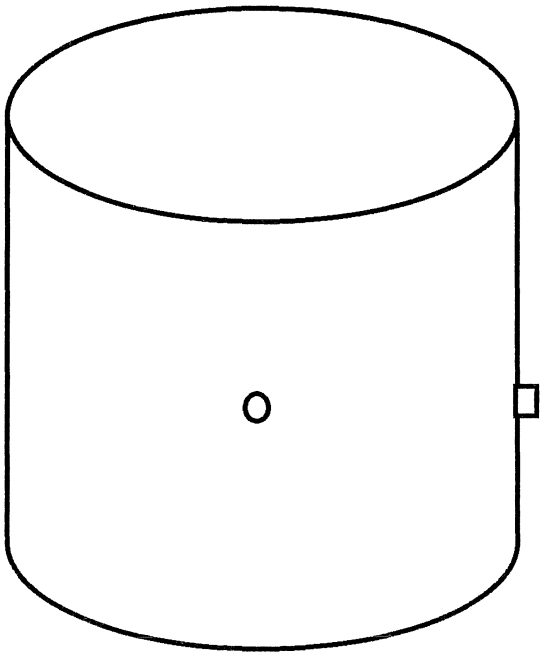
Disturbance to Ports Distance

Upstream = 8.48 Diameters
Downstream = 3.96 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	1.24"
2	3.95"
3	6.96"
4	10.44"
5	14.75"
6	21.00"
7	38.00"
8	44.25"
9	48.56"
10	52.04"
11	55.05"
12	57.76"

Instrumental Sampling	
Traverse Points	Measurements
1	9.85"
2	29.5"
3	49.14"

FIGURE 8
VENT ID SVG-BH
Traverse Point Identification



Exhaust Stack Specifications

49" Diameter
Two test Ports

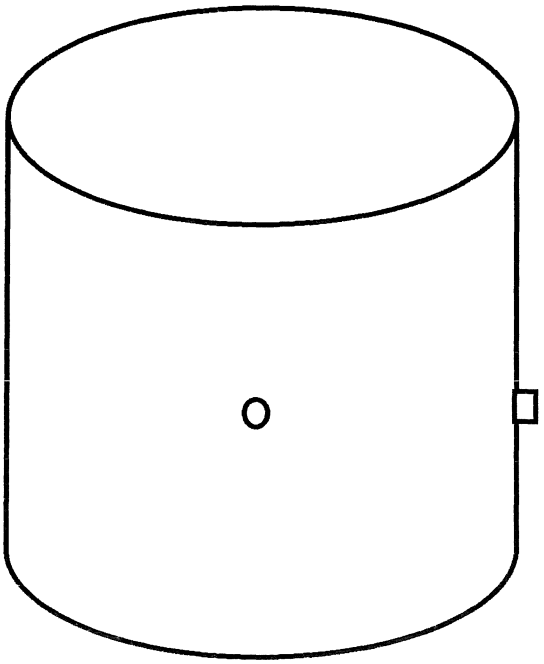
Disturbance to Ports Distance

Upstream = 10.04 Diameters
Downstream = 5.14 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	1.27"
2	4.02"
3	7.15"
4	11.07"
5	16.76"
6	32.24"
7	37.93"
8	41.85"
9	44.98"
10	47.73"

Instrumental Sampling	
Traverse Points	Measurements
1	8.18"
2	24.5"
3	40.81"

FIGURE 9
VENT ID SVHJ-BH
Traverse Point Identification



Exhaust Stack Specifications

113" Diameter
Two test Ports

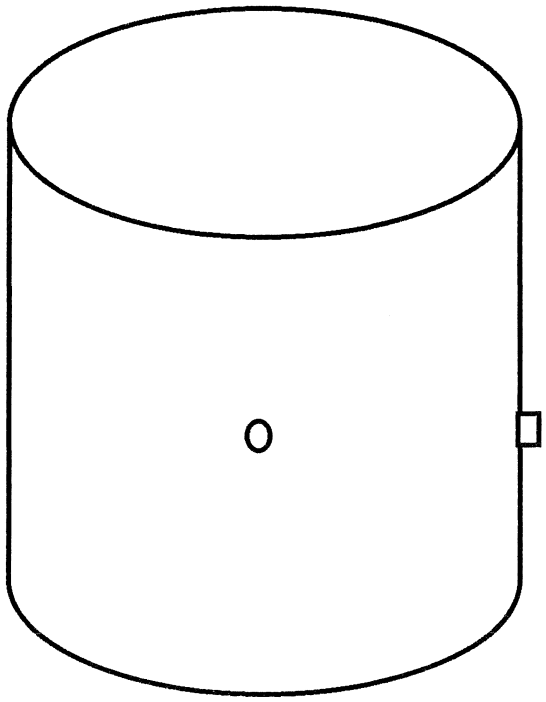
Disturbance to Ports Distance

Upstream = 1.73 Diameters
Downstream = 7.20 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	3.62"
2	11.87"
3	21.92"
4	36.50"
5	76.50"
6	91.08"
7	101.14"
8	109.38"

Instrumental Sampling	
Traverse Points	Measurements
1	18.87"
2	56.5"
3	94.12"

FIGURE 10
VENT ID SVK-BH
Traverse Point Identification



Exhaust Stack Specifications

34" Diameter
Two test Ports

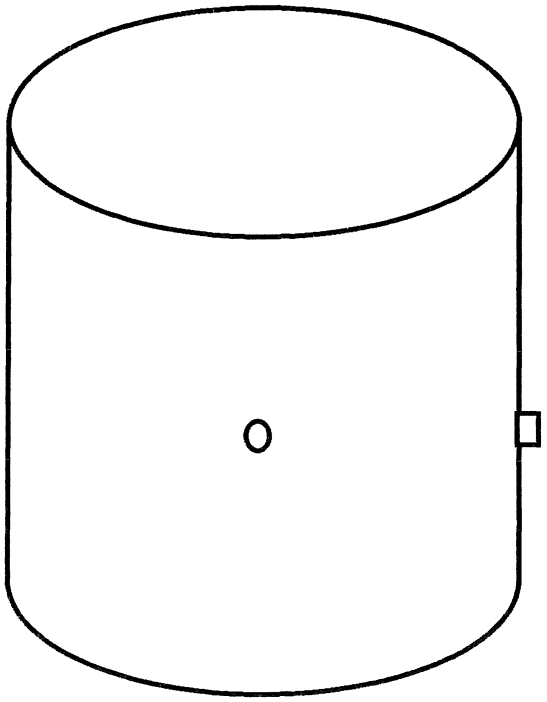
Disturbance to Ports Distance

Upstream = 7.90 Diameters
Downstream = 7.30 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	1.50"
2	4.96"
3	10.06"
4	23.94"
5	29.04"
6	32.50"

Instrumental Sampling	
Traverse Points	Measurements
1	5.67"
2	17"
3	28.32"

FIGURE 11
VENT ID SVL-BH
Traverse Point Identification



Exhaust Stack Specifications

34" Diameter
Two test Ports

Disturbance to Ports Distance

Upstream = 7.49 Diameters
Downstream = 8.21 Diameters

Particulate Sampling	
Traverse Points	Measurements
1	1.50"
2	4.96"
3	10.06"
4	23.94"
5	29.04"
6	32.50"

Instrumental Sampling	
Traverse Points	Measurements
1	5.67"
2	17"
3	28.32"

TEST METHOD SAMPLING SCHEMATICS

FIGURE 12

EPA Test Method 5 Sampling Schematic

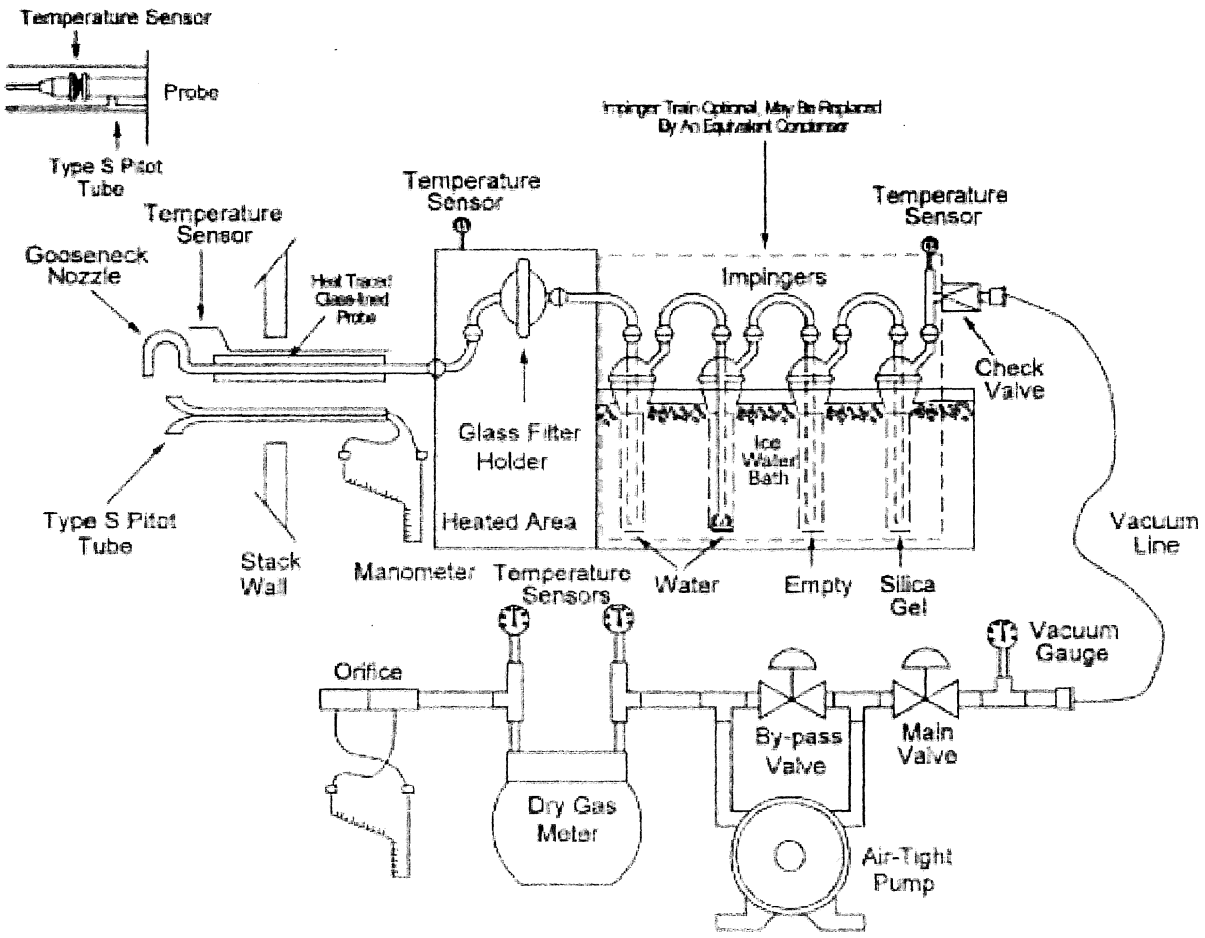


FIGURE 13

EPA Test Method 202 Sampling Schematic

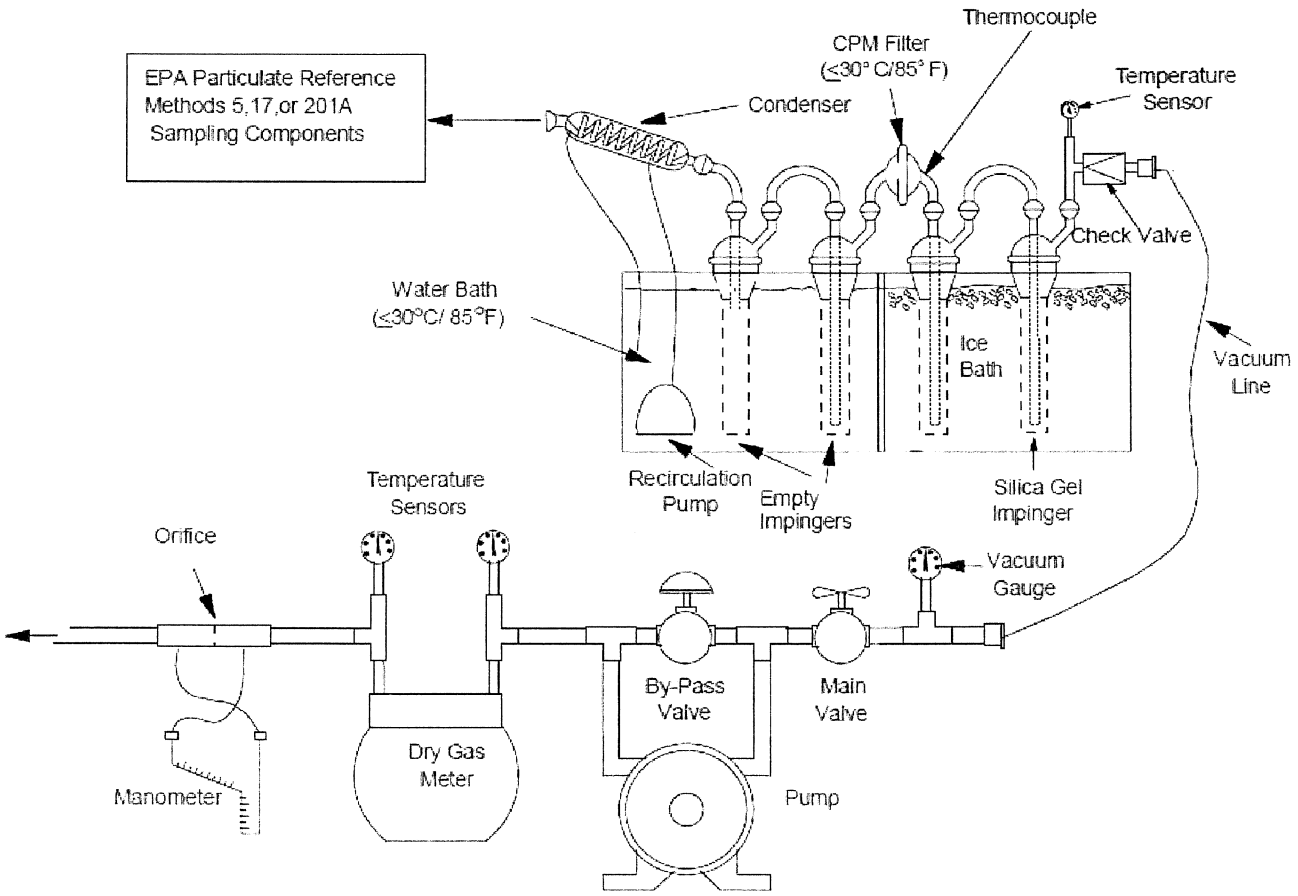


FIGURE 14

EPA Test Method 17 Sampling Schematic

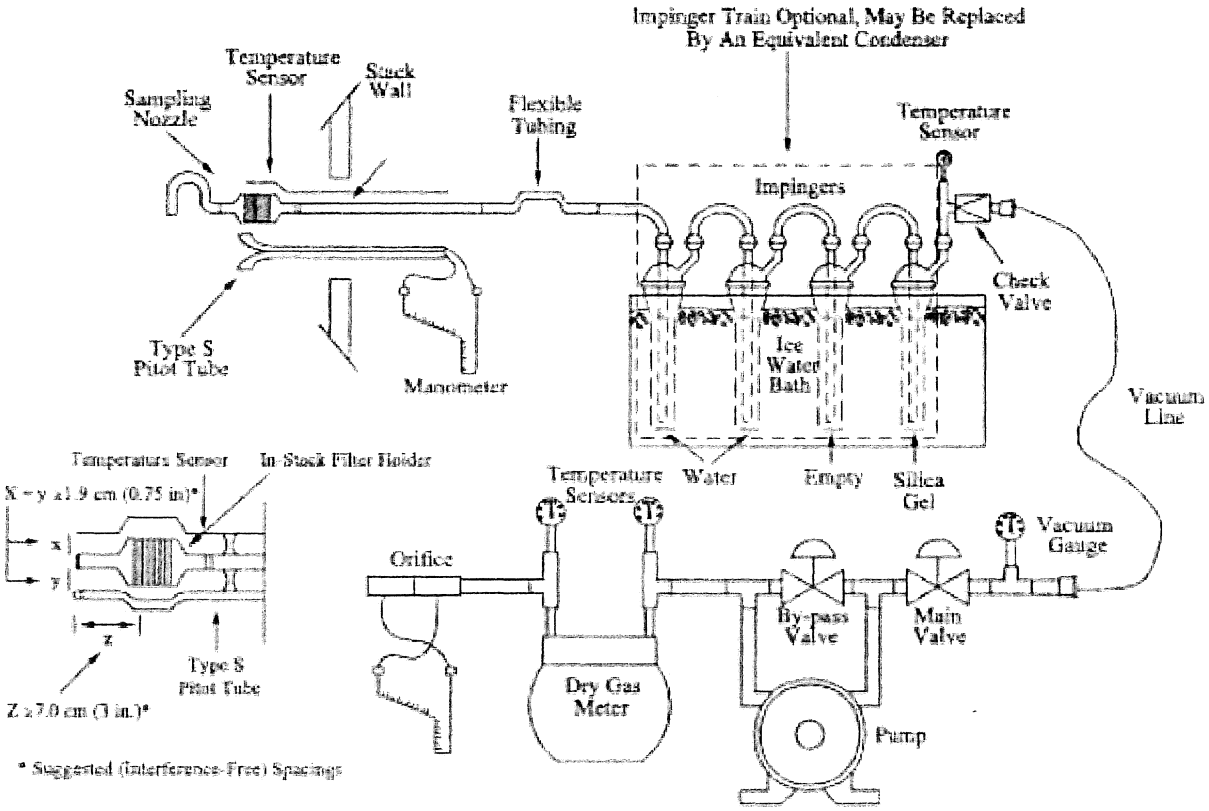


FIGURE 15

EPA Instrumental Test Methods 7E, 6C, 10 and 3A Sampling Schematic

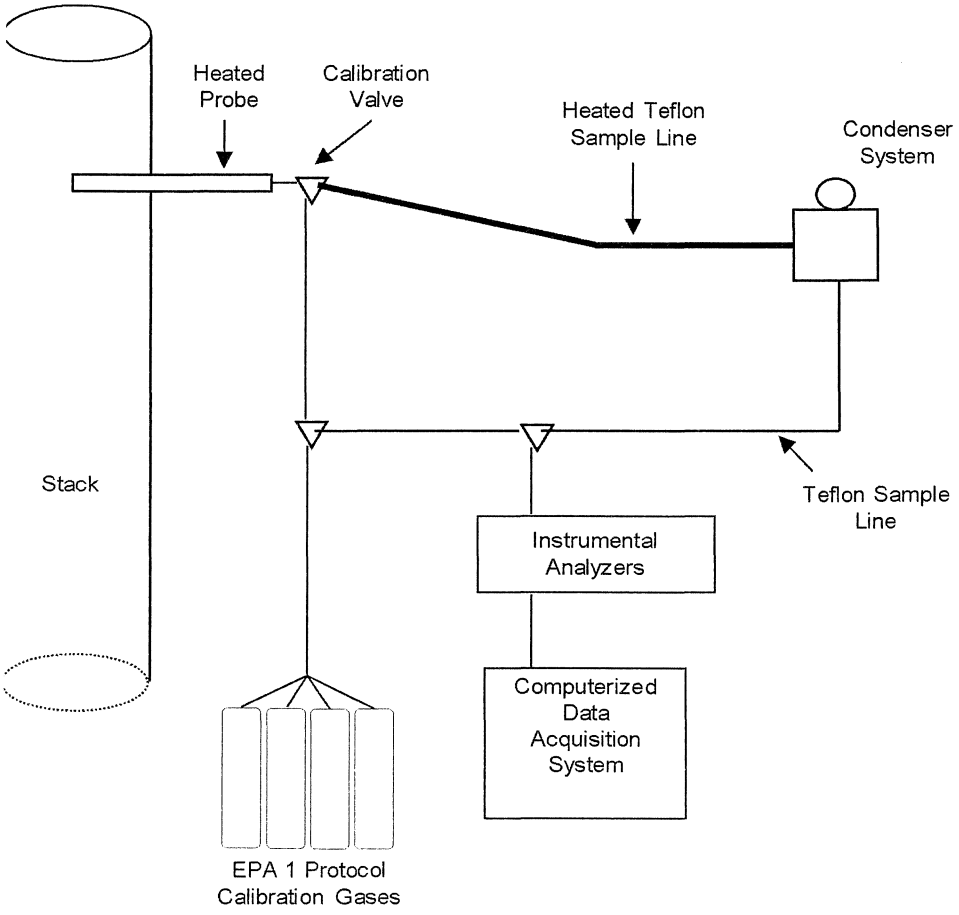


FIGURE 16

EPA Instrumental Test Method 25A Sampling Schematic