8.6

EPA/600/X-85/332b

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

REPORT

CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRY PROCESS CEMENT PLANT

FINAL REPORT

February 24, 1983

Volume II

APPENDICES

EPA Contract No. 68-02-3158, Technical Directive No. 16
MRI Project No. 4892-L(64)

For

Industrial Environmental Research Laboratory
Environmental Protection Agency
5555 Ridge Avenue
Cincinnati, Ohio 45268

Attn: Charles H. Darvin

MRI WASHINGTON, D.C. 20006—Suite 250, 1750 K Street, N.W. • 202 293-3800

CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRY PROCESS CEMENT PLANT

by

Mark D. Hansen
John S. Kinsey

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APPENDIX A

FIELD TEST PERIOD NO. 5 KILN OPERATIONS LOG

KILN NO. 5 OPERATIONS LOG

DATE 11-16-81

	PREHEATER OPERATION DATA — TEMPERATURES ✓						PREHEATER OPERATION DATA — DRAFT READINGS						KILN OPERATION DATA									COOLER DATA						REMARKS
	BAG HSE IN.	STG. 1 OUT.	STG. 2 OUT.	STG 3 OUT.	STG. 4 OUT.	KILN EXIT	BAG HSE IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG 4 OUT.	KILN EXIT	KILN SPD.	BURN. ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW CFH.	I.D. FAN AMP	AIR PRESS COMPARTMENT 1	2	3	4	BAG HSE. IN. TEMP.	CLR SPD. SPM	
7A	570	680	1080	1410	1560		9.5	12.5	11.5	9.4	5.4	.5	110			53		34.5		3.2	90	11.0	9.6	4.6	4.0	320	6.0	
8A	570	690	1060	1320	1550		9.5	12.5	11.5	9.6	5.2	.6	110		800 [illegible]	53		34.5	[illegible]	3.2	90	11.0	9.8	4.6	4.0	330	6.0	Temp. under 600°
9A	570	680	1050	1375	1550		9.5	12.5	11.5	9.8	5.0	.5	110			53		34.5		3.1	90	10.4	9.0	4.2	3.8	350	6.0	Rdg. 1100
10A	570	650	1040	1350	1550		9.5	12.0	11.5	9.8	5.4	.4	110			53		34.5		3.2	90	11.0	9.0	5.0	4.4	380	7.0	
11A	570	680	1080	1375	1550		9.5	12.5	11.5	8.8	5.0	.5	110			53		34.5		3.2	90	11.0	9.0	4.0	3.8	340	5.0	
12N	570	670	1080	1350	1550		9.5	12.0	11.5	9.2	5.0	.5	110			53		34.5		3.1	90	10.6	10.0	5.0	3.8	380	9.0	
1P	570	680	1150	1350	1525		9.5	12.0	11.5	9.8	5.0	.5	108			52		33.8		3.2	90	10.4	9.6	5.0	4.6	330	5.0	
2P	570	680	1060	1375	1525		9.5	12.0	11.5	9.8	5.0	.5	110			53		34.5		3.2	90	10.0	9.0	4.4	3.6	350	5.0	
3P	560	670	1050	1350	1525		9.5	12.5	11.5	9.4	5.0	.4	110			53		34.5		3.1	90	10.0	9.4	4.8	4.2	350	6.0	
4P	570	700	1140	1375	1525		9.5	12.5	10.5	9.0	4.0	.4	104			50		32.5		3.1	90	10.0	9.4	6.0	5.0	330	5.0	
5P	570	680	1080	1375	1525		9.0	12.5	11.5	9.4	4.6	.4	106			52		33.2		3.1	90	10.6	9.6	4.6	4.0	350°	5.0	
6P	570	640	1080	1375	1525		10.5	16.5	11.0	9.2	4.6	.4	108			51.5		33.5		3.1	90	10.2	9.4	4.6	4.0	350°	5.0	
7P	560	680	1070	1375	1525	.46	9.0	12.0	11.0	9.2	4.8	.4	108			51.5		33.5		3.1	90	10.2	9.2	4.0	3.6	350°	5.0	
8P	560	680	1070	1325	1525		9.5	12.5	11.5	9.6	5.0	.5	108			51.5		33.5		3.1	90	10.6	9.4	4.8	3.0	350°	3.6	1100 rpm - Less Than 100°
9P	570	680	1080	1375	1525		9.0	12.5	11.5	9.6	4.8	.5	110			52		33.8		3.1	90	10.6	9.4	4.0	3.4	330°	4.8	
10P	570	660	1060	1375	1525		9.0	12.5	11.5	9.6	4.8	.4	110			52		33.8		3.1	90	10.8	9.8	4.2	3.6	330°	5.8	
11P	570	680	1070	1375	1525		9.5	12.0	11.0	9.0	5.0	.5	110			52		33.8	[illegible]	3.1	90	10.0	9.0	4.6	4.0	350°	6.0	
12M	570	690	1090	1400	1550		10.0	12.5	11.5	9.6	5.0	.5	110		805255	52		33.8	[illegible]	3.1	90	10.0	9.0	5.6	4.6	330°	3.6	
1A	570	690	1090	1400	1550		10.0	12.5	11.5	9.6	5.0	.5	110			52		33.8		3.1	90	10.0	9.0	4.6	3.4	350°	5.0	
2A	570	690	1090	1400	1550		10.0	12.5	11.5	9.6	5.0	.5	110			53		33.8		3.1	90	10.4	9.0	4.6	4.0	360°	5.0	
3A	570	670	1080	1400	1550		10.0	12.5	11.5	9.8	5.0	.5	110			52		33.8		3.1	90	10.4	9.0	5.0	4.2	350°	6.0	1120 RPM 170°
4A	570	670	1080	1400	1550		9.5	12.5	11.5	9.4	5.0	.5	110			52		33.8		3.1	90	10.4	9.0	5.4	4.2	350°	5.0	
5A	570	680	1090	1400	1550		9.5	12.5	11.5	9.4	5.0	.5	110			52		33.8		3.1	90	10.4	9.4	5.4	4.8	320°	5.0	
6A	570	680	1090	1400	1550		9.5	12.5	11.5	9.4	5.0	.5	110			52		33.8	[illegible]	3.1	90	10.4	9.4	5.4	4.8	320°	6.0	
7A	570	680	1090	1400	1550		9.5	12.5	11.5	9.4	5.0	.5	110		[illegible]	52		33.8	[illegible]	3.1	90	10.4	9.4	5.4	4.8	310°	5.4	

3300-62

A-2

KILN NO. 5 OPERATIONS LOG

DATE 11-11-81

	PREHEATER OPERATION DATA												KILN OPERATION DATA									COOLER DATA						REMARKS
	TEMPERATURES					FREE LIME	DRAFT READINGS															AIR PRESS COMPARTMENT						
	BAG HSE IN.	STG 1 OUT.	STG 2 OUT.	STG 3 OUT.	STG 4 OUT.	KILN SPOT	BAG HSE IN.	STG 1 OUT.	STG 2 OUT.	STG 3 OUT.	STG 4 OUT.	KILN EXIT	KILN SPD.	BURN ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.M.	I.D. FAN AMP.	1	2	3	4	BAG HSE IN. TEMP.	CLR SPD. SPM	
7A	570	680	1090	1400	1550		9.5	17.5	11.5	9.4	5.0	1	110		811803	52				3.1	96	10.4	9.4	5.4	4.8	310°	5.4	Temp Less 100°
8A	570	680	1080	1400	1550		9.5	17.5	11.5	9.4	5.0	1	110			52				3.1	90	10.4	9.6	4.2	3.8	350	5.0	RPM - 1090
9A	560	680	1080	1375	1550		9.5	18.0	11.5	9.6	5.0	1	110			52				3.2	90	10.4	9.4	4.0	3.6	350	5.0	
10A	560	680	1080	1375	1550		9.5	18.0	11.5	9.4	5.0	1	110			52				3.0	90	10.0	9.6	4.6	4.0	340	6.0	
11A	560	680	1080	1375	1550	.77	9.5	18.0	11.0	9.0	4.8	.2	110			52				3.1	90	11.0	9.4	4.4	4.0	330	5.0	
12N	560	700	1100	1400	1550		9.5	17.0	11.0	9.2	4.6	.2	106			50				3.2	90	11.0	10.0	5.2	4.6	340	6.4	
1P	560	690	1090	1400	1550		9.5	17.0	11.5	9.6	4.6	.2	108			52				3.1	90	10.6	10.0	6.0	4.6	350	8.0	
2P	560	690	1090	1400	1550		9.5	17.0	11.5	9.0	4.8	.2	108			52				3.1	90	11.0	9.8	4.6	3.8	330	5.0	
3P	560	680	1080	1375	1550		9.5	17.0	11.0	9.0	4.6	.2	108			52				3.0	90	11.0	9.4	4.6	4.0	320	6.0	
4P	560	680	1070	1375	1550		9.5	17.5	11.5	9.6	5.0	2	108			52				3.0	90	11.0	9.6	4.6	3.6	340	6.0	
5P	560	680	1080	1375	1550		10.0	17.0	11.0	9.4	4.6	.—	108			07				3.0	92	10.6	9.6	5.6	4.6	320°	4.0	
6P	560	680	1070	1375	1550		10.0	17.0	11.0	9.4	4.8	.—	108			07				3.0	92	10.6	9.8	5.6	5.0	310°	6.0	
7P	560	680	1070	1375	1550	51	9.5	17.5	11.0	9.4	4.8	.—	108			57				3.0	90	10.0	9.8	5.6	4.6	330°	5.2	
8P	560	690	1090	1400	1550		9.5	17.5	11.0	9.0	4.6	.5	100			46.5				3.0	92	10.2	9.4	6.0	5.0	230°	3.0	1090 2PM - Keep than 100°
9P	560	690	1090	1375	1550		10.0	17.0	11.0	9.2	4.6	.4	104			49				3.0	90	10.6	9.8	6.0	5.0	330°	5.0	
10P	560	680	1080	1400	1550		10.0	17.5	11.5	9.6	5.0	.3	107			505				3.0	90	10.0	9.6	6.0	5.0	320°	6.0	
11P	550	680	1080	1375	1525		9.5	17.5	11.0	9.4	5.0	.4	108			57				3.0	90	10.6	9.8	5.0	4.4	320°	4.2	
12M	550	680	1080	1375	1550		10.0	17.0	11.0	9.2	4.8	.5	108		820465	57				3.0	92	10.6	9.6	5.6	4.8	320°	4.2	
1A	550	680	1080	1375	1550		10.0	17.0	11.0	9.2	4.8	.5	108			51				3.0	90	10.6	9.6	6.0	5.0	330°	5.0	1080 - 100°
2A	550	680	1080	1375	1550		10.0	17.0	11.5	9.4	5.0	.8	108			51				3.0	90	10.6	9.8	5.6	4.2	350°	5.0	
3A	560	680	1080	1375	1550	.97	10.0	17.0	11.5	9.4	5.0	.8	108			51				3.0	90	10.6	9.6	5.6	4.6	350°	5.0	
4A	560	680	1080	1375	1550		10.0	17.0	11.5	9.4	5.0	.8	108			51				3.0	90	10.6	10.0	5.6	4.6	340°	4.4	
5A	560	680	1080	1375	1550		10.0	17.5	11.5	9.6	5.2	.7	108			51				3.0	90	10.6	10.0	6.0	5.2	330°	6.0	
6A	560	680	1090	1375	1550		10.0	17.5	11.5	9.4	5.2	.2	108			51				3.1	90	10.0	9.8	5.6	4.6	350	5.0	
7A	560	680	1090	1375	1550		10.0	17.5	11.5	9.4	5.2	.2	108		824003	51				3.1	96	10.0	9.8	5.0	4.0	330°	6.4	

KILN NO. 5 OPERATIONS LOG

DATE 11-12-

	PREHEATER OPERATION DATA												KILN OPERATION DATA									COOLER DATA						REMARKS
	TEMPERATURES					FREE LIME	DRAFT READINGS															AIR PRESS COMPARTMENT						
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD.	BURN. ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.M.	I.D. FAN AMP.	1	2	3	4	BAG HSE. IN. TEMP.	CLR SPD. SPM	
7A	560	680	1070	1375	1550		110	12.5	11.5	9.4	5.2	7	108		824040	51			gas 9829.97 coal 1033505.0	3.1	90	10.6	9.8	5.0	4.0	330°	6.4	Loss 100°
8A	560	680	1070	1375	1550		10.9	16.5	10.5	9.6	4.8	7	108			51				3.1	90	10.6	9.8	5.0	4.0	330°	5.0	1100 RPM
9A	560	680	1040	1375	1550		9.5	17.0	11.0	9.0	4.6	.4	108			51				3.1	90	11.0	9.6	5.0	4.2	350	6.0	
10A	560	680	1080	1375	1550		9.5	18.0	12.0	9.4	5.0	.2	108			51				3.1	90	11.0	9.6	5.0	4.2	330	6.0	
11A	560	680	1100	1400	1550	1.17	9.5	17.0	11.0	9.2	4.8	.2	108			51				3.2	90	11.0	10.4	5.0	4.0	350	8.0	
12N	560	680	1100	1400	1550		9.5	17.0	11.0	9.0	4.6	.5	108			51				3.1	90	11.0	9.4	4.6	4.0	350	6.0	
1P	560	680	1100	1400	1550		9.5	17.0	11.0	9.2	4.6	.4	108			51				3.1	90	11.0	9.6	5.6	4.6	330	6.0	
2P	560	640	1100	1400	1550		9.5	17.0	11.0	9.4	4.6	.4	108			51				3.1	90	11.0	9.4	4.8	4.8	350	6.0	
3P	560	680	1100	1400	1550		9.5	17.5	11.5	9.4	4.4	.3	108			51			982955	3.1	90	11.0	9.4	5.0	4.0	330	6.0	
4P	560	680	1100	1400	1550		9.5	17.5	11.5	9.6	4.6	.3	108		828480	51			1026330	3.1	90	11.0	9.6	5.6	4.6	330	6.0	
5P	570	660	1080	1400	1550		9.5	18.5	11.5	9.4	4.4	.2	108			51				3.1	90	10.4	9.6	5.6	4.6	340	5.0	
6P	570	680	1100	1400	1550		9.5	18.0	11.0	9.4	4.6	.1	108			51				3.1	90	10.6	9.6	5.6	4.8	340	5.0	
7P	570	680	1080	1400	1550	.22	9.5	18.0	11.5	9.4	4.6	.1	108			51				3.1	88	10.6	9.6	5.8	4.8	320	5.4	
8P	570	680	1100	1400	1550		9.5	17.5	11.0	9.4	4.6	.2	104			51				3.1	90	10.0	9.2	5.6	4.6	330	5.0	
9P	570	680	1100	1400	1550		9.5	17.0	11.0	9.4	4.6	.2	104			50				3.1	90	10.0	9.4	5.2	4.8	360	3.0	
10P	570	680	1100	1400	1550		9.0	17.5	11.0	9.0	4.2	.3	108			52				3.1	90	11.0	10.2	5.8	5.0	320	7.0	1100 RPM -108
11P	570	680	1100	1400	1550		9.0	17.0	11.0	9.4	4.6	.3	108			52				3.1	90	10.0	9.4	5.4	4.6	360	4.4	
12M	570	680	1090	1400	1550		9.0	17.5	11.5	9.6	4.8	.4	108		833500	51.5			983093 2028740.0	3.1	90	10.6	9.6	5.8	5.0	330	5.0	
1A	570	670	1070	1400	1550		9.0	17.5	11.5	9.6	5.0	4	105			52				3.1	90	10.6	9.4	6.0	5.6	360	5.4	
2A	570	680	1080	1400	1550		9.4	17.5	11.5	9.6	5.1	1.4	108			52				3.1	90	10.6	9.4	6.0	5.0	330°	4.6	
3A	570	650	1080	1400	1550	1.33	9.0	17.5	11.5	9.6	5	.4	108			52				3.1	90	10.6	9.6	6.0	5.0	360	5.0	
4A	570	680	1080	1400	1550		9.0	17.5	11.5	9.6	5	.4	110			54				3.1	90	10.0	9.0	5.0	4.4	350	4.0	RPM. 1080 100°
5A	570	680	1080	1400	1550		9.0	17.5	11.5	9.6	5	.4	110			54				3.1	90	10.6	9.6	5.8	5.0	340	5.0	
6A	570	680	1080	1400	1550		9.0	17.5	11.5	9.6	5	.4	110			54			983097 coal 1030813.0	3.1	90	10.6	9.4	6.0	5.0	350	5.0	
7A	570	680	1080	1400	1550		9.0	17.5	11.5	9.6	5	.4	110		831052	55				3.1	90	10.6	9.4	6.0	5.0	360	6.4	

KILN NO. 5 OPERATIONS LOG

DATE 11-13-82

	PREHEATER OPERATION DATA												KILN OPERATION DATA								COOLER DATA						REMARKS
	TEMPERATURES					FREE LIME	DRAFT READINGS														AIR PRESS COMPARTMENT				BAG HSE. IN. TEMP.	CLR SPD SPM	
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	MAIN EXIT	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD.	BURN. ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.M.	I.D. FAN AMP	1	2	3	4			
7A	570	680	1080	1400	1500		9.0	17.5	11.5	9.6	5.0	4	110		831152	55			4P3087 Gas 20309330 Coal	3.1	90	10.6	9.8	6.6	5.0	360°	6.4	ID FAN TEMP 100°F
8A	670	680	1080	1400	1500		9.0	17.5	11.5	9.6	5.0	4	100			50				3.1	96	10.6	9.4	6.0	5.0	350°	4.4	SPEED 1090RPM @ 3,000A.M
9A	570	680	1080	1375	1550		9.0	17.5	11.5	9.2	5.0	5	106			53				3.15	92	10.6	10.0	5.8	4.6	340°	6.6	
10A	570	680	1080	1400	1550		9.0	18.0	12.0	10.0	5.2	5	108			54				3.2	90	10.6	9.6	5.4	4.4	340°	7.0	
11A	570	680	1080	1390	1550	1.33	9.5	18.0	12.0	10.2	5.6	5	108			54				3.25	92	10.6	9.4	4.8	4.0	360°	6.0	
12N	570	670	1070	1360	1540		9.5	18.0	12.0	9.6	5.2	3	110			55				3.1	90	10.4	9.2	4.4	3.6	320°	5.6	
11P	570	660	1060	1350	1525		8.5	18.0	12.0	10.2	5.2	4	110			55				3.1	90	10.6	9.4	4.8	4.2	350°	6.6	
2P	570	670	1070	1375	1550		9.0	17.5	11.5	10.0	5.0	3	110			55				3.1	90	10.8	9.8	4.4	4.0	360°	5.8	
3P	560	670	1070	1375	1550		9.0	17.5	11.5	10.0	5.0	3	110			55				3.1	92	10.8	9.6	4.4	3.6	340°	6.8	
4P	560	670	1060	1375	1550		9.0	18.0	12.0	11.0	5.4	6	110		840870	55			20337050	3.1	90	10.6	9.6	4.8	4.0	320°	6.6	
5P	570	660	1060	1375	1550		8.5	18.0	12.0	10.2	5.4	5	110			55			20	3.1	90	10.6	9.6	4.4	3.8	360	6.0	
6P	570	670	1060	1375	1550	3.26	8.5	18.0	12.0	10.0	5.2	5	110			55				3.1	90	10.0	9.6	4.2	3.8	330°	6.0	
7P	570	680	1070	1375	1550		8.5	18.0	12.0	10.2	5.4	6	110			55				3.1	90	10.0	9.0	5.0	4.0	330°	5.4	
8P	570	660	1060	1375	1550		8.5	18.0	12.0	10.2	5.4	5	110			55				3.1	90	10.0	9.2	5.6	4.6	360	5.4	
9P	570	670	1070	1375	1550		8.5	18.0	12.0	10.2	5.4	6	110			55				3.1	90	10.6	10.0	5.4	4.6	360	5.4	
10P	570	680	1070	1375	1550		8.0	17.5	12.0	10.0	5.2	5	110			55				3.1	90	10.4	9.2	4.8	4.0	360	5.0	
11P	570	660	1070	1375	1550		8.0	17.5	12.0	10.4	5.6	5	110			55				3.1	92	10.4	9.8	5.0	4.2	330	6.2	
12M	570	670	1070	1375	1550		8.0	18.5	12.0	10.2	5.4	5	110		844470	55			20871605 20861900	3.1	90	10.8	10.0	5.6	5.0	340	5.0	
1A	570	675	1070	1375	1550		8.5	18.5	12.0	10.2	5.4	5	110			55				3.1	90	10.4	10.4	5.6	4.8	350°	5.6	
2A	570	670	1070	1375	1550		8.0	18.0	12.0	10.0	5.4	5	110			55				3.1	90	10.4	9.8	5.6	4.4	350°	5.0	
3A	570	670	1070	1375	1550	1.17	8.5	18.0	12.0	10.0	5.4	5	110			55				3.1	90	10.4	9.6	5.4	4.4	350°	5.0	RPM 1080 100°
4A	570	670	1070	1375	1550		8.0	18.0	12.0	10.4	5.4	5	110			55				3.1	90	10.4	9.4	5.8	4.8	360°	4.6	
5A	570	670	1070	1375	1550		8.5	18.0	12.0	10.4	5.4	5	110			55				3.1	90	10.4	9.5	5.8	4.8	360°	5.0	
6A	570	670	1070	1375	1550		8.5	18.0	12.0	10.4	5.4	5	100			49			9P 4P3146 Gas 20393230 Coal	3.1	90	10.4	9.8	6.0	4.8	340°	3.0	
7A	570	670	1080	1375	1550		8.8	18.0	12.0	10.4	5.0	5	108			53				3.1	90	10.4	9.6	5.6	4.4	350°	5.0	

KILN NO. 5 OPERATIONS LOG

DATE

	PREHEATER OPERATION DATA												KILN OPERATION DATA									COOLER DATA						REMARKS
	TEMPERATURES						DRAFT READINGS															AIR PRESS COMPARTMENT						
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	FINISH MILL	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD.	BURN. ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.M.	I.D. FAN AMP.	1	2	3	4	BAG HSE. IN. TEMP.	CLR. SPD. SPM.	
7A	570	670	1050	1375	1550		95	180	120	10.4	5.0	5	108		P44920	53		34.5	93161	31	90	10.4	9.6	5.0	4.4	330	5.0	
8A	570	680	1060	1375	1550		95	180	120	10.4	5.0	5	108			53		34.5	2838320	31	90	10.4	9.6	5.0	4.4	330°	5.0	
9A	570	680	1060	1375	1550		95	175	11.5	9.6	5.2	.8	108			53		34.5		31	90	10.6	9.6	5.6	4.4	340°	6.0	
10A	570	680	1080	1375	1550	1.02	90	175	11.5	9.6	5.2	.7	108			53		34.5		31	90	10.4	9.6	5.4	4.2	360°	5.6	
11A	570	670	1070	1375	1550		90	175	11.5	9.6	5.4	.8	110			54		35.1		31	90	10.2	9.0	5.0	4.2	330°	5.6	
12M	570	670	1070	1375	1550		100	175	11.5	9.6	5.0	.5	110			54		35.1		31	90	10.2	9.2	5.0	4.2	330°	5.4	1090 RPM less Than 100°
1P	570	680	1080	1325	1525		90	175	11.5	9.6	5.0	.5	106			5225		34.1		31	90	10.4	9.4	5.0	4.2	330°	5.6	
2P	570	670	1070	1375	1525		95	175	11.5	9.6	5.2	.6	108			53		34.5		31	90	10.6	9.6	5.0	4.2	330°	6.0	
3P	570	670	1070	1375	1550		90	175	11.5	10.0	5.2	.6	108			53		34.5	CV) 98823 Cone 2410100	31	90	10.6	9.0	5.0	4.0	330°	5.6	
4P	570	670	1060	1375	1550		95	180	120	10.0	5.6	.8	108		85.3150	53		34.5		31	90	11.0	9.8	4.8	4.0	360°	6.0	
5P	570	670	1120	1400	1550	1.33	95	16.0	12.0	10.4	4.0	.6	94			45		29.3		3.1	88	20	6.2	3.2	3.2	210	3.0	
6P	570	700	1140	1400	1570		90	120	11.5	9.4	4.6	.6	104			51		33.2		3.1	90	10.6	9.6	4.0	3.4	340	3.4	1080 RPM — 100°
7P	570	680	1080	1400	1550		95	125	12.0	9.8	4.0	.6	108			54		35.1		3.2	88	11.0	9.6	4.4	3.4	360	5.4	
8P	570	680	1080	1400	1550		95	125	11.5	9.6	5.0	.8	108			54		34.5		3.1	88	10.6	9.8	4.6	4.0	360	5.4	
9P	570	680	1080	1375	1550		95	125	11.5	9.6	5.4	.7	108			53		34.5		3.1	90	10.6	9.4	4.4	4.0	350	5.0	
10P	570	680	1080	1375	1550		90	150	12.0	10.2	5.4	.6	110			54		35.1		3.1	90	10.4	9.6	4.6	3.8	340	5.4	
11P	570	680	1080	1375	1550		90	150	11.0	10.0	5.2	.6	110			54		35.1		3.1	90	10.6	9.4	4.0	3.0	340	5.0	
12M	560	670	1070	1375	1550		90	150	12.0	10.0	5.4	.6	110		85.2200	54		35.1	FE3203 2043580	3.1	90	11.0	9.4	4.6	3.0	340	5.6	
1A	560	670	1070	1350	1550		90	15.5	12.0	10.0	5.4	.6	110			54		35.1		3.1	90	11.6	9.4	3.4	3.0	330	6.0	
2A				#5 Kiln	down		run	at	1/10	AM	East	Rotor	Kiln															RPM 1½ - 110°
3A																												
4A																												
5A																												
6A																			Gas FE3209 Code 2043580									
7A															758031													

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KILN NO. 5 OPERATIONS LOG

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	PREHEATER OPERATION DATA												KILN OPERATION DATA										COOLER DATA						REMARKS
	TEMPERATURES					FREE LIME	DRAFT READINGS																AIR PRESS COMPARTMENT						
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD.	BURN. ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.H.	I.D. FAN AMP.	1	2	3	4	BAG HSE. IN. TEMP.	CLR SPD. SPM.	
7A															858[illegible]				Gas 858240 Coal 104,7220									
8A																												
9A														Main burner Lit at 1:50 PM -														
10A														feed on at 3:15 PM														
11A						.82																						
12N																												
1P																												
2P																												
3P																			9896[illegible]									
4P	560	700	1080	1300	1400		90	135	85	70	22	.6	60		858160	30			2043220	2000	88	50	40	20	16	100	2.0	
5P	570	700	1120	1285	1500		90	140	95	78	34	.5	68			35				[illegible]	90	104	88	36	20	350°	3.0	
6P	570	660	1040	1325	1425		85	180	120	100	56	.6	90			45				[illegible]	85	100	90	40	30	330°	4.0	
7P	560	670	1080	1375	1500		85	120	115	92	48	.6	88			435				3.2	88	100	86	36	30	280°	3.6	
8P	570	700	1120	1425	1550		100	155	105	84	40	.5	94			46				3.1	90	106	96	60	46	340°	4.6	
9P	560	690	1080	1335	1525		90	125	120	98	52	.6	104			50				3.1	86	106	90	54	44	340°	5.2	
10P	570	680	1100	1400	1530		90	110	115	92	46	.4	104			50				3.1	88	110	100	56	50	350°	6.0	
11P	570	690	1090	1400	1550		95	165	115	94	20	.7	106			50			285 8216	3.1	88	102	94	60	46	330°	4.0	
12M	570	680	1080	1400	1530	✓	95	165	115	96	48	.8	106		861365	50			CLINK 2045[illegible]	3.1	88	106	98	60	48	330°	5.0	
1A	570	690	1090	1400	1550		90	165	115	94	46	.8	106			50				3.1	88	108	94	58	46	330°	5.0	
2A	560	660	1100	1400	1550		95	130	115	98	50	.8	106			50				3.1	92	110	94	60	40	330	5.6	
3A	570	700	1110	1400	1550	1.83	95	165	115	94	46	.6	106			50				3.1	92	106	92	54	36	330	4.0	1100 RPM -400°
4A	570	700	1120	1400	1550		95	120	115	94	48	.6	108			51				3.1	92	106	96	58	48	330	4.4	
5A	570	700	1100	1400	1550		90	165	115	94	46	.8	108			51				3.1	92	106	98	60	50	350	4.4	
6A	570	700	1100	1400	1550		90	150	120	100	54	.8	108			51				3.1	92	96	96	50	40	330	6.0	
7A	570	690	1080	1400	1550		100	125	110	96	50	.9	108			51				3.1	92	104	92	58	46	350	4.4	

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KILN NO. 5 OPERATIONS LOG

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	PREHEATER OPERATION DATA — TEMPERATURES						PREHEATER OPERATION DATA — DRAFT READINGS						KILN OPERATION DATA (D.L.S. X FEED T.P.H. = PRODUCTION)								COOLER DATA						REMARKS
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD.	BURN-ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK. T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.H.	I.D. FAN AMP.	AIR PRESS COMPARTMENT 1	2	3	4	BAG HSE. IN. TEMP.	CLR. SPD. SPM	
7A	570	690	1080	1400	1550		11.5	12.5	10.5	9.6	5.0	.5	108			51		33.2		3.1	92	10.4	9.2	5.8	4.6	350°	4.4	Temp Loss 150°
8A	570	690	1090	1400	1550		10.0	12.0	11.5	9.4	4.6	.6	108		985332	51		33.2	985832 2058 1500	3.2	92	10.2	9.2	5.0	4.2	350	4.4	RPM 1120
9A	570	700	1100	1400	1550		10.0	11.5	11.0	9.2	4.6	.4	108			51		33.2		3.10	92	10.0	9.0	5.0	4.2	350	5.0	
10A	570	690	1100	1400	1550		10.0	11.0	11.5	9.6	4.8	.4	108			51		33.2		3.2	92	11.0	9.6	5.0	4.0	340	6.0	
11A	570	690	1080	1375	1550	1.07	10.0	11.0	11.5	10.0	4.6	—	108			51		33.2		3.1	92	11.0	9.4	5.0	4.0	340	5.0	
12N	570	680	1100	1400	1550		10.0	11.5	11.0	8.8	4.2	.4	108			51		33.2		3.1	92	11.0	9.4	5.0	4.0	340	5.0	
1P	570	680	1100	1400	1550		10.0	11.0	11.5	9.6	4.6	.3	108			51		33.2		3.0	92	11.0	9.0	4.4	4.0	350	5.0	
2P	570	680	1100	1375	1550		10.0	11.0	11.5	9.6	4.8	.3	108			51		33.2		3.0	92	10.0	9.4	4.8	4.2	350	5.0	
3P	570	680	1090	1375	1550		10.0	11.5	11.5	9.6	4.6	.3	108			51		33.2	985829	3.0	92	10.0	9.0	4.4	3.6	340	5.0	
4P	570	690	1080	1375	1550		11.0	11.0	11.0	9.0	4.2	.3	108		89345	51		33.2	2058 1500	3.0	92	11.0	9.0	4.0	3.2	350	5.0	
5P	570	690	1080	1375	1525		9.5	11.5	11.5	9.8	4.8	.4	108			57		33.2		3.0	90	9.8	9.0	4.0	3.6	370°	5.6	
6P	570	680	1080	1375	1550		10.0	12.0	11.5	9.6	4.6	.4	108			57		33.2		3.0	90	10.0	9.6	3.6	3.0	330°	6.0	
7P	570	690	1080	1375	1525	.77	10.0	12.0	11.5	9.6	4.6	.4	108			57		33.2		3.0	90	10.2	9.4	4.0	3.2	340°	5.6	
8P	570	680	1080	1375	1525		10.0	12.0	11.5	9.4	4.6	.5	108			51		33.2		3.0	92	10.6	9.0	3.6	3.0	340°	5.4	1100 RPM - Burn JP 100°
9P	570	690	1080	1375	1525		10.0	12.0	11.5	9.6	4.6	.5	108			57		33.2		3.0	90	10.2	9.0	4.0	3.0	340°	5.0	
10P	570	680	1080	1375	1525		9.5	11.0	11.5	9.4	4.6	.4	108			57		33.2		3.0	92	10.6	9.0	4.0	3.0	360°	4.6	
11P	570	710	1120	1425	1525		10.0	11.0	10.5	8.8	4.0	.5	86			42		27.3	GBS 986128	3.2	92	9.6	9.0	5.8	4.6	350°	5.6	
12M	570	700	1110	1400	1550		10.0	11.5	11.0	8.4	4.4	.5	102		823300	49		31.9	GBS 985832 2058 1500	3.2	92	10.6	9.2	3.4	3.0	330°	6.6	
1A	570	700	1100	1400	1550		10.0	12.0	11.0	9.2	4.6	.4	104			50		32.5		3.2	92	11.0	9.6	3.4	2.6	360°	5.6	
2A	570	700	1100	1400	1550	1.58	10.0	12.5	11.5	9.4	4.6	.4	106			50		32.5		3.2	90	10.0	8.6	4.6	3.6	350°	4.0	
3A	570	700	1090	1400	1550		10.0	12.5	11.5	9.4	4.6	.6	106			50		32.5		3.1	92	10.4	9.4	4.6	4.0	360°	4.0	
4A	570	700	1100	1400	1550		10.0	12.5	11.5	9.4	4.6	.5	106			50		32.5		3.1	92	11.0	9.6	5.0	4.4	360°	6.0	1100 RPM -100°
5A	570	700	1100	1400	1550		10.0	12.0	11.5	9.4	4.4	.5	106			50		32.5		3.1	92	11.0	9.2	4.6	3.8	340°	5.0	
6A	570	690	1090	1400	1550		10.0	12.0	11.0	9.6	4.8	.7	108			51		33.2		3.1	92	10.6	9.6	5.8	4.4	340°	5.4	
7A	570	690	1100	1400	1550		10.0	12.0	11.5	9.6	4.6	.6	108			42				3.2	92	10.0	9.4	6.4	5.2	360°	5.0	

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APPENDIX B

CALIBRATION DATA

POSTTEST CALIBRATION CHECKS

(Method 5, Figure 5.1)

Plant Humbolt Calibrated by RCS

Meter box number 5 Date 11-25-81

Dry Gas Meter

Pretest calibration factor, Y 0.976 (within 2%)
Posttest check, Y* 0.976 (within 5% of pretest)
Recalibration required? ____ yes ✓ no
If yes, recalibration factor, Y ____ (within 2%)
Lower calibration factor, Y 0.976 for calculations (pretest or posttest)

Dry Gas Meter Thermometers

Was a pretest temperature correction used? ____ yes ✓ no
If yes, temperature correction ____ (within 3°C (5.4°F) over range)
Posttest comparison with mercury-in-glass thermometer?* (within 6°C (10.8°F) at ambient temperature)
Recalibration required? ____ yes ✓ no
Recalibration temperature correction? ____ (within 3°C (5.4°F) over range)*
If yes, no correction necessary for calculations if meter thermometer temperature is higher; if calibration temperature is higher, add correction to average meter temperature for calculations Ref Therm. = ASTM 63F #A06633
Ref = 67.5°F In = 66
Out = 67.5

Stack Temperature Sensor

Was a pretest temperature correction used? ____ yes ____ no
If yes, temperature correction ____ °C (°F) (within 1.5% of readings in K (°R) over range)
Average stack temperature of compliance test, T_s ____ K (°R)
Temperature of reference thermometer or solution for recalibration ____ K (°R)* (within ±10% of T_s)
Temperature of stack thermometer for recalibration ____ K (°R)
Difference between reference and stack thermometer temperatures, ΔT_s ____ K (°R)
Do values agree within ±1.5%?* ____ yes ____ no
If yes, no correction necessary for calculations
If no, calculations must be done twice--once with the recorded values and once with the average stack temperature corrected to correspond to the reference temperature differential (ΔT_s); both final result values must be reported since there is no way to determine which is correct

(continued)

POSTTEST CALIBRATION CHECKS

(Method 5, Figure 5.1)

Plant Humboldt Calibrated by RCS

Meter box number 6 Date 11-25-81

Dry Gas Meter

Pretest calibration factor, Y 0.994 (within ±2%)
Posttest check, Y* 1.014 (within 5% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 0.994 for calculations (pretest or posttest)

Dry Gas Meter Thermometers

Was a pretest temperature correction used? _____ yes ✓ no
If yes, temperature correction _____ (within ±3°C (5.4°F) over range)
Posttest comparison with mercury-in-glass thermometer?* (within ±6°C (10.8°F) at ambient temperature)
Recalibration required? _____ yes ✓ no
Recalibration temperature correction? _____ (within ±3°C (5.4°F) over range)*
If yes, no correction necessary for calculations if meter thermometer temperature is higher; if calibration temperature is higher, add correction to average meter temperature for calculations Ref. Therm. = ASTM 63F #A 06653
Ref. = 62°F In = 62
Out = 62.5

Stack Temperature Sensor

Was a pretest temperature correction used? _____ yes _____ no
If yes, temperature correction _____°C (°F) (within ±1.5% of readings in K (°R) over range)
Average stack temperature of compliance test, T_s _____ K (°R)
Temperature of reference thermometer or solution for recalibration _____K (°R)* (within ±10% of T_s)
Temperature of stack thermometer for recalibration _____K (°R)
Difference between reference and stack thermometer temperatures, ΔT_s _____K (°R)
Do values agree within ±1.5%?* _____ yes _____ no
If yes, no correction necessary for calculations
If no, calculations must be done twice--once with the recorded values and once with the average stack temperature corrected to correspond to the reference temperature differential (ΔT_s); both final result values must be reported since there is no way to determine which is correct

(continued)

POSTTEST CALIBRATION CHECKS

(Method 5, Figure 5.1)

Plant Humboldt Calibrated by RCS

Meter box number 8 Date 11-24-81

Dry Gas Meter

Pretest calibration factor, Y 1.045 (within ±2%)
Posttest check, Y* 1.058 (within ±5% of pretest)
Recalibration required? ____ yes ✓ no
If yes, recalibration factor, Y ____ (within ±2%)
Lower calibration factor, Y 1.045 for calculations (pretest or posttest)

Dry Gas Meter Thermometers

Was a pretest temperature correction used? ____ yes ✓ no
If yes, temperature correction ____ (within ±3°C (5.4°F) over range)
Posttest comparison with mercury-in-glass thermometer?* (within ±6°C (10.8°F) at ambient temperature)
Recalibration required? ____ yes ✓ no
Recalibration temperature correction? ____ (within ±3°C (5.4°F) over range)*
If yes, no correction necessary for calculations if meter thermometer temperature is higher; if calibration temperature is higher, add correction to average meter temperature for calculations Ref. Therm. = ASTM 63F #A 06655
Ref. = 58.5°F Tm = 59 out = 57

Stack Temperature Sensor

Was a pretest temperature correction used? ____ yes ____ no
If yes, temperature correction ____°C (°F) (within ±1.5% of readings in K (°R) over range)
Average stack temperature of compliance test, T_s ____ K (°R)
Temperature of reference thermometer or solution for recalibration ____K (°R)* (within ±10% of T_s)
Temperature of stack thermometer for recalibration ____K (°R)
Difference between reference and stack thermometer temperatures, ΔT_s ____K (°R)
Do values agree within ±1.5%?* ____ yes ____ no
If yes, no correction necessary for calculations
If no, calculations must be done twice--once with the recorded values and once with the average stack temperature corrected to correspond to the reference temperature differential (ΔT_s); both final result values must be reported since there is no way to determine which is correct

(continued)

POSTTEST CALIBRATION CHECKS

(Method 5, Figure 5.1)

Plant Humboldt Calibrated by RCS

Meter box number 9 Date 11-25-81

Dry Gas Meter

Pretest calibration factor, Y 1.069 (within 12%)
Posttest check, Y* 1.073 (within 15% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 1.069 for calculations (pretest or posttest)

Dry Gas Meter Thermometers

Was a pretest temperature correction used? _____ yes ✓ no
If yes, temperature correction _____ (within ±3°C (5.4°F) over range)
Posttest comparison with mercury-in-glass thermometer?* (within ±6°C (10.8°F) at ambient temperature)
Recalibration required? _____ yes ✓ no
Recalibration temperature correction? _____ (within ±3°C (5.4°F) over range)*
If yes, no correction necessary for calculations if meter thermometer temperature is higher; if calibration temperature is higher, add correction to average meter temperature for calculations Ref. Therm. = ASTM 63F ≡ A 06653
Ref. = 64°F En = 62.5°
Out = 63.5°

Stack Temperature Sensor

Was a pretest temperature correction used? _____ yes _____ no
If yes, temperature correction _____ °C (°F) (within ±1.5% of readings in K (°R) over range)
Average stack temperature of compliance test, T_s _____ K (°R)
Temperature of reference thermometer or solution for recalibration _____ K (°R)* (within ±10% of T_s)
Temperature of stack thermometer for recalibration _____ K (°R)
Difference between reference and stack thermometer temperatures, ΔT_s _____ K (°R)
Do values agree within ±1.5%?* _____ yes _____ no
If yes, no correction necessary for calculations
If no, calculations must be done twice--once with the recorded values and once with the average stack temperature corrected to correspond to the reference temperature differential (ΔT_s); both final result values must be reported since there is no way to determine which is correct

(continued)

STACK TEMPERATURE ~~SENSOR~~ Meter CALIBRATION DATA FORM

Date 11-30-81 ~~Thermocouple~~ Pyrometer number 9516

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Ice Bath	31.7°F	31°F	−0.14 %
	Ref. Therm. = ASTM		63F SN A	06653
	Boiling H_2O	211°F	211°F	± 0
	Ref. Therm. = ASTM		67F SN	579382

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE ~~SENSOR~~ Meter CALIBRATION DATA FORM

Date 11-30-81 Pyrometer ~~Thermocouple~~ number 9517

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, ~~°C~~	Temperature difference,[c] %
	Ice Bath	32°F	32°F	± 0
	Ref. Thermometer =	ASTM 63F		SN A 06653
	Boiling H2O	211°F	211°F	± 0
	Ref. Therm. = ASTM	67F	SN	579382

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE ~~SENSOR~~ Meter CALIBRATION DATA FORM

Date 11-30-81 Pyrometer ~~Thermocouple~~ number 9518

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, ~~°C~~	Temperature difference,[c] %
	Ice Bath	31.8 °F	31 °F	− 0.16 %
	Ref. Therm. = ASTM	63F SN A	06653	
	Boiling H_2O	211 °F	210 °F	− 0.15 %
	Ref. Therm. = ASTM	67F SN	579382	

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE ~~SENSOR~~ Meter CALIBRATION DATA FORM

Date 11-30-81 ~~Thermocouple~~ Pyrometer number 9519

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, ~~°C~~	Temperature difference,[c] %
	Ice Bath	32°F	32°F	± 0
	Ref. Therm. = ASTM 63F SN A06653			
	Boiling H_2O	211°F	211°F	± 0
	Ref. Therm. = ASTM 67F SN 579382			

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1$

STACK TEMPERATURE ~~SENSOR~~ Meter CALIBRATION DATA FORM

Date 11-30-81 ~~Thermocouple~~ Potentiometer number 8025

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, ~~°C~~	Temperature difference,[c] %
	Ice Bath	31.8°F	23°F	-1.79%
	Ref. Therm. = ASTM		63F SN A-06653	
	Boiling H2O	211°F	203°F	-1.19%
	Ref. Therm. = ASTM		67F SN	579382

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth 5 Inlet

Date 11-19-81 Thermocouple number 63-1

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	419 °F	417 °F	-0.2 %

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth 5 Inlet

Date 11-19-81 Thermocouple number 6 (83-1)

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	oil Bath	498°F	490°F	-0.8%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c]$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM
HCSS Inlet

Date 11-19-81 Thermocouple number 12-1

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	oil Bath	499°F	495°F	-0.4%

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

HCSS

Date 11-19-81 Thermocouple number Impactor T.C.

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	oil Bath	500°F	497°F	- 0.3%

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth. 17 Outlet

Date 11-19-81 Thermocouple number 8-63-1

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
		498°F	497°F	-0.1 %

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c]$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth. 17 Outlet

Date 11-19-81 Thermocouple number 63-2

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator _____ Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	421°F	418°F	-0.3%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c]$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth. 17 Outlet

Date 11-19-81 Thermocouple number 83-2

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	415°F	412°F	-0.3%

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

~~Meth 5 Inlet~~
MK III Outlet

Date 11-19-81 Thermocouple number 83-1

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	423°F	421°F	-0.2%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c]$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM
Short Traverse Pitot

Date 11-19-81 Thermocouple number 6-6

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	430°F	430°F	±0%
	" "	500°F	499°F	-0.2%

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM
Long Traverse Pitot

Date 11-19-81 Thermocouple number 63-3

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator 1265 Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	426°F	424°F	-0.22%
	" "	501°F	501°F	±0%

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

15μm

NOZZLE CALIBRATION Preseparator – Particle Size Tests

Date 11 - 9 '81

Calibrated by RCS

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
60 - 3.0	.117	.119	.119	.002	.118
60 - 3.5	.137	.138	.137	.001	.137
60 - 4.0	.156	.158	.156	.002	.157
60 - 4.5	.177	.176	.176	.001	.176
60 - 5.0	.197	.194	.195	.003	.195
60 - 6.0	.234	.234	.235	.001	.235
60 - 7.0	.274	.271	.275	.004	.273
60 - 8.5	.335	.332	.333	.003	.333
60 - 10	.392	.394	.394	.002	.393
60 - 12.0	.470	.471	.470	.001	.470
60 - 14.5	.565	.566	.568	.003	.566

where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

Nozzle calibration data.

42 .249

NOZZLE CALIBRATION 15 1/4M Preseparator - Particle Size Tests

Date 11-9 '81 Calibrated by RCS

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
61-3.0	.115	.115	.113	.002	.114
61-3.5	.136	.137	.137	.001	.137
61-4.0	.156	.155	.156	.001	.156
61-4.5	.177	.176	.177	.001	.177
61-5.0	.194	.195	.195	.001	.195
61-6.0	.234	.235	.236	.002	.235
61-7.0	.275	.276	.275	.001	.275
61-8.5	.331	.334	.331	.003	.332
61-10.0	.394	.395	.396	.002	.395
61-12.0	.469	.472	.472	.003	.471
61-14.5	.567	.567	.568	.001	.567

where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

Nozzle calibration data.

NOZZLE CALIBRATION - Method 5 and Method 17

Date 11 - 9 - 81 Calibrated by RCS

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
1	.115	.115	.116	.001	.115
2	.120	.118	.117	.003	.118
35	.122	.123	.123	.001	.122
36	.122	.122	.122	zero	.122
3	.122	.123	.123	.001	.123
5	.182	.182	.180	.002	.181
6	.184	.186	.187	.003	.186
7	.186	.185	.188	.003	.186
43	.190	.190	.190	zero	.190
30	.247	.247	.247	zero	.247
24	.250	.250	.249	.001	.250
42	.249	.248	.251	.003	.249
11	.251	.250	.250	.001	.250
10	.249	.253	.253	.004	.250
12	.300	.297	.300	.003	.299
13	.306	.304	.304	.002	.305
15	.362	.362	.360	.002	.361
34	.369	.368	.368	.001	.368
45	.375	.373	.374	.002	.374
27	.376	.375	.375	.001	.375
33	.376	.375	.374	.002	.375
32	.441	.438	.438	.003	.439
20	.463	.465	.467	.004	.465
31	.495	.493	.494	.002	.494
22	.509	.505	.504	.005	.505

where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in. Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in. Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

Nozzle calibration data.

APPENDIX C

LABORATORY AND ANALYTICAL DATA

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Page ____

METHOD 5

FILTER TARE WEIGHTS

Filter No.	First Weigh Weight (mg)	By	Date	Second Weigh Weight (mg)	By	Date	Third Weigh Weight (mg)	By	Date	Average Weight
1151	3662.6	MG	11-7-81	3662.2	MG	11-9-81				3662.4
2	3737.4	"	"	3737.4	"	"				3737.4
3	3669.6			3669.1						3669.4
4	3679.1			3678.7						3678.9
5	3713.5			3713.0						3713.2
6	3719.4			3719.3						3719.4
7	3665.8			3665.4						3665.6
8	3671.7			3671.4						3671.6
9	3698.8			3698.6						3698.7
10	3727.6			3727.3						3727.4
11	3697.1			3696.8						3697.0
12	3667.6	↓	↓	3667.4	↓	↓				3667.5
13	3717.2	MG	11-7-81	3716.8	MG	11-9				3717.0
14	3674.5	MG	11-9-81	3673.7	MG	11-9				3674.1
15	3710.1	MG	11-9-81	3710.5	MG	11-9				3710.3

Remarks: Calibration wt 10.30 147.4987 11-7-81
Calibration wt 11-9-81 - 147.4981
Filter # 1 unused - torn while loading

Page No. 1

Run No. I-2-1

Date of Run 11-12-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
17	99.2600	99.2602		99.2601

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
17	101.1820	101.1854	101.1835	101.1834

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 175 ml (Volume of Rinse) = .875 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-7-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
2	3.7134	3.7134		3.7134

FILTER FINAL WEIGHTS

Filter No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
2	5.5217	5.5227		5.5222

Page No. 3

Run No. T-C-1

Date of Run 11-13-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
13	99.5769	99.5769		99.5769

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
13	101.3962	101.3985	101.3988	101.3986

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 150 ml (Volume of Rinse) = .75 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
4	3.6791	3.6787		3.6789

FILTER FINAL WEIGHTS

Filter No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
4	5.8833	5.8787	5.8764	~~5.8~~
				5.8765

11/16/81
Beall
4th weigh
5.8766

Page No. 5

Run No. I-3-1

Date of Run 11-13-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
32	101.2371	101.2380		101.2376

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
32	102.2869	102.2879		102.2874

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 140 ml (Volume of Rinse) = .70 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
53	3.6690	3.6691		3.6694

FILTER FINAL WEIGHTS

Filter No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
53	6.2915	6.2917		6.2916

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Run No. I-1-1

Date of Run 11-14-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: 11-7-81 By: Gabriel Third Weigh (g)	Average Weight
5				
28	108.3009	108.2986	108.2977	108.2982

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11/16/81 By: Beall First Weigh (g)	Date: 11/17/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
5				
28	110.2457	110.2440	110.2440	110.2440

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 200 ml (Volume of Rinse) = 1.0 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight mg
5	3713.5	3713.0		3713.2

FILTER FINAL WEIGHTS

Filter No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: 11-24-81 11-25-81 By: Gabriel Gabriel Third Weigh (g)	Average Weight
5	5.0443	5.0400	5.0334 5.0340	5.0337

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Run No. I-1-2

Date of Run 11-14-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
33	77.8435	77.8445		77.8440

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11/16/81 By: Beall First Weigh (g)	Date: 11/17/81 By: Beall Second Weigh (g)	Date: 11-25-81 By: Gabriel Third Weigh (g)	Average Weight
33	80.1614	80.1550	80.1553	80.1552

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 175 ml (Volume of Rinse) = .875 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (mg)	Date: 11-9-81 By: Gabriel Second Weigh (mg)	Date: By: Third Weigh (g)	Average Weight mg
1	3665.8	3665.4		3665.6

FILTER FINAL WEIGHTS

Filter No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
7	4.9073	4.9074		4.9074

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Run No I-3-2

Date of Run 11/10/81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
26	111.4901	111.4897		111.4899

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
26	113.1772	113.1779		113.1776

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 225 ml (Volume of Rinse) = 1.13 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
8	3.6717	3.6714		3.6716

FILTER FINAL WEIGHTS

Filter No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
8	5.1959	5.1959		5.1959

Page No. 13

Run No. I-4-2

Date of Run 11/16/81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: 11-7-81 By: Gabriel Third Weigh (g)	Average Weight
27	91.0253	91.0223	91.0230	91.0226

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: 11-30-81 By: Gabriel Third Weigh (g)	Average Weight
27	92.8698	92.86660	92.8651 92.8657	92.8654

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 150 ml (Volume of Rinse) = .75 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
9	3.6988	3.6986		3.6987

FILTER FINAL WEIGHTS

Filter No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
9	5.1291	5.1291		5.1291

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Run No. I-2-1

Date of Run 11-16-81

DRY Catch Beakers

250-ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
30	86.8197	86.8207		86.8202

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
30	87.6477	87.6482		87.6480

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 400 ml (Volume of Rinse) = 2.0 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	3.7194	3.7193		3.7194

FILTER FINAL WEIGHTS

Filter No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	5.2191	5.2192		5.2192

C-1-1-2 Beaker Tare and Final Weights

BEAKER TARE WEIGHTS 250 ml

Beaker No.	First Weigh Weight (g)	By	Date	Second Weigh Weight (g)	By	Date	Third Weigh Weight (g)	By	Date	Average Weight
1	98.81609	MG	11-4-81	98.81160	MG	11-5-81		MG	~~11-7~~	98.81606
2	101.9775			101.97707						101.9771
3	106.7152			106.7121			11-7 106.7153	106	11-9	106.7149
4	103.5630			103.5608			103.5618		11-6	103.5613
5	85.7195			85.7190						85.7192
6	103.0349			103.0330			103.0339			103.0334
7	97.6598			97.6597						97.6598
8	104.0384			104.0318			11-7 104.0329	104.0326	11-9	104.0328
9	85.8396			85.8405						85.8400
10	102.7397			102.7363			11-7 102.7424	102.7416	11-9	102.7420
11	102.6141			102.6134						102.6138
12	99.8759			99.8729			11-7 99.8765	99.8751	11-9	99.8761
13	99.57609	MG	11-4	99.5769						99.57609
14	100.8131			100.8115			100.8125		11-7	100.8120
15	103.4049			103.4049						103.4049
16	101.1003			101.1009	MG	11-5				101.1006
17	99.2600			99.2602						99.2601
18	103.9948			103.9953						103.9951
19	101.4791			101.4785						101.4788
20	84.1265			84.1260						84.1262
21	102.1655			102.1653						102.1654
22	91.9240			91.9231						91.92316
23	102.4950			102.4943						102.4946
24	86.0367			86.0361						86.03614
25	87.9279			87.9213			11-7 87.9238	87.9239	11-9	87.9238
26	111.4901			111.4897						111.4899
27	91.0253			91.0223			91.0230		11-7	91.02316
28	108.3009			108.2986			108.2977		11-7	108.2982
29	91.2342			91.2302			91.2301		11-6	91.2302
30	86.8197		11-9	86.8207						86.8202
71	111.8077	MG	11-4-81	111.8055	MG	11-5-81	111.8062		11-7	111.8058

Remarks calibration wt 11-9-81 - 147.4980

BEAKER TARE WEIGHTS

Beaker No.	First Weigh Weight (g)	By	Date	Second Weigh Weight (g)	By	Date	Third Weigh Weight (g)	By	Date	Average Weight
50	112.1501	MG	11-9	112.1509						112.1506
31	97.8740			97.8749						97.8744
32	101.2371			101.2380						101.2376
33	77.8435			77.8445						77.8440
42	91.4850		11-9-81	91.4842		11-9-81				91.48410

Remarks

Page No. 1

Run No. I-2-1

Date of Run 11-12-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
17	99.2600	99.2602		99.2601

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
17	101.1820	101.1834	101.1835	101.1834

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 175 ml (Volume of Rinse) = .875 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-7-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
2	3.7734	3.7734		3.7734

FILTER FINAL WEIGHTS

Filter No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
2	5.5217	5.5227		5.5222

Page No. 2

Run No. I-2-1

Date of Run 11-12-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: 11-7-81 By: Gabriel Third Weigh (g)	Average Weights
14	100.8131	100.8115	100.8125	100.8120

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weights
14	101.9507	101.9496	101.9507	101.9485

4th weigh 101.9489 5th 101.9480

Filter Blank Correction .3

COMMENTS

vol of dry catch 150

vol of probe rinse 175

Page No. 3

Run No. T-4-1

Date of Run 11-13-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
13	99.5769	99.5769		99.5769

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
13	101.3962	101.3985	101.3988	101.3986

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 150 ml (Volume of Rinse) = .75 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
4	3.6791	3.6787		3.6789

FILTER FINAL WEIGHTS

Filter No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
4	5.8833	5.8784	5.8764	~~5.8~~ 5.8765

11/14/81
Beall
4th weigh
5.8766

Page No. 4

Run No. I-4-1

Date of Run 11-13-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: 11-9-81 By: Gabriel Third Weigh (g)	Average Weights
12	99.8759	99.8729	99.8765 99.8757	99.8761

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cohn Third Weigh (g)	Average Weights
12	101.7399	101.7424	101.7434	101.7429

Filter Blank Correction .3

COMMENTS

#25 - acetone blank 11-13-81
200 ml used

Vol of dry catch 150 ml

Vol of probe rinse 150 ml

Page No. 5

Run No. I-3-1

Date of Run 11-13-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
32	101.2371	101.2380		101.2376

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
32	102.2869	102.2879		102.2874

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 140 ml (Volume of Rinse) = .70 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
53	3.6694	3.6691		3.6694

FILTER FINAL WEIGHTS

Filter No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
53	6.2915	6.2917		6.2916

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Run No. I-3-1

Date of Run 11-13-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights
50	112.1501	112.1569		112.1506

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: 11-15-81 By: Cabb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights
50	115.3827	115.3831		115.3829

.3 MD #

Filter Blank Correction .3

COMMENTS

Dry catch vol - 175 ml
Probe rinse vol - 140 ml

Page No. 7

Run No. I-1-1

Date of Run 11-14-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: 11-7-81 By: Gabriel Third Weigh (g)	Average Weight
5				
28	108.3009	108.2986	108.2977	108.2982

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11/16/81 By: Beall First Weigh (g)	Date: 11/17/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
5				
28	110.2457	110.2440	110.2440	110.2440

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 200 ml (Volume of Rinse) = 1.0 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (mg)	Date: 11-9-81 By: Gabriel Second Weigh (mg)	Date: By: Third Weigh (g)	Average Weight mg
5	3713.5	3713.0		3713.2

FILTER FINAL WEIGHTS

Filter No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: 11-24-81 11-25-81 By: Gabriel Gabriel Third Weigh (g)	Average Weight
5	5.0443	5.0400	5.0334 5.0340	5.0337

Page No. 8

Run No. I-1-1

Date of Run 11-14-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights
7	97.6598	97.6597		97.6598

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: ~~11/17/81~~ By: ~~Beall~~ Third Weigh (g)	Average Weights
7	98.4363	98.4356	~~98.4362~~	98.4360

Filter Blank Correction .2

COMMENTS

Dry catch vol - 135 ml
Probe rinse vol - 200 ml

Page No. 9

Run No. I-1-2

Date of Run 11-14-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
33	77.8435	77.8445		77.8440

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11/16/81 By: Beall First Weigh (g)	Date: 11/17/81 By: Beall Second Weigh (g)	Date: 11-25-81 By: Gabriel Third Weigh (g)	Average Weight
33	80.1614	80.1550	80.1553	80.1552

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 175 ml (Volume of Rinse) = .875 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (mg)	Date: 11-9-81 By: Gabriel Second Weigh (mg)	Date: By: Third Weigh (g)	Average Weight mg
1	3665.8	3665.4		3665.6

FILTER FINAL WEIGHTS

Filter No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
7	4.9073	4.9074		4.9074

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Run No. I-1-2

Date of Run 11-14-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights
31	97.8740	97.8749		97.8744

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: 11/16/81 By: Beall First Weigh (g)	Date: 11/17/81 By: Beall Second Weigh (g)	Date: 11-25-81 By: Gabriel Third Weigh (g)	Average Weights
31	98.7842	98.7814	98.7849 98.7852	98.7851

Filter Blank Correction .2

COMMENTS

Dry catch vol - 140 ml
Probe rinse vol - 175 ml

Page No. 11

Run No I-3-5

Date of Run 11/16/81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
26	111.4901	111.4897		111.4899

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
26	113.1772	113.1779		113.1776

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 225 ml (Volume of Rinse) = 1.13 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
8	3.6717	3.6714		3.6716

FILTER FINAL WEIGHTS

Filter No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
8	5.1959	5.1959		5.1959

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Run No. I-3-2

Date of Run 11/16/81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights
1	98.8169	98.8160		98.8166

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights
1	99.7369	99.7365		99.7367

Filter Blank Correction .1

~~aqua A~~

COMMENTS

dry catch vol - ~~200~~ 250 ~~145~~ ml
probe rinse vol - 225 ml

Page No. 13

Run No. I-4-2

Date of Run 11/16/81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: 11-7-81 By: Gabriel Third Weigh (g)	Average Weight
27	91.0253	91.0223	91.0230	91.0226

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: 11-30-81 By: Gabriel Third Weigh (g)	Average Weight
27	92.8698	92.8666	92.8651 92.8657	92.8654

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 150 ml (Volume of Rinse) = .75 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
9	3.6988	3.6986		3.6987

FILTER FINAL WEIGHTS

Filter No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
9	5.1291	5.1291		5.1291

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Run No. I-4-2

Date of Run 11-16-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights
42	91.4850	91.4842		91.4846

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: 11-30-81 By: Gabriel Third Weigh (g)	Average Weights
42	92.3730	92.3666	92.3654 92	3663 92.3659

Filter Blank Correction .1

COMMENTS

dry catch vol. 150 ml
probe rinse vol. 150 ml

Page No. 15

Run No. I-2-2

Date of Run 11-16-81

DRY Catch Beakers

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 11-9-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
30	86.8197	86.8207		86.8202

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
30	87.6477	87.6482		87.6480

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 400 ml (Volume of Rinse) = 2.0 mg

FILTER TARE WEIGHTS

Filter No.	Date: 11-7-81 By: Gabriel First Weigh (g)	Date: 11-9-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	3.7194	3.7193		3.7194

FILTER FINAL WEIGHTS

Filter No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	5.2191	5.2192		5.2192

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Run No. I-2-2

Date of Run 11-16-81

Probe Rinse Final
~~DRY CATCH BEAKER~~ - ~~TARE~~ WEIGHT

Beaker No.	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: 11-30-81 By: Gabriel Third Weigh (g)	Average Weights
3	108.1947	108.1951		108.1949
8	105.2109	105.2131	105.2089 105.2082	105.2086

2134035

Tare
DRY CATCH BEAKER - ~~FINAL~~ WEIGHT

Beaker No.	Date: 11-4-81 By: Gabriel First Weigh (g)	Date: 11-5-81 By: Gabriel Second Weigh (g)	Date: 11-7-81 11-9-81 By: Gabriel Third Weigh (g)	Average Weights
* 3	106.7152	106.7121	106.7153 106.7145	106.7149
* 8	104.0384	104.0318	104.0329 104.0326	104.0328

2107177

Filter Blank Correction .1

COMMENTS

dry catch vol. - 200ml
* probe rinse vol. — 400 ml so much it was put in 2 beakers

C-1-1-3 Blank Filter Tare and Final Weights

METHOD 5

FILTER BLANK TARE WEIGHTS

Filter No.	First Weigh Weight (mg)	By	Date	Second Weigh Weight (mg)	By	Date	Third Weigh Weight (mg)	By	Date	Average Weight	Daily Average
15	3710.1	MG	11-9-81	3710.5	MG	11-9				3710.3	

Remarks

BLANK WEIGHT FINAL ANALYSIS

Date: 11-14-81
By: Gabriel

METHOD 5

	Filter No. MS 15 First Weigh (mg)	Filter No. MS-15 Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter	3.7101	3.7100	3.7101	3.7100

Average Tare Weight: 3710.3 mg
Blank Weight: .3 mg

DCIP SAMPLER

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter - 2.5"				

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks

Acetone blank in Method 17 book. #25

1st	2nd	3rd	Avg.
87.9299	87.9298	87.9308	87.9305

This is for 11-15-81

Avg Tare wt 87.9238
Blank wt .0067 gm 6.7 mg

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BLANK WEIGHT FINAL ANALYSIS

Date: 11-15-87
By: CoCh

METHOD 5

	Filter No. 15 First Weigh (mg)	Filter No. 15 Second Weigh (mg)	Filter No. 15 Third Weigh (mg)	Average Weight
Filter 3 foc	3.7099	3.7103	3.7099	3700.1

Average Tare Weight: 3710.3 mg
Blank Weight: .2 mg

DCIP SAMPLER

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter - 2.5"				

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks

Acetone Blank - beaker #25 - see Method 17 book

for 111

BLANK WEIGHT FINAL ANALYSIS

Date: 11/16/81
By: Beall

METHOD 5

	Filter No. 15 First Weigh (mg)	Filter No. 15 Second Weigh (mg)	Filter No. 15 Third Weigh (mg)	Average Weight
Filter	3.7100	3.7100	3.7103	3.7101

Average Tare Weight: 3710.3 mg
Blank Weight: .2 mg

DCIP SAMPLER

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter - 2.5"				

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks

Acetone blank - beaker #25 - see Method 17 book

for 11/10/81 : 1st weigh 2nd 3rd

87.9299 87.9305 87.9305 87.9303

Avg Tare wt 87.9238

Blank wt. .0065 gm 6.5 mg

BLANK WEIGHT FINAL ANALYSIS

Date: 11-25-81
By: Gabriel

METHOD 5

	Filter No. MS-15 First Weigh (~~mg~~)	Filter No. MS-15 Second Weigh (mg)	Filter No. MS-15 Third Weigh (~~mg~~)	Average Weight
Filter	3.7104	3.7106	3.7102	3710.4

Average Tare Weight: 3710.3 mg
Blank Weight: .1 mg

DCIP SAMPLER

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter - 2.5"				

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks Acetone Blank

	1st	2nd	3rd	Avg
Beaker #25	87.9311e	87.9313	87.9306	87.9312

Big Tare wt 87.9238 gm
Blank wt .0074 gm ~~7.4 mg~~ 7.4 mg

C-1-2 EPA Method 17

C-1-2-1 Filter Tare and Final Weights

METHOD 17

FILTER TARE WEIGHTS

Filter No.	First Weigh Weight (mg)	By	Date	Second Weigh Weight (mg)	By	Date	Third Weigh Weight (mg)	By	Date	Average Weight
17-23	1.5736	MG	11-5-81	1573.7	MG	11-5-81				1573.6
17-24	1.5251			1524.9						1525.0
17-25	1528.6			1528.5						1528.6
17-26	1524.2			1524.1						1524.2
17-27	1523.1			1523.1						1523.1
17-28	1536.0			1536.6						1536.3
29	1524.4			1524.7						1524.6
30	1525.8			1525.6						1525.7
31	1573.9			1573.6						1573.8
32	1586.3			1586.3						1586.3
33	1569.7			1569.6						1569.6
34	1520.1			1520.3						1520.2
35	1518.8			1518.7						1518.8
42	1587.6			1587.6						1587.6
43	1580.7	MG	11-5-81	1580.6	MG	11-5-81				1580.6
21	1576.7		11-5-	1576.3		11-5				1576.5
22	1589.4	MG	11-5	1589.3	MG	11-5				1589.4

Remarks

METHOD 17

Run Number: 0-1-1
Date of Run: 11-12-81

FILTER ANALYSIS

Filter No. 22	Date: 11-14-81 By: Gabriel First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1702.6	1702.3		1702.4

Tare Weight: 1589.4 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 24	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	67.7497	67.7492		67.7494

Tare Weight: ~~67.9288~~ g 67.7427 Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = .1 mg

Remarks

Beaker 13 - procedural blank

METHOD 17

Run Number: 0-1-2, 0-2
Date of Run: 11-13-81

FILTER ANALYSIS

Filter No. 21	Date: 11-14-81 By: Gabriel First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1625.2	1624.9		1625.0

Tare Weight: 1576.5 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 4	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11-15-81 By: Cobb Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.0417	68.0410		68.0414

68.0390

Tare Weight: ~~68.1871~~ g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = .1 mg

Remarks

Baker 4/1 - procedural blank 20 ml used

METHOD 17

Run Number: ~~D-1-3~~ D-3-1
Date of Run: 11-13-81

FILTER ANALYSIS

Filter No. 23	Date: 11-14-81 By: Gabriel First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1646.1	1645.9		1646.0

Tare Weight: 1573.10 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 11	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	67.6274	67.6266		67.6270

Tare Weight: 67.6207 g Vol. of Probe Rinse: 25 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 25 ml (Volume of Rinse) = .125 mg

Remarks

METHOD 17

Run Number: ~~0-4~~ 0-41
Date of Run: 11-14-81

FILTER ANALYSIS

Filter No. 24	Date: 11-15-81 By: Cobb First Weigh (mg)	Date: 11/16/81 By: Beall Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.6236	1.6235		1.6236

Tare Weight: 1525.0 mg Blank Correction: .1 mg

PROBE RINSE ANALYSIS

Beaker No. 14	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.6357	68.6351		68.6354

Tare Weight: 68.6300 g Vol. of Probe Rinse: 25 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 25 ml (Volume of Rinse) = .125 mg

Remarks

procedural blank - Beaker # 4/4 20 ml used

METHOD 17

Run Number: ~~0-2-1~~ 0-1-2
Date of Run: 11-14-81

FILTER ANALYSIS

Filter No. 25	Date: 11-15-81 By: Cobb First Weigh (mg)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.6297	1.6304		1630.1

Tare Weight: 1528.10 mg Blank Correction: .1 mg

PROBE RINSE ANALYSIS

Beaker No. 32	Date: 11/16/81 By: Beall First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	65.8542	65.8545		65.8544

Tare Weight: 65.8509 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = .1 mg

Remarks

METHOD 17

Run Number: 0-2-2
Date of Run: 11/16/81

FILTER ANALYSIS

Filter No. 26	Date: 11-25-81 By: Gabriel First Weigh (mg)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1639.5	1638.9		1639.2

Tare Weight: 1524.2 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 3	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.0552	68.0558		68.0555

Tare Weight: 68.0490 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = .1 mg

Remarks

procedural acetone blank - 150 ml beaker - 20 ml
#34

METHOD 17

Run Number: ~~0-2-3~~ 0-3-2
Date of Run: 11/16/81

FILTER ANALYSIS

Filter No. 27	Date: 11-25-81 By: Gabriel First Weigh (~~mg~~)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.6215	1620.9		1621.2

Tare Weight: 1523.1 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 10	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.20606	68.2069		68.20608

Tare Weight: 68.1876 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = 0.1 mg

Remarks

METHOD 17

Run Number: ~~0-1-2~~ 0-2-1
Date of Run: 11-13-81

FILTER ANALYSIS

Filter No. 21	Date: 11-14-81 By: Gabriel First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1625.2	1624.9		1625.0

Tare Weight: 1576.5 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 4	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11-15-81 By: Cobb Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.0417	68.0410		68.0414

68.0390

Tare Weight: ~~68.1572~~ g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = .1 mg

Remarks

Beaker 4/1 - procedural blank 20 ml used

METHOD 17

Run Number: ~~D-1-3~~ D-3-1
Date of Run: 11-13-81

FILTER ANALYSIS

Filter No. 23	Date: 11-14-81 By: Gabriel First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1646.1	1645.9		1646.0

Tare Weight: 1573.10 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 11	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	67.6274	67.6266		67.6270

Tare Weight: 67.6207 g Vol. of Probe Rinse: 25 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 25 ml (Volume of Rinse) = .125 mg

Remarks

METHOD 17

Run Number: ~~0-1-4~~ 0-4
Date of Run: 11-14-81

FILTER ANALYSIS

Filter No. 24	Date: 11-15-81 By: Cobb First Weigh (mg)	Date: 11/16/81 By: Beall Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
Final Weight	1.6236	1.6235		1.6236

Tare Weight: 1525.0 mg Blank Correction: .1 mg

PROBE RINSE ANALYSIS

Beaker No. 14	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
Final Weight	68.6357	68.6351		68.6354

Tare Weight: 68.6300 g Vol. of Probe Rinse: 25 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 25 ml (Volume of Rinse) = .125 mg

Remarks

procedural blank - Beaker # 4/4 20 ml used

METHOD 17

Run Number: ~~0-0-1~~ 0-1-2
Date of Run: 11-14-81

FILTER ANALYSIS

Filter No. 25	Date: 11-15-81 By: Cobb First Weigh (mg)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.6297	1.6304		1630.1

Tare Weight: 1528.16 mg Blank Correction: .1 mg

PROBE RINSE ANALYSIS

Beaker No. 32	Date: 11/16/81 By: Beall First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	65.8542	65.8545		65.8544

Tare Weight: 65.8509 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = .1 mg

Remarks

METHOD 17

Run Number: 0-2-2
Date of Run: 11/16/81

FILTER ANALYSIS

Filter No. 26	Date: 11-25-81 By: Gabriel First Weigh (mg)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1639.5	1638.9		1639.2

Tare Weight: 1524.2 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 3	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.0552	68.0558		68.0555

Tare Weight: 68.0490 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = .1 mg

Remarks

procedural acetone blank - 150 ml beaker - 20 ml
#34

2-2

METHOD 17

Run Number: ~~0-2-3~~ 0-3-2
Date of Run: 11/16/81

FILTER ANALYSIS

Filter No. 27	Date: 11-25-81 By: Gabriel First Weigh (~~mg~~)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
Final Weight	1.6215	1620.9		1621.2

Tare Weight: 1523.1 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 10	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
Final Weight	68.2066	68.2069		68.2068

Tare Weight: 68.1876 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = 0.1 mg

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-2-2
Date of Run: 11-12-81

TARE WEIGHTS

Sample ID		Date: 11-5-81 By: Gabriel	Date: 11-6-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
2	1	1.4547	1.4546		1.4546
2	2	1.4554	1.4551		1.4552
2	3	1.4566	1.4563		1.4564
2	4	1.4537	1.4535		1.4536

Thimble Filter Tare Weight (mg) 23214.7

FINAL WEIGHTS

Sample ID		Date: 11-14-81 By: Gabriel	Date: 11/14/81 By: Beall	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
2	1	3.3913	3.3920		3.3916
2	2	1.5228	1.5222	—	1.5225
2	3	1.6633	1.6636		1.6634
2	4	2.3399	2.3405		2.3332
Thimble Filter #1		23508.4	23508.7		23508.6

Thimble Filter Blank Correction (mg) = .1

Remarks

METHOD 17

Run Number: ~~0-2-3~~ 0-3-2
Date of Run: 11/16/81

FILTER ANALYSIS

Filter No. 27	Date: 11-25-81 By: Gabriel First Weigh (mg)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.6215	1620.9		1621.2

Tare Weight: 1523.1 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 10	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.2066	68.2069		68.2068

Tare Weight: 68.1876 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = 0.1 mg

Remarks

METHOD 17

Run Number: ~~0-2-4~~ 0-4-A
Date of Run: 11-16-81

FILTER ANALYSIS

Filter No. 28	Date: 11-25-81 By: Gabriel First Weigh (mg)	Date: 11-25-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1641.0	1640.5		1640.8

Tare Weight: 1536.3 mg Blank Correction: 0 mg

PROBE RINSE ANALYSIS

Beaker No. 20	Date: 11-25-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.2622	68.2626		68.2624

Tare Weight: 68.2486 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction:

.005 mg/ml (Acetone Blank) x 20 ml (Volume of Rinse) = 0.1 mg

Remarks

C-1-2-3 Blank Filter Tare and Final Weights

METHOD 17

FILTER BLANK TARE WEIGHTS

Filter No.	First Weigh Weight (mg)	By	Date	Second Weigh Weight (mg)	By	Date	Third Weigh Weight (mg)	By	Date	Average Weight	Daily Average
17-43	1580.7	MG	11-5	1580.16	MG	11-5				1580.16	

Remarks

BLANK WEIGHT FINAL ANALYSIS

Date: 11-14-81
By: _____

METHOD 17

	Filter No. 17-43 First Weigh (mg)	Filter No. 17-43 Second Weigh (mg)	Filter No. 17-43 Third Weigh (mg)	Average Weight
Filter 17-43	1580.8	1580.4	1580.7	1580.6

Average Tare Weight: 1580.6 mg
Blank Weight: 0 mg

ANDERSEN MARK III

	Filter Set No. BS-1 First Weigh (mg)	Filter Set No. BS-1 Second Weigh (mg)	Filter Set No. BS-1 Third Weigh (mg)	Average Weight
Cyclone	370.17	370.27	370.22	370.24
Substrate Stages 0-7	563.87	563.68	563.67	563.68
Final Filter	631.82	631.69	631.68	631.68

Average Tare Weights		Blank Weights	
Cyclone:	370.43 mg	-.19	mg
Substrate (Stages 0-7):	563.97 mg	-.29	mg
Final Filter:	631.96 mg	-.28	mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9288	23.9283	23.9286	23928.6

Average Tare Weight: 23928.7 mg
Blank Weight: -.1 mg

ACETONE PROCEDURAL BLANK

Beaker No. 13

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
68.0967	68.0963		68.0965

Average Tare Weight: 68.0949 mg
Blank Weight: .0016 mg

Remarks

BLANK WEIGHT FINAL ANALYSIS

Date: 11-15-81
By: Cobb

METHOD 17

	Filter No. 43 First Weigh (mg)	Filter No. 43 Second Weigh (mg)	Filter No. 43 Third Weigh (mg)	Average Weight
Filter	1.5806	1.5806	1.5808	1.5807

Average Tare Weight: 1580.6 mg
Blank Weight: .1 mg

ANDERSEN MARK III

	Filter Set No. ____ First Weigh (mg)	Filter Set No. ____ Second Weigh (mg)	Filter Set No. ____ Third Weigh (mg)	Average Weight
Cyclone				
Substrate Stages 0-7				
Final Filter				

Average Tare Weights
Cyclone: _____ mg
Substrate (Stages 0-7): _____ mg
Final Filter: _____ mg

Blank Weights
_____ mg
_____ mg
_____ mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9290	23.9290	23.9288	23.9289

Average Tare Weight: 23928.6 mg (7 mm)
Blank Weight: +.2 mg

ACETONE PROCEDURAL BLANK

Beaker No. 41

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
67.8686	67.8685	67.8682	67.8684

Average Tare Weight: 67867.6 mg
Blank Weight: .8 mg

Remarks

BLANK WEIGHT FINAL ANALYSIS

Date: 11/16/81
By: Beall

METHOD 17

	Filter No. 43 First Weigh (mg)	Filter No. 43 Second Weigh (mg)	Filter No. 43 Third Weigh (mg)	Average Weight
Filter	1.5809	1.5810	1.5808	1.5809

Average Tare Weight: 1580.2 mg
Blank Weight: .3 mg

ANDERSEN MARK III

	Filter Set No. BS-1 First Weigh (mg)	Filter Set No. BS-1 Second Weigh (mg)	Filter Set No. BS-1 Third Weigh (mg)	Average Weight
Cyclone	369.14	370.26	369.16 *	369.18
Substrate Stages 0-7	563.67	563.72	563.70	563.71
Final Filter	631.65	631.70	631.70	631.70

4th weigh

Average Tare Weights
Cyclone: 370.43 mg
Substrate (Stages 0-7): 563.97 mg
Final Filter: 631.96 mg

Blank Weights
-1.25 mg
-.26 mg
-.16 mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9288	23.9290	23.9292	23.9290

Average Tare Weight: 2392.8.7 mg
Blank Weight: .3 mg

ACETONE PROCEDURAL BLANK

Beaker No. 44

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
68.2244			

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks * 4th weigh of cyclone BS-1 . 169.19

BLANK WEIGHT FINAL ANALYSIS

Date: 11-25-81
By: Gabriel

METHOD 17

	Filter No. 17-43 First Weigh (mg)	Filter No. 43 Second Weigh (mg)	Filter No. 43 Third Weigh (mg)	Average Weight
Filter	1580.9	1581.3	1581.7	1580.6

Average Tare Weight: 1580.6 mg
Blank Weight: 0 mg

ANDERSEN MARK III

	Filter Set No. ____ First Weigh (mg)	Filter Set No. ____ Second Weigh (mg)	Filter Set No. ____ Third Weigh (mg)	Average Weight
Cyclone				
Substrate Stages 0-7				
Final Filter				

Average Tare Weights
Cyclone: _____ mg
Substrate (Stages 0-7): _____ mg
Final Filter: _____ mg

Blank Weights
_____ mg
_____ mg
_____ mg

H.C.S.S.

	Filter No. HT-10 First Weigh (mg)	Filter No. HT-10 Second Weigh (mg)	Filter No. HT-10 Third Weigh (mg)	Average Weight
Thimble Filter	23929.3	23929.3	23929.1	23929.2

Average Tare Weight: 23928.0 mg
Blank Weight: .5 mg

ACETONE PROCEDURAL BLANK

Beaker No. 34

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
65.8632	65.8641		

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks

C-1-3 EPA Method 5 and Method 17 Acetone Blank
Tare and Final Weights

BLANK WEIGHT FINAL ANALYSIS

Date: _____

By: _____

METHOD 5

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter				

Average Tare Weight: _____ mg

Blank Weight: _____ mg

DCIP SAMPLER

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter - 2.5"				

Average Tare Weight: _____ mg

Blank Weight: _____ mg

Volume of Acetone = 200 ml

Remarks	Acetone Blanks 12-7-81		12-8-81	
Avg Tare	111.8058			111.8064
Final 71	111.8056	111.8070	111.8063	111.8065
Tare	103.9951			103.9966
18	103.9967	103.9976	103.9964	103.9967
Tare	102.6138			102.6146
11	102.6146	102.6160	102.6145	102.6146
Tare	103.0334			103.0359
6	103.0358	103.0374	103.0357	103.0360

Final - Tare = mg

71 111.8064 - 111.8058 = .6

18 103.9966 - 103.9951 = ~~1.4~~ 1.5 mg

6 103.0359 - 103.0334 = 2.5 mg

11 102.6146 - 102.6138 = .8 mg

1.6 mg Avg

-.6

1.0 mg Avg

Calibration wt 30.0108 30.0109 30.0107

C-2 Particle Size

C-2-1 Andersen High Capacity Stack Sampler
with 15 μm Preseparator

C-2-1-1 Thimble Filter and Impactor Stage Tare and Final Weights

H.C.S.S.

THIMBLE FILTER TARE WEIGHTS

Filter No.	First Weigh Weight (mg)	By	Date	Second Weigh Weight (mg)	By	Date	Third Weigh Weight (mg)	By	Date	Average Weight
AT-9	23702.4	MG	11-7	23702.6						23702.5
10	23729.9			23730.4						23730.6
22	23352.9			23353.4						23353.6
11	23143.1			23143.0						23143.0
13	24271.0			24271.0						24271.0
5	23688.8			23688.8						23688.8
19	23213.9			23213.7						23213.8
2	23819.9			23820.2						23820.0
7	23742.0			23742.0						23742.0
14	24201.2			24201.2						24201.2
12	23427.1			23427.0						23427.0
23	23648.0			23648.1						23648.0
15	23459.8			23459.8						23459.8
8	24031.7			24031.7						24031.7
17	23107.4			23107.3						23107.4
24	23634.0			23633.8						23633.9
16	23193.8			23193.7						23193.8
18	23271.5			23271.6						23271.6
4	23026.1			23026.5						23026.3
21	23305.9			23305.9						23305.9
3	23837.9			23537.3						23837.6
1	23215.0			23214.4						23214.7
6	23868.5			23868.0						23868.2
20	24161.1	MG	11-7-81	24160.8						24161.0

Remarks

Filter # 11 torn - 11-14-81

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-2-1
Date of Run: 11-12-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
1	1	1.4541	1.4540		1.4540
1	2	1.4574	1.4578		1.4576
1	3	1.4547	1.4544		1.4546
1	4	1.4545	1.4542		1.4544

Thimble Filter Tare Weight (mg) 23026.3

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Gabb Third Weigh (g)	Average Weight
1	1*	5.1949	5.1968	5.1980	
1	2	1.5286	1.5285		1.5286
1	3	1.7313	1.7321		1.7317
1	4	2.4827	2.4841	2.4846	2.4844
Thimble Filter (mg)		23317.4	23318.0		23317.7

Thimble Filter Blank Correction (mg) -.1

Remarks * 4th weigh for 1-1 on 11/14/81 by Beall 5.1982 g

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-2-2
Date of Run: 11-12-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
2	1	1.4547	1.4546		1.4546
2	2	1.4554	1.4551		1.4552
2	3	1.4566	1.4563		1.4564
2	4	1.4537	1.4535		1.4536

Thimble Filter Tare Weight (mg) 23214.7

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
2	1	3.3913	3.3920		3.3916
2	2	1.5228	1.5222	—	1.5225
2	3	1.6633	1.6636		1.6634
2	4	2.3399	2.3405		2.3332
Thimble Filter #1		23506.4	23508.7		23505.6

Thimble Filter Blank Correction (mg) -.1

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-4-1
Date of Run: 11-13-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
3	1	1.4512	1.4511		1.4512
3	2	1.4482	1.4480		1.4481
3	3	1.4475	1.4475		1.4475
3	4	1.4543	1.4546		1.4544

Thimble Filter Tare Weight (mg) 23730.6

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
3	1	4.3548	4.3564	4.3567	4.3566
3	2	1.5297	1.5297		1.5297
3	3	1.7137	1.7139		1.7138
3	4	2.3720	2.3728		2.3724
Thimble Filter #16		24564.6	24564.4		24564.5

(mg)

Thimble Filter Blank Correction (mg) ← .1

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-4-2
Date of Run: 11-13-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
4	1	1.4492	1.4492		1.4492
4	2	1.4488	1.4490		1.4489
4	3	1.4539	1.4538		1.4538
4	4	1.4552	1.4551		1.4552

Thimble Filter Tare Weight (mg) 23427.0

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
4	1	~~1.0~~ 3.8061	3.8073	3.8077	3.8075
4	2	1.5217	1.5215		1.5216
4	3	1.6984	1.6987		1.6986
4	4	2.3459	2.3468		2.3464
Thimble Filter #12		23759.2	23760.1		23759.6

Thimble Filter Blank Correction (mg) − .1

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-4-1- I-3-1
Date of Run: 11-13-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
5	1	1.4502	1.4508		1.4505
5	2	1.4530	1.4528		1.4529
5	3	1.4541	1.4539		1.4540
5	4	1.4489	1.4489		1.4489

Thimble Filter Tare Weight (mg) 23648.0

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-14-81 By: Gabriel First Weigh (g)	Date: 11/14/81 By: Beall Second Weigh (g)	Date: 11-15-81 By: Cobb Third Weigh (g)	Average Weight
5	1	4.4540	4.4539		4.4540
5	2	1.5350	1.5349		1.5350
5	3	1.8483	1.8489		1.8486
5	4	2.4339	2.4350	2.4347	2.4349
Thimble Filter #23 (mg)		24381.5	24382.5		24382.0

Thimble Filter Blank Correction (mg) −.1

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: ~~I-4-2~~ I-5
Date of Run: 11-13-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	1	1.4489	1.4487		1.4488
6	2	1.4465	1.4463		1.4464
6	3	1.4463	1.4463		1.4463
6	4	1.4469	1.4466		1.4468

Thimble Filter Tare Weight (mg) 23459.8

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	1	3.6761	3.6763		3.6762
6	2	1.5215	1.5216		1.5216
6	3	1.7237	1.7240		1.7238
6	4	1.8962	1.8964		1.8963
Thimble Filter ~~4~~ 15		24.1492	24.1496		24149.4 (mg)

Thimble Filter Blank Correction (mg) +.2 ~~3~~ MDH

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-1-1
Date of Run: 11-14-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
7	1	1.4450	1.4449		1.4450
7	2	1.4467	1.4469		1.4468
7	3	1.4417	1.4418		1.4418
7	4	1.4393	1.4395		1.4394

Thimble Filter Tare Weight (mg) 24201.2

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
7	1	2.1766	2.1766		2.1766
7	2	1.4876	1.4877		1.4876
7	3	1.5025	1.5025		1.5025
7	4	1.9660	1.9661		1.9660
Thimble Filter 7	4	24.7825	24.7830		24782.8 (mg)

Thimble Filter Blank Correction (mg) ~~5~~ 7.2 MDH

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-1-2
Date of Run: 11-14-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
8	1	1.4359	1.4365		1.4362
8	2	1.4463	1.4471		1.4467
8	3	1.4465	1.4469		1.4467
8	4	1.4377	1.4382		1.4380

Thimble Filter Tare Weight (mg) 23837.6

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-15-81 By: Cobb First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
8	1	3.5227	3.5233		3.5230
8	2	1.5289	1.5289 *		1.5289
8	3	1.7561	1.7563		1.7562
8	4	2.4574	2.4577		2.4576
Thimble Filter #3		24.1824	24.1824		24182.4 (mg)

Thimble Filter Blank Correction (mg) 5 ± 2 MDH

Remarks * spilled when removed from balance

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: T-1-3
Date of Run: 11-12-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
9	1	1.4471	1.4472		1.4472
9	2	1.4498	1.4498		1.4498
9	3	1.4480	1.4480		1.4480
9	4	1.4505	1.4504		1.4504

Thimble Filter Tare Weight (mg) 23107.4

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-15-81 By: Cash First Weigh (g)	Date: 11/16/81 By: Beall Second Weigh (g)	Date: 11-24-81 By: Gabriel Third Weigh (g)	11-25-81 Gabriel Average Weight
9	1	5.1048	5.1033	5.1070 5.1064	5.1067
9	2	1.5472	1.5471		1.5472
9	3	1.8310	1.8309		1.8310
9	4	2.5627	2.5628		2.5628
Thimble Filter # 17		23.3959	23.3959		23395.9 (MA)

Thimble Filter Blank Correction (mg) 3 ± .2 MDH

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I - 1 - C
Date of Run: 11-14-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
10	1	1.4469	1.4470		1.4470
10	2	1.4473	1.4477		1.4475
10	3	1.4484	1.4484		1.4484
10	4	1.4496	1.4494		1.4496

Thimble Filter Tare Weight (mg) 23353.6

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-15-81 By: Cobb First Weigh (g) *	Date: 11/16/81 By: Beall Second Weigh (g)	Date: 11/17/81 By: Beall Third Weigh (g)	Average Weight
10	1	3.5339	3.5344	3.5340	~~3.5342~~ 3.5341
10	2	1.5287	1.5289	1.5288	~~1.5288~~ 1.5289
10	3	1.8159	1.8157	1.8157	~~1.8158~~ 1.8157
10	4	2.4313	2.4318	2.4321	~~2.4316~~ 2.4320
Thimble Filter # 22 (9)			23.8045 1st weigh	23.8049	23804.7

Thimble Filter Blank Correction (mg) .3

Remarks * I believe these were mistakenly weighed on 11/15 - only a few hours after being put in the desiccator - so ~~was~~ weighed a 3rd time.

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-3-3
Date of Run: 11-16-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
11	1	1.4445	1.4446		1.44460
11	2	1.4446	1.4445		1.44455
11	3	1.4466	1.4466		1.44660
11	4	1.4475	1.4474		1.44745

Thimble Filter Tare Weight (mg) 24161.0

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11/17/81 By: Beall First Weigh (g)	Date: 11-24-81 By: C Second Weigh (g)	Date: 11-25-81 By: Gabriel Third Weigh (g)	Average Weight
11	1	3.5461	3.5439	3.5446	3.5443
11	2	1.5245	1.5244		1.5245
11	3	1.7883	1.7881		1.7882
11	4	1.8903	1.8899		1.8901
Thimble Filter 20 (mg)		25370.1 11-25-81	25370.8		25370.5

Thimble Filter Blank Correction (mg) .5

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-3-4
Date of Run: 11-16-81

TARE WEIGHTS

Sample ID		Date: 11-5-81	Date: 11-6-81	Date:	
Set No.	Stage No.	By: Gabriel First Weigh (g)	By: Gabriel Second Weigh (g)	By: Third Weigh (g)	Average Weight
12	1	1.4509	1.4510		1.4510
12	2	1.4457	1.4458		1.4458
12	3	1.4483	1.4483		1.4483
12	4	1.4512	1.4510		1.4511

Thimble Filter Tare Weight (mg) 233059

FINAL WEIGHTS

Sample ID		Date: 11/17/81	Date: 11-24-81	Date: 11-25-81	
Set No.	Stage No.	By: Beall First Weigh (g)	By: Gabriel Second Weigh (g)	By: Gabriel Third Weigh (g)	Average Weight
12	1	3.4006	3.3988	3.3993	3.3990
12	2	1.5159	1.5158		1.5159
12	3	1.6939	1.6938		1.6939
12	4	2.1357	2.1354		2.1356
Thimble Filter 21		24033.4	24033.7		24033.6
(mg)		11-25-81			

Thimble Filter Blank Correction (mg) .5

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-4-3
Date of Run: 11/16/81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
13	1	1.4481	1.4481		1.4481
13	2	1.4515	1.4513		1.4514
13	3	1.4406	1.4402		1.4404
13	4	1.4435	1.4435		1.4435

Thimble Filter Tare Weight (mg) 2368.8

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
13	1	2.2462	2.2456		2.2459
13	2	1.4863	1.4861		1.4862
13	3	1.5023	1.5023		1.5023
13	4	2.1151	2.1147		2.1149
Thimble Filter 5 (mg)		24077.0	24077.3		24077.2

Thimble Filter Blank Correction (mg) .5

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-4-4
Date of Run: 11-16-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
14	1	1.4472	1.4472		1.4472
14	2	1.4614	1.4615		1.4615
14	3	1.4626	1.4625		1.4626
14	4	1.4604	1.4604		1.4604

Thimble Filter Tare Weight (mg) 23820.0

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
14	1	3.1270	3.1265		3.1268
14	2	1.5330	1.5330		1.5330
14	3	1.6543	1.6542		1.6543
14	4	2.3014	2.3010		2.3012
Thimble Filter 2 (mg)		24361.1 11-25-81	24362.1		24361.6

Thimble Filter Blank Correction (mg) .5

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-2-3
Date of Run: 11-16-81

TARE WEIGHTS

Sample ID		Date: 11-5-81 By: Gabriel	Date: 11-6-81 By: Gabriel	Date: By:	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
15	1	1.4649	1.4648		1.4649
15	2	1.4622	1.4619		1.4621
15	3	1.4563	1.4563		1.4563
15	4	1.4575	1.4575		1.4575

Thimble Filter Tare Weight (mg) 24271.0

FINAL WEIGHTS

Sample ID		Date: 11-24-81 By: Gabriel	Date: 11-25-81 By: Gabriel	Date: By:	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
15	1	4.1650	4.1644		4.1648
15	2	1.5980	1.5980		1.5980
15	3	1.8705	1.8705		1.8705
15	4	2.5252	2.5249		2.5251
Thimble Filter 13 (mg)		24923.1 11-25-81	24923.3		24923.2

Thimble Filter Blank Correction (mg) .5

Remarks

H.C.S.S. STAGE TARE AND FINAL WEIGHTS

Run Number: I-2-4
Date of Run: 11-16-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-5-81 By: Gabriel First Weigh (g)	Date: 11-6-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
16	1	1.46004	~~1.6~~ 1.41600		1.4602
16	2	1.45804	1.45806		1.4585
16	3	1.4598	1.4595 ~~1.45~~		1.45946
16	4	1.46035	1.46033		1.46034

Thimble Filter Tare Weight (mg) 23213.8

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-24-81 By: Gabriel First Weigh (g)	Date: 11-25-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
16	1	2.86446	2.8644		2.8645
16	2	1.5175	1.5175		1.5175
16	3	1.60946	1.6097		1.6097
16	4	2.2485	2.2487		2.24860
Thimble Filter 19		23550.4	23550.8		23550.6
(mg)		11-25-81			

Thimble Filter Blank Correction (mg) .5

Remarks

C-2-1-2 Blank Thimble Filter Tare and Final Weights

H.C.S.S.

THIMBLE FILTER BLANK TARE WEIGHTS

Filter No.	First Weigh Weight (mg)	By	Date	Second Weigh Weight (mg)	By	Date	Third Weigh Weight (mg)	By	Date	Average Weight	Daily Average
T15	24785.2	MG	11-7	24785.1a						24785.4	
24	23913.4	MG	11-7	23913.3	MG					23913.4	24269.2
16	23928.8	MG	11-7	23925.6	MG	11-9-81				23928.7	

Remarks

BLANK WEIGHT FINAL ANALYSIS

Date: 11-14-81
By: _____

METHOD 17

	Filter No. 17-43 First Weigh (mg)	Filter No. 17-43 Second Weigh (mg)	Filter No. 17-43 Third Weigh (mg)	Average Weight
Filter 17-43	1580.8	1580.4	1580.7	1580.6

Average Tare Weight: 1580.6 mg
Blank Weight: 0 mg

ANDERSEN MARK III

	Filter Set No. BS-1 First Weigh (mg)	Filter Set No. BS-1 Second Weigh (mg)	Filter Set No. BS-1 Third Weigh (mg)	Average Weight
Cyclone	370.17	370.27	370.22	370.24
Substrate Stages 0-7	563.87	563.68	563.67	563.68
Final Filter	631.82	631.69	631.68	631.68

Average Tare Weights		Blank Weights	
Cyclone:	370.43 mg	-.19	mg
Substrate (Stages 0-7):	563.92 mg	-.29	mg
Final Filter:	631.96 mg	-.28	mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9288	23.9283	23.9286	23928.6

Average Tare Weight: 23928.7 mg
Blank Weight: -.1 mg

ACETONE PROCEDURAL BLANK

Beaker No. 13

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
68.0967	68.0963		68.0965

Average Tare Weight: 68.0949 mg
Blank Weight: .0016 mg

Remarks

BLANK WEIGHT FINAL ANALYSIS

Date: 11-15-81
By: Cobb

METHOD 17

	Filter No. 43 First Weigh (mg)	Filter No. 43 Second Weigh (mg)	Filter No. 43 Third Weigh (mg)	Average Weight
Filter	1.5806	1.5806	1.5808	1.5807

Average Tare Weight: 1580.6 mg
Blank Weight: .1 mg

ANDERSEN MARK III

	Filter Set No. ___ First Weigh (mg)	Filter Set No. ___ Second Weigh (mg)	Filter Set No. ___ Third Weigh (mg)	Average Weight
Cyclone				
Substrate Stages 0-7				
Final Filter				

Average Tare Weights
Cyclone: _____ mg
Substrate (Stages 0-7): _____ mg
Final Filter: _____ mg

Blank Weights
_____ mg
_____ mg
_____ mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9290	23.9290	23.9288	23.9289

Average Tare Weight: 23928.6 mg
Blank Weight: .2 mg

ACETONE PROCEDURAL BLANK

Beaker No. 21

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
67.8686	67.8685	67.8682	67.8684

Average Tare Weight: 67.8676 g
Blank Weight: .8 mg

Remarks

C-98

BLANK WEIGHT FINAL ANALYSIS

Date: 11/16/81
By: Beall

METHOD 17

	Filter No. 43 First Weigh (mg)	Filter No. 43 Second Weigh (mg)	Filter No. 43 Third Weigh (mg)	Average Weight
Filter	1.5809	1.5810	1.5808	1.5809

Average Tare Weight: 1580.9 mg
Blank Weight: .3 mg

ANDERSEN MARK III

	Filter Set No. BS-1 First Weigh (mg)	Filter Set No. BS-1 Second Weigh (mg)	Filter Set No. BS-1 Third Weigh (mg)	Average Weight
Cyclone	369.14	370.26	369.16 *	369.18
Substrate Stages 0-7	563.67	563.72	563.70	563.71
Final Filter	631.65	631.70	631.70	631.70

4th weigh

Average Tare Weights
Cyclone: 370.43 mg
Substrate (Stages 0-7): 563.97 mg
Final Filter: 631.96 mg

Blank Weights
-1.25 mg
-.26 mg
-.16 mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9288	23.9290	23.9292	23.9290

Average Tare Weight: 23928.7 mg
Blank Weight: .3 mg

ACETONE PROCEDURAL BLANK

Beaker No. 44

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
68.2244			

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks * 4th weigh of cyclone BS-1 : 169.19

BLANK WEIGHT FINAL ANALYSIS

Date: 11-25-81
By: Gabriel

METHOD 17

	Filter No. 17-43 First Weigh (mg)	Filter No. 43 Second Weigh (mg)	Filter No. 43 Third Weigh (mg)	Average Weight
Filter	1580.9	1581.3	1581.7	1580.6

Average Tare Weight: 1580.6 mg
Blank Weight: 0 mg

ANDERSEN MARK III

	Filter Set No. ____ First Weigh (mg)	Filter Set No. ____ Second Weigh (mg)	Filter Set No. ____ Third Weigh (mg)	Average Weight
Cyclone				
Substrate Stages 0-7				
Final Filter				

Average Tare Weights
Cyclone: _____ mg
Substrate (Stages 0-7): _____ mg
Final Filter: _____ mg

Blank Weights
_____ mg
_____ mg
_____ mg

H.C.S.S.

	Filter No. HT-10 First Weigh (mg)	Filter No. HT-10 Second Weigh (mg)	Filter No. HT-10 Third Weigh (mg)	Average Weight
Thimble Filter	23929.3	239293	23929.1	23929.2

Average Tare Weight: 23928.0 mg
Blank Weight: .5 mg

ACETONE PROCEDURAL BLANK

Beaker No. 34

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
65.8632	65.8641		

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks

C-100

C-2-2 Andersen Mark III Impactor with
15 μm Preseparator

C-2-2-1 Filter Tare and Final Weights

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: ~~D-1-4~~ 0-4-1
Date of Run: 11-12-81

Fourth weigh continued on pg. 1

Filter Set Number: 46

TARE WEIGHTS

Stage	Date: 11/9/81 By: DG. First Weigh (mg)	Date: 11/9/81 By: D.G. Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	222.42	222.41		222.42
0	375.70	375.70		375.70
1	364.47	364.46		364.46
2	372.33	372.33		372.33
3	395.65	395.65		395.65
4	391.47	391.46		391.46
5	393.42	393.41		393.42
6	401.27	401.25		401.26
7	398.96	398.96		398.96
F	438.61	438.61		438.61

FINAL WEIGHTS

Stage	Date: 11/14/81 By: Gabriel/Beall First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: 11/14/81 By: Beall Third Weigh (mg)	Average Weight
Pres	226.57	226.57		226.57
0	376.09	376.12		376.11
1	364.94	364.94		364.94
2	374.30	374.35		374.33
3	400.25	400.31	399.27	399.29
4	398.57	398.63	398.62	398.63
5	401.26	401.33	400.27	400.27
6	406.46	406.52	405.47	405.46
7	400.57	400.64	399.59	399.59
F	442.55	442.62	441.58	441.58

Blank Weight Corrections (mg)

Cyclone: -.19
Substrate Stages 0-7: -.29
Final Filter: -.28

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: ~~0-1-1~~ 0-3-1
Date of Run: 11-13-81

Fourth weigh on pg. 16
Filter Set Number: 47

TARE WEIGHTS

Stage	Date: 9/10/81 By: D.G. First Weigh (mg)	Date: 9/14/81 By: D.G. Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	240.46	240.47		240.46
0	395.17	395.18		395.18
1	388.75	388.76		388.76
2	400.05	400.07		400.06
3	372.52	372.52		372.52
4	395.62	395.63		395.62
5	388.16	388.17		388.16
6	410.44	410.45		410.44
7	398.28	398.28		398.28
F	448.89	448.89		448.89

FINAL WEIGHTS

Stage	Date: 11/14/81 By: Beall First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: 11/14/81 By: Beall Third Weigh (mg)	Average Weight
Pres	247.74	248.83	247.74 ✓	247.75
0	394.92	396.00	394.90 ✓	394.91
1	387.94	389.01	387.93 ✓	387.93
2	400.97	400.04	400.00	400.02
3	373.04	374.13	373.04 ✓	373.65
4	395.60	398.55	[illegible]	398.57
5	390.38	391.47	390.39 ✓	390.40
6	411.49	410.53	410.51	410.52
7	398.61	398.54	397.49 ✓	397.47
F	449.65	448.65	448.62	448.64

Blank Weight Corrections (mg)

Cyclone: -.19
Substrate Stages 0-7: -.29
Final Filter: -.28

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: ~~D-1-2~~ D-2-1
Date of Run: 11-13-81

Fourth weigh continued pg 7

Filter Set Number: 48

TARE WEIGHTS

Stage	Date: 11/9/81 By: D.G. First Weigh (mg)	Date: 11/9/81 By: D.G Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	240.13	240.14		240.14
0	404.76	404.77		404.76
1	395.19	395.20		395.20
2	403.54	403.51		403.52
3	387.78	387.77		387.78
4	389.47	389.47		389.47
5	372.36	372.36		372.36
6	388.85	388.85		388.85
7	381.66	381.66		381.66
F	438.35	438.35		438.35

FINAL WEIGHTS

Stage	Date: 11/14/81 By: Beall First Weigh (mg)	Date: 11/14/81 By: Beall Second Weigh (mg)	Date: 11/14/81 By: Beall Third Weigh (mg)	Average Weight
Pres	244.81	244.83		244.82
0	~~4~~04.22	405.31	404.26	4 404.28
1	394.97	394.97		394.97
2	404.95	405.02	404.98	~~405.00~~ 404.99
3	390.05	390.08		390.06
4	393.26	393.27		393.26
5	375.74	375.76		375.75
6	389.52	389.51		389.52
7	380.89	380.89		380.89
F	439.86	440.93	439.89	~~440.91~~ 439.91

Blank Weight Corrections (mg)

Cyclone: -.19
Substrate Stages 0-7: -.29
Final Filter: -.28

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: O-1-1
Date of Run: 11-14-81

4th weigh (continued on pg 18

Filter Set Number: 4/9

TARE WEIGHTS

Stage	Date: 11/9/81 By: D.G. First Weigh (mg)	Date: 11/9/81 By: D.G. Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	250.04	250.04		250.04
0	408.49	408.48		408.48
1	373.60	373.61		373.60
2	397.07	397.08		397.08
3	382.94	382.95		382.94
4	395.36	395.36		395.36
5	384.76	384.77		384.76
6	385.99	385.99		385.99
7	382.03	382.04		382.04
F	450.32	450.32		450.32

FINAL WEIGHTS

Stage	Date: 11/16/81 By: Beall First Weigh (mg)	Date: 11/16/81 By: Beall Second Weigh (mg)	Date: 11/16/81 By: Beall Third Weigh (mg)	Average Weight
Pres	254.18	255.25	254.17	254.17
0	408.25	409.33	408.28	408.26
1	373.10	374.21	373.13	373.15
2	398.11	399.22	398.12	398.13
3	384.95	386.05	384.96	384.97
4	400.82	401.89	400.84	400.84
5	390.04	391.14	390.05	390.07
6	387.88	388.98	387.91	387.91
7	381.79	382.87	381.79	381.79
F	450.42	451.47	450.43	450.44

Blank Weight Corrections (mg)

Cyclone: -1.25
Substrate Stages 0-7: -.26
Final Filter: -.116

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: ~~0-2-4~~ 0-4-2
Date of Run: ~~11/4/81~~ 11/4/81

Filter Set Number: 50

TARE WEIGHTS

Stage	Date: 11/9/81 By: D.G. First Weigh (mg)	Date: 11/9/81 By: D.G. Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
Pres	241.86	241.84		241.85
0	390.19	390.21		390.20
1	373.46	373.46		373.46
2	396.71	396.72		396.72
3	387.37	387.39		387.38
4	397.84	397.86		397.85
5	387.66	387.66		387.66
6	390.71	390.91		390.71
7	385.30	385.30		385.30
F	438.27	438.29		438.28

FINAL WEIGHTS

Stage	Date: 11/16/81 By: Beall First Weigh (mg)	Date: 11/16/81 By: Beall Second Weigh (mg)	Date: 11/16/81 By: Beall Third Weigh (mg)	Average Weight
Pres	247.19	247.16		247.18
0	389.60	389.60		389.60
1	373.18	373.17		373.18
2	399.01	399.02		399.02
3	390.04	390.03		399.04
4	403.73	404.79	403.74 *	403.73
5	394.40	394.42		394.41
6	393.26	393.28		393.27
7	384.87	384.89		384.88
F	437.72	438.78	437.72 *	437.72

Blank Weight Corrections (mg)

Cyclone: -1.25
Substrate Stages 0-7: -.26
Final Filter: -.116

Remarks * Fourth weighs for: 50-4 403.72
50-F 437.72

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: 0-2-2
Date of Run: 11/16/81

Filter Set Number: 51

TARE WEIGHTS

Stage	Date: 11/9/81 By: D.G. First Weigh (mg)	Date: 11/12/81 By: D.G. Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
Pres	243.60	243.61		243.60
0	387.57	387.55		387.56
1	377.16	377.14		377.15
2	421.35	421.35		421.35
3	369.67	369.67		369.67
4	387.37	387.37		387.37
5	383.00	383.01		383.00
6	385.31	385.32		385.32
7	384.96	384.95		384.96
F	438.36	438.36		438.36

FINAL WEIGHTS

Stage	Date: 11-23-81 By: Gabriel First Weigh (mg)	Date: 11-23-81 By: Gabriel Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
Pres	246.23	246.22		246.22
0	387.30	387.30		387.30
1	376.48	376.48		376.48
2	422.81	422.81		422.81
3	373.12	373.09		373.11
4	393.47	393.50		393.49
5	388.65	388.70		388.68
6	387.92	387.89		387.91
7	384.59	384.61		384.60
F	437.62	437.60		437.61

Blank Weight Corrections (mg)

Cyclone: -1.16
Substrate Stages 0-7: -.24
Final Filter: -.18

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: ~~D-2-3~~ O-3-2
Date of Run: 11/16/81

Filter Set Number: 52

TARE WEIGHTS

Stage	Date: 11/9/81 By: D.G. First Weigh (mg)	Date: 11/9/81 By: D.G. Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	241.01	241.02		241.02
0	391.79	391.79		391.79
1	382.06	382.07		382.06
2	396.74	396.74		396.74
3	389.89	389.90		389.90
4	399.58	399.59		399.58
5	392.29	392.29		392.29
6	400.33	400.33		400.33
7	389.73	389.73		389.73
F	457.53	457.54		457.54

FINAL WEIGHTS

Stage	Date: 11-23-81 By: Gabriel First Weigh (mg)	Date: 11-23-81 By: Gabriel Second Weigh (mg)	Date: 11-23-81 By: Gabriel Third Weigh (mg)	Average Weight
Pres	245.92	245.84	245.81	245.83
0	391.80	391.83		391.82
1	381.43	381.44		381.44
2	398.09	398.10		398.10
3	392.06	392.06		392.06
4	405.50	405.26	405.22	405.24
5	399.61	399.63		399.62
6	404.78	404.78		404.78
7	390.51	391.51		391.51
F	459.80	459.80		459.80

Blank Weight Corrections (mg)

Cyclone: -1.116
Substrate Stages 0-7: -.24
Final Filter: -.18

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: ~~0-2-1~~ 0-1-2
Date of Run: 11-16-81

Filter Set Number: 53

TARE WEIGHTS

Stage	Date: 11/9/81 By: D.G. First Weigh (mg)	Date: 11/9/81 By: D.G. Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	237.59	237.60		237.60
0	~~375.85~~ 388.92	388.92		388.92
1	~~394.49~~ 387.54	387.54		387.64
2	~~339.42~~ 401.49	401.48		401.48
3	~~345.46~~ 378.52	378.50		378.59
4	~~376.29~~ 389.35	389.35		389.35
5	~~368.13~~ 381.19	381.18		381.18
6	~~378.82~~ 391.87	391.86		391.86
7	~~348.61~~ 381.67	381.67		381.67
F	~~445.91~~ 459.03	459.04		459.04

FINAL WEIGHTS

Stage	Date: 11-23-81 By: Gabriel First Weigh (mg)	Date: 11-23-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	241.03	241.06		240.05
0	388.01	388.01		388.01
1	387.48	387.49		387.48
2	405.65	405.69		405.67
3	383.18	383.16		383.17
4	396.46	396.45		396.46
5	387.42	387.42		387.42
6	393.86	393.86		393.86
7	380.85	380.84		380.85
F	458.30	458.33		458.32

Blank Weight Corrections (mg)

Cyclone: -1.16
Substrate Stages 0-7: -.24
Final Filter: -.18

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

continued from pg 1

Run Number: _____
Date of Run: _____

Filter Set Number: 46

TARE WEIGHTS

Stage	Date: _____ By: _____ First Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres				
0				
1				
2				
3				
4				
5				
6				
7				
F				

FINAL WEIGHTS

Stage	Date: 11/14/81 By: Beall ~~First~~ Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres				
0				
1				
2				
(3)	399.26			
4				
(5)	400.26			
(6)	405.44			
(7)	399.58			
(F)	441.58			

Blank Weight Corrections (mg)

Cyclone: _____
Substrate Stages 0-7: _____
Final Filter: _____

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: _____
Date of Run: _____

Continued from pg. 2

Filter Set Number: 47

TARE WEIGHTS

Stage	Date: _____ By: _____ First Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres				
0				
1				
2				
3				
4				
5				
6				
7				
F				

FINAL WEIGHTS

Stage	Date. 11/14/81 By: Brad ~~First~~ Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
(Pres)	247.75			
(0)	394.91			
(1)	357.93			
2				
(3)	373.05			
4				
(5)	390.40			
6				
(7)	397.45			
F				

Blank Weight Corrections (mg)

Cyclone: _____
Substrate Stages 0–7: _____
Final Filter: _____

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Continued from pg. 3

Run Number: _____
Date of Run: _____

Filter Set Number: 48

TARE WEIGHTS

Stage	Date: _____ By: _____ First Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres				
0				
1				
2				
3				
4				
5				
6				
7				
F				

FINAL WEIGHTS

Stage	Date: 11/14/81 By: Beall ~~First~~ Fourth Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres				
0	404.30			
1				
2	405.00			
3				
4				
5				
6				
7				
F	439.94			

Blank Weight Corrections (mg)

Cyclone: _____
Substrate Stages 0-7: _____
Final Filter: _____

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: _____
Date of Run: _____

(continued from pg. 4
Filter Set Number: _____

TARE WEIGHTS

Stage	Date: _____ By: _____ First Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres				
0				
1				
2				
3				
4				
5				
6				
7				
F				

FINAL WEIGHTS

Stage	Date: 11/16/91 By: Brad ~~First~~ Weigh (mg)	Date: _____ By: _____ Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres	254.17			
0	408.23			
1	373.16			
2	398.13			
3	384.97			
4	400.83			
5	390.07			
6	387.91			
7	381.79			
F	450.44			

Blank Weight Corrections (mg)

Cyclone: _____
Substrate Stages 0-7: _____
Final Filter: _____

Remarks

C-2-2-2 Blank Filter Tare and Final Weights

ANDERSEN
FILTER BLANK TARE WEIGHTS

Filter Set No. BS-1

	Date: 11/9/81 By: DG First Weigh (mg)	Date: 11/9/81 By: DG. Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
1 Cyclone	370.43	370.43		370.43
2 Substrate Stages 0-7	563.97	563.97		563.97
3 Final Filter	631.95	631.97		631.96

Filter Set No. BS-2

	Date: 11/9/81 By: DG First Weigh (mg)	Date: 11/9/81 By: DG. Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
1 Cyclone	402.65	402.65		402.65
2 Substrate Stages 0-7	585.62	585.63		585.63
3 Final Filter	606.79	606.80		606.80

Filter Set No. BS-3

	Date: 11/9/81 By: DG. First Weigh (mg)	Date: 11/9/81 By: D.G. Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
1 Cyclone	403.52	403.51		403.52
2 Substrate Stages 0-7	597.66	597.67		597.67
3 Final Filter	616.01	616.03		616.02

Average of Three Sets (mg)

Cyclone: _____

Substrate Stages 0-7: _____

Final Filter: _____

Remarks Just used set BS-1

BLANK WEIGHT FINAL ANALYSIS

Date: 11-14-81
By: _____

METHOD 17

	Filter No. 17-43 First Weigh (mg)	Filter No. 17-43 Second Weigh (mg)	Filter No. 17-43 Third Weigh (mg)	Average Weight
Filter 17-43	1580.8	1580.4	1580.7	1580.6

Average Tare Weight: 1580.6 mg
Blank Weight: 0 mg

ANDERSEN MARK III

	Filter Set No. BS-1 First Weigh (mg)	Filter Set No. BS-1 Second Weigh (mg)	Filter Set No. BS-1 Third Weigh (mg)	Average Weight
Cyclone	370.17	370.27	370.22	370.24
Substrate Stages 0-7	563.87	563.68	563.67	563.68
Final Filter	631.82	631.69	631.68	631.68

Average Tare Weights		Blank Weights
Cyclone:	370.43 mg	-.19 mg
Substrate (Stages 0-7):	563.97 mg	-.29 mg
Final Filter:	631.96 mg	-.28 mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9288	23.9283	23.9286	23928.6

Average Tare Weight: 23928.7 mg
Blank Weight: -.1 mg

ACETONE PROCEDURAL BLANK

Beaker No. 13

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
68.0967	68.0963		68.0965

Average Tare Weight: 68.0949 mg
Blank Weight: .0016 mg

Remarks

C-119

BLANK WEIGHT FINAL ANALYSIS

Date: 11/16/81
By: Beall

METHOD 17

	Filter No. 43 First Weigh (mg)	Filter No. 43 Second Weigh (mg)	Filter No. 43 Third Weigh (mg)	Average Weight
Filter	1.5809	1.5810	1.5808	1.5809

Average Tare Weight: 1580.0 mg
Blank Weight: .3 mg

ANDERSEN MARK III

	Filter Set No. BS-1 First Weigh (mg)	Filter Set No. BS-1 Second Weigh (mg)	Filter Set No. BS-1 Third Weigh (mg)	Average Weight
Cyclone	369.14	370.26	369.16 *	369.18
Substrate Stages 0-7	563.67	563.72	563.70	563.71
Final Filter	631.65	631.70	631.70	631.70

* 4th weigh

Average Tare Weights
Cyclone: 370.43 mg
Substrate (Stages 0-7): 563.97 mg
Final Filter: 631.92 mg

Blank Weights
-1.25 mg
-.26 mg
-.11 mg

H.C.S.S.

	Filter No. 10 First Weigh (mg)	Filter No. 10 Second Weigh (mg)	Filter No. 10 Third Weigh (mg)	Average Weight
Thimble Filter	23.9288	23.9290	23.9292	23.9290

Average Tare Weight: 23925.7 mg
Blank Weight: .3 mg

ACETONE PROCEDURAL BLANK

Beaker No. 44

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
68.2244			

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks * 4th weigh of cyclone BS-1 . 169.19

BLANK WEIGHT FINAL ANALYSIS

Date: 11-23-81
By: Gabriel

METHOD 17

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Filter				

Average Tare Weight: _____ mg
Blank Weight: _____ mg

ANDERSEN MARK III

	Filter Set No. B5-1 First Weigh (mg)	Filter Set No. B5-1 Second Weigh (mg)	Filter Set No. ____ Third Weigh (mg)	Average Weight
Cyclone	369.24	369.29		369.27
Substrate Stages 0-7	563.72	563.74		563.73
Final Filter	631.76	631.80		631.78

Average Tare Weights		Blank Weights	
Cyclone:	370.43 mg	-1.16	mg
Substrate (Stages 0-7):	563.97 mg	-.24	mg
Final Filter:	631.96 mg	-.18	mg

H.C.S.S.

	Filter No. _____ First Weigh (mg)	Filter No. _____ Second Weigh (mg)	Filter No. _____ Third Weigh (mg)	Average Weight
Thimble Filter				

Average Tare Weight: _____ mg
Blank Weight: _____ mg

ACETONE PROCEDURAL BLANK

Beaker No. _____

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight

Average Tare Weight: _____ mg
Blank Weight: _____ mg

Remarks

C-121

APPENDIX D

SAMPLE CALCULATIONS AND NOMENCLATURE

NOMENCLATURE

Equation No.	Symbol	Description	Units
1	Vi	Initial meter reading	dcf
	Vf	Final meter reading	dcf
	Vm	Volume meter, actual	dcf
2	Pb	Barometric pressure	in. Hg
	ΔH_{avg}	Average orifice pressure drop	in. H_2O
	Tm_{avg}	Average meter temperature	°F
	Vm_{std}	Volume meter, standard conditions	dscf
3	Vlc	Total moisture collected	grams
	Wwc_{std}	Volume of water vapor collected, standard conditions	ft^3
	% H_2O	Percent moisture by volume	-
4	Mf	Mole fraction of dry gas	-
5	% CO_2	Percent carbon dioxide by volume, dry	-
	% O_2	Percent oxygen by volume, dry	-
	% CO	Percent carbon monoxide by volume, dry	-
	% N_2	Percent nitrogen by volume, dry	-
6	Md	Molecular weight, dry stack gas	lb/lb-mole
7	Ms	Molecular weight, stack gas	lb/lb-mole
8	θi	Sampling time interval	minutes
	Dn	Diameter of nozzle	inches
	ΔPs	Velocity head of S pitot	in. H_2O
	Ts	Temperature of stack gas	°F
	Vm_i	Volume of meter per sampling interval	ft^3
9	ΔPs_{avg}	Average velocity head of S pitot	in. H_2O
	Ts_{avg}	Average temperature of stack gss	°F
	Ps	Stack pressure, absolute	in. Hg
	Vs	Average stack gas velocity	fpm
10	θ	Total time of test	minutes
	% I	Percent isokinetic	-
11	ID	Inside diameter of stack	inches
	As	Area of stack	in^2
12	Qs	Stack flowrate, dry standard conditions	dscfm
13	m_n	Total particulate matter collected	mg
	Cs_{std}	Concentration of particulate collected, dry basis, standard conditions	gr/dscf
14	Cs_{act}	Concentration of particulate collected, actual conditions	gr/acf
15	Ep	Particulate emission rate	lb/hr

PARTICULATE CALCULATION EQUATIONS

1. $Vm = Vf - Vi$

2. $$Vm_{std} = \frac{17.64\ (Vm)\left(Pb + \frac{\Delta H_{avg}}{13.6}\right)}{Tm_{avg} + 460}$$

3. $$Vwc_{std} = 0.0471\ (Vlc)$$

$$\%\ H_2O = \frac{100\ (Vwc_{std})}{Vm_{std} + Vwc_{std}}$$

4. $$Mf = \frac{100 - \%\ H_2O}{100}$$

5. $$\%\ N_2 = 100 - (\%\ CO_2 + \%\ O_2 + \%\ CO)$$

6. $$Md = (\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$$

7. $$Ms = (Md \times Mf) + 18(1 - Mf)$$

8. $$Vm_i = \frac{5.168\ (Tm + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}} \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

9. $$Vs = 5{,}128.8\ (\sqrt{\Delta Ps}_{avg}) \sqrt{\frac{Ts_{avg} + 460}{Ps \times Ms}} \times C_p$$

10. $$\%\ I = \frac{1{,}039\ (Ts_{avg} + 460)\ (Vm_{std})}{Vs\ (\theta)\ (Ps)\ (Mf)\ (Dn^2)}$$

11. $$As = \pi\left(\frac{ID}{2}\right)^2$$

12. $$Qs = \frac{0.122\ (Vs)\ (As)\ (Mf)\ (Ps)}{Ts_{avg} + 460}$$

13. $$Cs_{std} = 0.0154\left(\frac{m_n}{Vm_{std}}\right)$$

14. $$Cs_{act} = \frac{17.64\ (Cs_{std})\ (Ps)\ (Mf)}{Ts_{avg} + 460}$$

15. $$Ep = 0.00857\ (Cs_{std})\ (Qs)$$

ANDERSEN SAMPLING CALCULATION WITH PRESEPARATOR

1. Static pressure in stack

   $P_s = Pb \pm (0.074 \times \text{gauge pressure, in } H_2O)$

2. Mole fraction, dry gas

   $$mf = \frac{100 - \% H_2O}{100}$$

3. Molecular weight, dry stack gas, lb/lb-mole

   $Md = (\% CO_2 \times 0.44) + (\% O_2 \times 0.32) + (\% N_2 + \% CO \times 0.28)$

4. Molecular weight, stack gas, lb/lb-mole

   $Ms = (Md)(Mf) + 18(1 - Mf)$

5. Stack velocity, fpm

   $$Vs = 5{,}128.8\ (Cp)\ \left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$$

6. Sample rate for 15 μ cutoff

   Viscosity = $63 + 0.4T(°K)$,
   then see graph for flow rate (F_s)

7. Calculated nozzle diameter, in.

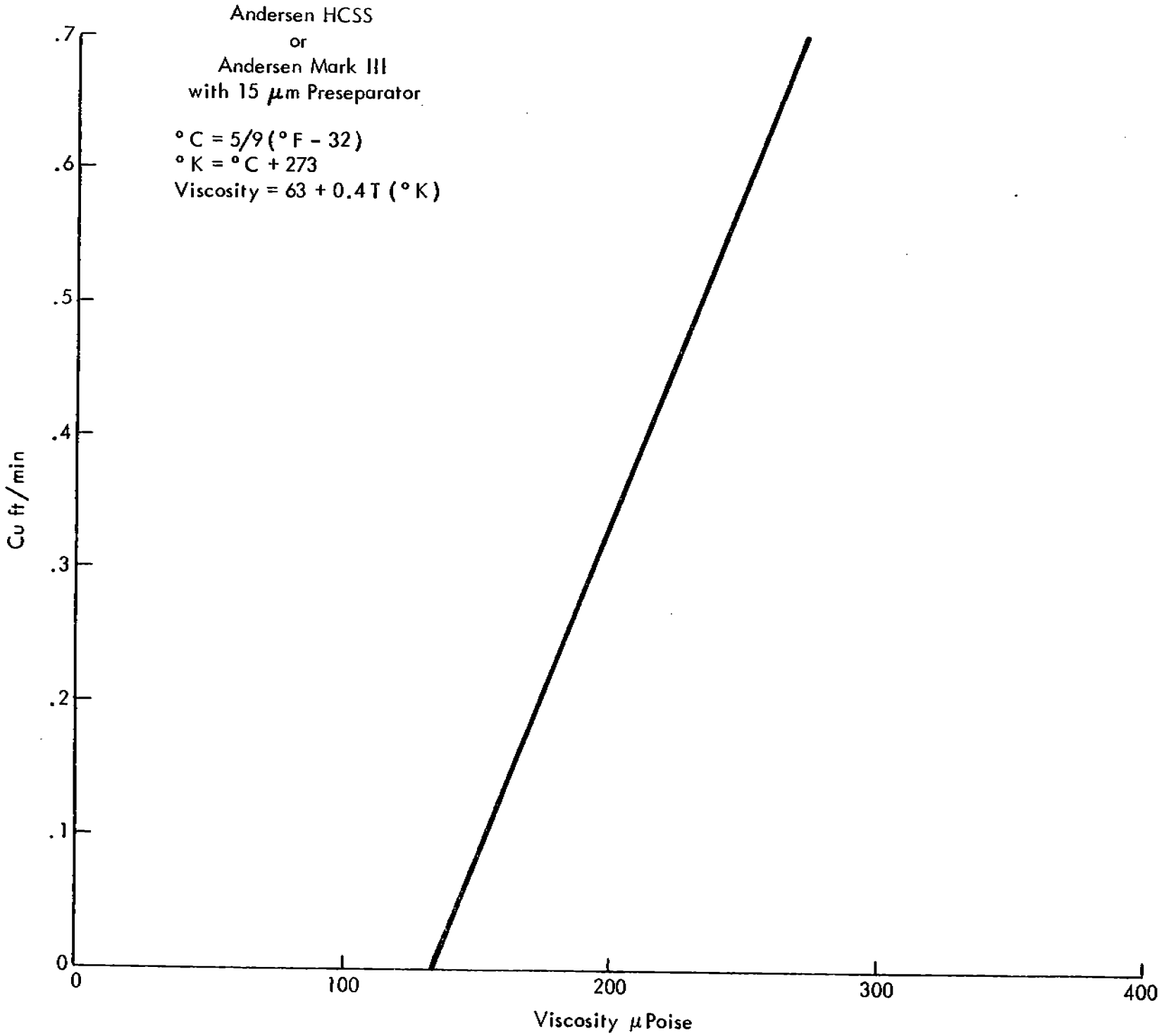
   $$24\sqrt{\frac{Fs/VS}{\pi}}$$

8. Calculated meter flow rate, ft^3/min (F_m)

   $$Fm = Fs\left(\frac{Tm + 460}{Ts + 460}\right)\left(\frac{Ps}{Pb}\right)\ (Mf)$$

9. Percent isokinetic

   $$\% I = \frac{1{,}039(Ts_{avg} + 460)(Vm_{std})}{Vs(\theta)(Ps)(Mf)(Dn^2)}$$


Andersen HCSS
or
Andersen Mark III
with 15 μm Preseparator
° C = 5/9 (° F - 32)
° K = ° C + 273
Viscosity = 63 + 0.4 T (° K)
.7
.6
.5
.4
.3
.2
.1
0
Cu ft/min
0
100
200
300
400
Viscosity μ Poise

Andersen D_{50} Calculations

Below is the formula for calculating the cutpoint on a Mark III sampler at various temperatures and pressures:

Plate No.	No. of Holes	Hole Diameter (cm)
0	264	0.1613
1	264	0.1181
2	264	0.0914
3	264	0.0711
4	264	0.0533
5	264	0.0343
6	264	0.0254
7	156	0.0254

$$D_{p50} = \sqrt{\frac{18\mu\,\psi N\pi\,D_c^{3}}{4\,C\,\rho\,Q}}$$

Where:

D_{p50} = 50% effective cutoff diameter of particle, cm

μ = gas viscosity, poise = $63 + 0.40\ T\ (^{o}K)\ 10^{-6}$

ψ = dimensionless inertial impaction parameter, 0.14

N = number of jets per plate

D_c = jet diameter, cm

C = Cunningham slip correction factor

$$= 1 + \left(\frac{2\lambda}{D_p}\right)\left[1.257 + 0.40e^{\left(-1.10\,\frac{D_p}{\lambda}\right)}\right] = \left(1 + \frac{2\lambda}{D_p}\,(1.257)\right)$$

ρ = particle density, 1 gm/cm^3

Q = actual gas flow rate, cm^3/sec

λ = mean free path length for gas molecules

$$\lambda = \frac{\mu\,(82.057)\,T\,(^oK)}{0.499\,P\,M\sqrt{\frac{8\,R\,T\,(^oK)}{\pi\,M}}}$$

Where:

P = Pressure = 1 ATM

M = Molecular weight of gas = 28.9 for air

R = 8.31×10^7

μ = Gas viscosity = $63 + 0.40\,T\,(^oK)\,10^{-6}$

T = Temperature in ^oK

To solve the equation for D_{p50}, you must first compute μ, then substitute μ into the equation for λ, and then substitute λ into the equation for C. Since C is dependent upon D_{p50}, several iterations are normally required to solve for the proper C to use in the equation for D_{p50}.

A sample calculation of the cutpoint of stage 4 at 300°F and a flow rate of 0.6 CFM follows:

1. $\mu = (63 + 0.40\,T) \times 10^{-6} = [63 + (0.4)\,(421)] \times 10^{-6}$

$= 2.31 \times 10^{-4}$ poise

2. $\lambda = \dfrac{\mu\ (82.057)\ T}{0.499\ PM\ \sqrt{\dfrac{8RT}{\pi\ M}}} = 996.29 \times 10^{-8}$

3. $C = 1 + \dfrac{2\lambda}{D_{p50}}\ (1.257) = 1 + \dfrac{.250 \times 10^{-4}}{D_{p50}}$

4. $D_{p50} = \sqrt{\dfrac{18\ \mu\ \Psi\ N\ \pi\ D_c^3}{4\ C\ \rho\ Q}}$

$$D_{p50} = \sqrt{\frac{(18)\ (2.31 \times 10^{-4})\ (0.14)\ (264)\ (3.14)\ (.0533)^3}{(4)\ \left(1 + \dfrac{.250 \times 10^{-4}}{D_{p50}}\right)\ (1)\ (283)}}$$

$$D_{p50} = \sqrt{\frac{6.454 \times 10^{-8}}{1 + \dfrac{.250 \times 10^{-4}}{D_{p50}}}}$$

Substituting D_{p50} = 2.5 micrometers into the right hand side of the equation, we get:

$$D_{p50} = \sqrt{5.867 \times 10^{-8}} = 2.43 \text{ micrometers}$$

APPENDIX E

COMPUTER PRINTOUTS FOR TOTAL MASS

		Page
E-1	Inlet to No. 5 Kiln 10-Cell Baghouse - EPA Method 5. . . .	E-3
E-2	Common Outlet Stack from No. 5 Kiln 10-Cell and 3-Cell Baghouses - EPA Method 17.	E-29

E-1 Inlet to No. 5 Kiln 10-Cell
Baghouse - EPA Method 5

TABLE E-1. SUMMARY OF TOTAL MASS TEST RESULTS FOR THE INLET TO THE NO. 5 KILN 10-CELL BAGHOUSE

Run No.	Date	V_m (ft^3)[a]	Avg. Δp (in. H_2O)[b]	Avg. ΔH (in. H_2O)[c]	Avg. T_s (°F)[d]	Avg. T_m (°F)[e]	P_b (in. Hg)[f]	$V_{m_{std}}$ (ft^3)[g]	% H_2O[h]	M_d[i]	M_s[j]	Q_s (dscfm)[k]	% Isok.[ℓ]	Total sample time (min)	Total part. col. (g)	Emission rate (gr/dscf)[m]	Emission rate (lb/hr)[n]
I-1-1	11/14/81	4.291	2.33	1.75	538.5	63.8	29.02	4.213	2.61	31.720	31.361	50,581	102.6	6.0	4.0415	14.7729	6,403.73
I-2-1	11/12/81	3.887	2.60	1.90	509.0	69.8	29.11	3.786	8.53	31.746	30.573	51,724	90.1	6.0	4.8435	19.7002	8,732.63
I-3-1	11/13/81	6.068	2.42	1.53	542.3	66.2	29.02	5.926	8.17	31.670	30.553	49,174	98.9	9.0	6.9022	17.9357	7,558.54
I-4-1	11/13/81	5.558	2.18	1.35	528.7	69.0	29.11	5.414	6.43	31.670	30.791	47,820	92.9	9.0	5.8856	16.7417	6,861.09
I-1-2	11/14/81	4.192	2.33	1.78	552.0	67.8	28.94	4.073	7.09	31.720	30.747	48,349	103.7	6.0	4.4626	16.8726	6,991.20
I-2-2	11/16/81	4.285	2.43	1.83	552.0	60.8	28.89	4.213	6.09	31.867	31.022	49,646	104.5	6.0	4.8814	17.8451	7,592.43
I-3-2	11/16/81	4.360	2.55	1.98	558.0	67.0	28.93	4.243	10.08	31.867	30.469	49,075	106.5	6.0	4.1312	14.9940	6,306.06
I-4-2	11/16/81	4.008	2.13	1.53	551.0	68.5	28.88	3.879	6.47	31.867	30.969	46,338	103.1	6.0	4.1536	16.4908	6,548.84

[a] V_m (ft^3) = volume of dry gas at the meter.

[b] Avg. Δp (in. H_2O) = average stack gas velocity.

[c] Avg. ΔH (in. H_2O) = average pressure drop across the meter.

[d] Avg. T_s (°F) = average stack temperature.

[e] Avg. T_m (°F) = average meter temperature.

[f] P_b (in. Hg) = barometric pressure (in. of mercury).

[g] $V_{m_{std}}$ (ft^3) = volume of dry gas at the meter at standard conditions.

[h] % H_2O = percent moisture by volume.

[i] M_d = molecular weight, dry stack gas (lb/lb mole).

[j] M_s = molecular weight, stack gas (lb/lb mole).

[k] Q_s = stack flow rate, dry standard conditions (dry standard cubic feet per minute).

[ℓ] % Isok. = percent isokinetic.

[m] gr/dscf = grains per dry standard cubic foot.

[n] lb/hr = particulate emission rate, pounds per hour.

FILE NAME - I11
RUN # - I-1-1
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	944.201
FINAL METER VOLUME (CUBIC FEET)=	948.598
METER FACTOR= .976	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	4.291
GAS VOLUME (DRY STANDARD CUBIC FEET)=	4.213
BAROMETRIC PRESSURE (IN. HG)=	29.02
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	9.67
PERCENT CARBON DIOXIDE=	20.83
MOISTURE COLLECTED (ML)=	2.4
PERCENT WATER=	2.61
AVERAGE METER TEMPERATURE (F.)=	63.8
AVERAGE DELTA H (IN. H20)=	1.75
AVERAGE DELTA P (IN. H20)=	2.33
AVERAGE STACK TEMPERATURE (F.)=	538.5
DRY MOLECULAR WEIGHT=	31.720
WET MOLECULAR WEIGHT=	31.361
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.5246
% ISOKINETIC=	102.6
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	6,799
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	98,886
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	51,938
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	50,581

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.0415
PARTICULATE LOADING, DRY STD. (GR./SCF)=	14.7729
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	7.5535
EMISSION RATE (LB/HR)=	6403.73

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.0415
PARTICULATE LOADING, DRY STD. (GR./SCF)=	14.7729
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	7.5535
EMISSION RATE (LB/HR)=	6403.73
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I11
RUN # - I-1-1
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	26.736
FINAL METER VOLUME (CUBIC METERS)=	26.861
METER FACTOR= .976	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.122
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.119
BAROMETRIC PRESSURE (MM HG)=	737.11
STATIC PRESSURE (MM H2O)=	241.3
PERCENT OXYGEN=	9.67
PERCENT CARBON DIOXIDE=	20.83
MOISTURE COLLECTED (ML)=	2.4
PERCENT WATER=	2.61
AVERAGE METER TEMPERATURE (C.)=	17.6
AVERAGE DELTA H (MM H2O)=	44.5
AVERAGE DELTA P (MM H2O)=	59.1
AVERAGE STACK TEMPERATURE (C.)=	281.4
DRY MOLECULAR WEIGHT=	31.720
WET MOLECULAR WEIGHT=	31.361
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	7.6837
% ISOKINETIC=	102.6
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351
STACK VELOCITY (ACTUAL, M/MIN)=	2,072
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,800
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,471
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,432

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.0415
PARTICULATE LOADING, DRY STD. (G/CU. M)=	33.8777
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	17.3218
EMISSION RATE (KG/HR)=	2907.29

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.0415
PARTICULATE LOADING, DRY STD. (G/CU. M)=	33.8777
PARTICULATE LOADING, ACTUAL (G/CU. M)=	17.3218
EMISSION RATE (KG/HR)=	2907.29
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I11
RUN # - I-1-1
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.25	1.75	535	63	62
2	2.40	1.75	542	68	62

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	98.4360	97.6598	0.0000	0.7762
FILTER	5.0337	3.7132	0.0002	1.3203

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	110.2440	108.2980	200.0	1.9450
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - T21
RUN # - T-2-1
LOCATION - MONARCH CEMENT
DATE - 11-12-91
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	955,300
FINAL METER VOLUME (CUBIC FEET)=	959,020
METER FACTOR= 1.045	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	3.887
GAS VOLUME (DRY STANDARD CUBIC FEET)=	3.786
BAROMETRIC PRESSURE (IN. HG)=	29.11
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	12.33
PERCENT CARBON DIOXIDE=	20.33
MOISTURE COLLECTED (ML)=	7.5
PERCENT WATER=	3.53
AVERAGE METER TEMPERATURE (F.)=	69.8
AVERAGE DELTA H (IN. H20)=	1.90
AVERAGE DELTA P (IN. H20)=	2.60
AVERAGE STACK TEMPERATURE (F.)=	509.0
DRY MOLECULAR WEIGHT=	31.746
WET MOLECULAR WEIGHT=	30.573
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.6122
% ISOKINETIC=	90.1
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	7,162
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	104,170
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	56,550
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	51,724

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.8435
PARTICULATE LOADING, DRY STD. (GR./SCF)=	19.7002
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	9.7789
EMISSION RATE (LB/HR)=	8732.63

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.8435
PARTICULATE LOADING, DRY STD. (GR./SCF)=	19.7002
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	9.7780
EMISSION RATE (LB/HR)=	8732.63
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I21
RUN # - I-2-1
LOCATION - MONARCH CEMENT
DATE - 11-12-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	27,050
FINAL METER VOLUME (CUBIC METERS)=	27,156
METER FACTOR= 1,045	
FINAL LEAK RATE (CU M/MIN)=	0,0000
NET METER VOLUME (CUBIC METERS)=	0,110
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0,107
BAROMETRIC PRESSURE (MM HG)=	739,39
STATIC PRESSURE (MM H2O)=	241,3
PERCENT OXYGEN=	12,33
PERCENT CARBON DIOXIDE=	20,33
MOISTURE COLLECTED (ML)=	7,5
PERCENT WATER=	6,53
AVERAGE METER TEMPERATURE (C,)=	21,0
AVERAGE DELTA H (MM H2O)=	48,3
AVERAGE DELTA P (MM H2O)=	66,0
AVERAGE STACK TEMPERATURE (C,)=	265,0
DRY MOLECULAR WEIGHT=	31,746
WET MOLECULAR WEIGHT=	30,573
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	8,1250
% ISOKINETIC=	°0,1
PITOT COEFFICIENT=	0,8400
SAMPLING TIME (MINUTES)=	6,0
NOZZLE DIAMETER (MM)=	4,83
STACK AXIS #1 (METERS)=	1,499
STACK AXIS #2 (METERS)=	0,902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1,351
STACK VELOCITY (ACTUAL, M/MIN)=	2,183
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,950
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,601
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,465

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4,8435
PARTICULATE LOADING, DRY STD, (G/CU, M)=	45,1772
PARTICULATE LOADING, ACTUAL (G/CU, M,)=	22,4231
EMISSION RATE (KG/HR)=	3964,61

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4,8435
PARTICULATE LOADING, DRY STD, (G/CU, M)=	45,1772
PARTICULATE LOADING, ACTUAL (G/CU, M)=	22,4231
EMISSION RATE (KG/HR)=	3964,61
PERCENT IMPINGER CATCH=	0,0

FILE NAME - I21
RUN # - I-2-1
LOCATION - MONARCH CEMENT
DATE - 11-12-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.50	1.80	510	70	68
2	2.70	2.00	500	74	67

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	101.9490	100.8120	0.0000	1.1370
FILTER	5.5222	3.7374	0.0003	1.7845

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	101.1030	99.2601	175.0	1.9220
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I31
RUN # - I-3-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	923.643
FINAL METER VOLUME (CUBIC FEET)=	929.860
METER FACTOR= .976	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	6.068
GAS VOLUME (DRY STANDARD CUBIC FEET)=	5.926
BAROMETRIC PRESSURE (IN. HG)=	29.02
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	7.8
PERCENT CARBON DIOXIDE=	21.0
MOISTURE COLLECTED (ML)=	11.2
PERCENT WATER=	8.2
AVERAGE METER TEMPERATURE (F.)=	66
AVERAGE DELTA H (IN. H20)=	1.53
AVERAGE DELTA P (IN. H20)=	2.42
AVERAGE STACK TEMPERATURE (F.)=	542
DRY MOLECULAR WEIGHT=	31.67
WET MOLECULAR WEIGHT=	30.55
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.5545
% ISOKINETIC=	98.9
PITOT COEFFICIENT=	0.84
SAMPLING TIME (MINUTES)=	9.0
NOZZLE DIAMETER (INCHES)=	0.190
STACK AXIS #1 (INCHES)=	59.0
STACK AXIS #2 (INCHES)=	35.5
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.55
STACK VELOCITY (ACTUAL, FEET/MIN)=	7,037
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	102,349
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	53,551
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	49,174

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	6.9022
PARTICULATE LOADING, DRY STD. (GR./SCF)=	17.9357
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.6139
EMISSION RATE (LB/HR)=	7558.54

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	6.9022
PARTICULATE LOADING, DRY STD. (GR./SCF)=	17.9357
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.6139
EMISSION RATE (LB/HR)=	7558.54
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I31
RUN # - I-3-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	26.154
FINAL METER VOLUME (CUBIC METERS)=	26.330
METER FACTOR= .976	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.172
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.168
BAROMETRIC PRESSURE (MM HG)=	737
STATIC PRESSURE (MM H2O)=	241
PERCENT OXYGEN=	7.8
PERCENT CARBON DIOXIDE=	21.0
MOISTURE COLLECTED (ML)=	11.2
PERCENT WATER=	8.2
AVERAGE METER TEMPERATURE (C.)=	19
AVERAGE DELTA H (MM H2O)=	38.9
AVERAGE DELTA P (MM H2O)=	61.4
AVERAGE STACK TEMPERATURE (C.)=	284
DRY MOLECULAR WEIGHT=	31.67
WET MOLECULAR WEIGHT=	30.55
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	7.8347
% ISOKINETIC=	98.9
PITOT COEFFICIENT=	0.84
SAMPLING TIME (MINUTES)=	9.0
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351
STACK VELOCITY (ACTUAL, M/MIN)=	2,145
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,898
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,516
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,392

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	6.9022
PARTICULATE LOADING, DRY STD. (G/CU. M)=	41.1306
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	19.7536
EMISSION RATE (KG/HR)=	3431.58

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	6.9022
PARTICULATE LOADING, DRY STD. (G/CU. M)=	41.1306
PARTICULATE LOADING, ACTUAL (G/CU. M)=	19.7536
EMISSION RATE (KG/HR)=	3431.58
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I31
RUN # - I-3-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.40	1.60	548	64	65
2	2.40	1.55	539	68	65
3	2.45	1.45	540	70	65

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	115.3830	112.1510	0.0000	3.2320
FILTER	6.2916	3.6694	0.0003	2.6219

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	102.2870	101.2380	140.0	1.0483
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I41
RUN # - I-4-1
LOCATION - MONARCH CEMENT
DATE - 11-13-91
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	904.000
FINAL METER VOLUME (CUBIC FEET)=	909.695
METER FACTOR= .976	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	5.558
GAS VOLUME (DRY STANDARD CUBIC FEET)=	5.414
BAROMETRIC PRESSURE (IN. HG)=	29.11
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	7.75
PERCENT CARBON DIOXIDE=	21.00
MOISTURE COLLECTED (ML)=	7.9
PERCENT WATER=	6.43
AVERAGE METER TEMPERATURE (F.)=	69.0
AVERAGE DELTA H (IN. H20)=	1.35
AVERAGE DELTA P (IN. H20)=	2.18
AVERAGE STACK TEMPERATURE (F.)=	528.7
DRY MOLECULAR WEIGHT=	31.670
WET MOLECULAR WEIGHT=	30.791
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.4769
% ISOKINETIC=	92.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	9.0
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	6.604
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	96.054
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	51.107
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	47.820

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	5.8856
PARTICULATE LOADING, DRY STD. (GR./SCF)=	16.7417
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.3315
EMISSION RATE (LB/HR)=	6861.09

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	5.8856
PARTICULATE LOADING, DRY STD. (GR./SCF)=	16.7417
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.3315
EMISSION RATE (LB/HR)=	6861.09
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I41
RUN # - I-4-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	25.598
FINAL METER VOLUME (CUBIC METERS)=	25.759
METER FACTOR= .976	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.157
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.153
BAROMETRIC PRESSURE (MM HG)=	739.39
STATIC PRESSURE (MM H2O)=	241.2
PERCENT OXYGEN=	7.75
PERCENT CARBON DIOXIDE=	21.00
MOISTURE COLLECTED (ML)=	7.9
PERCENT WATER=	6.43
AVERAGE METER TEMPERATURE (C.)=	20.6
AVERAGE DELTA H (MM H2O)=	34.3
AVERAGE DELTA P (MM H2O)=	55.5
AVERAGE STACK TEMPERATURE (C.)=	275.9
DRY MOLECULAR WEIGHT=	31.670
WET MOLECULAR WEIGHT=	30.791
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	7.4495
% ISOKINETIC=	92.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	9.0
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351
STACK VELOCITY (ACTUAL, M/MIN)=	2,013
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,720
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,447
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,354

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	5.8856
PARTICULATE LOADING, DRY STD. (G/CU. M)=	38.3926
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	19.1060
EMISSION RATE (KG/HR)=	3114.93

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGER

PARTICULATE WEIGHT (G)=	5.9056
PARTICULATE LOADING, DRY STD. (G/CU. M)=	38.5226
PARTICULATE LOADING, ACTUAL (G/CU. M)=	19.1960
EMISSION RATE (KG/HR)=	3114.93
PERCENT IMPINGER CATCH=	0.4

FILE NAME - I41
RUN # - I-4-1
LOCATION - MONARCH CEMENT
DATE - 11-12-91
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.00	1.25	531	66	66
2	2.30	1.40	531	73	66
3	2.25	1.40	524	76	67

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	101.7430	99.8761	0.0000	1.8669
FILTER	5.8765	3.6789	0.0003	2.1973

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	101.3990	99.5769	150.0	1.8214
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I12
RUN # - I-1-2
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	959.772
FINAL METER VOLUME (CUBIC FEET)=	964.067
METER FACTOR= .976	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	4.192
GAS VOLUME (DRY STANDARD CUBIC FEET)=	4.073
BAROMETRIC PRESSURE (IN. HG)=	28.94
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	9.67
PERCENT CARBON DIOXIDE=	20.83
MOISTURE COLLECTED (ML)=	6.6
PERCENT WATER=	7.09
AVERAGE METER TEMPERATURE (F.)=	67.8
AVERAGE DELTA H (IN. H20)=	1.78
AVERAGE DELTA P (IN. H20)=	2.33
AVERAGE STACK TEMPERATURE (F.)=	552.0
DRY MOLECULAR WEIGHT=	31.720
WET MOLECULAR WEIGHT=	30.747
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.5248
% ISOKINETIC=	103.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	6,922
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	100,689
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	52,039
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	48,349

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.4626
PARTICULATE LOADING, DRY STD. (GR./SCF)=	16.8726
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.0987
EMISSION RATE (LB/HR)=	6991.20

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.4626
PARTICULATE LOADING, DRY STD. (GR./SCF)=	16.8726
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.0987
EMISSION RATE (LB/HR)=	6991.20
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I12
RUN # - I-1-2
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	27.177
FINAL METER VOLUME (CUBIC METERS)=	27.299
METER FACTOR= .976	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.119
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.115
BAROMETRIC PRESSURE (MM HG)=	735.08
STATIC PRESSURE (MM H2O)=	241.3
PERCENT OXYGEN=	9.67
PERCENT CARBON DIOXIDE=	20.83
MOISTURE COLLECTED (ML)=	6.6
PERCENT WATER=	7.09
AVERAGE METER TEMPERATURE (C.)=	19.9
AVERAGE DELTA H (MM H2O)=	45.1
AVERAGE DELTA P (MM H2O)=	59.1
AVERAGE STACK TEMPERATURE (C.)=	288.9
DRY MOLECULAR WEIGHT=	31.720
WET MOLECULAR WEIGHT=	30.747
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	7.6846
% ISOKINETIC=	103.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351
STACK VELOCITY (ACTUAL, M/MIN)=	2,110
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,851
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,474
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,369

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.4626
PARTICULATE LOADING, DRY STD. (G/CU. M)=	38.6928
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	18.5722
EMISSION RATE (KG/HR)=	3174.00

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.4626
PARTICULATE LOADING, DRY STD. (G/CU. M)=	38.6928
PARTICULATE LOADING, ACTUAL (G/CU. M)=	18.5722
EMISSION RATE (KG/HR)=	3174.00
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I12
RUN # - I-1-2
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.30	1.75	550	67	67
2	2.35	1.80	554	70	67

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	98.7851	97.8744	0.0000	0.9107
FILTER	4.9074	3.6656	0.0002	1.2416

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	80.1552	77.8440	175.0	2.3103
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I22
RUN # - I-2-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	21.530
FINAL METER VOLUME (CUBIC FEET)=	25.920
METER FACTOR= .976	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	4.285
GAS VOLUME (DRY STANDARD CUBIC FEET)=	4.213
BAROMETRIC PRESSURE (IN. HG)=	28.89
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	10.67
PERCENT CARBON DIOXIDE=	21.50
MOISTURE COLLECTED (ML)=	5.8
PERCENT WATER=	6.09
AVERAGE METER TEMPERATURE (F.)=	60.8
AVERAGE DELTA H (IN. H20)=	1.83
AVERAGE DELTA P (IN. H20)=	2.43
AVERAGE STACK TEMPERATURE (F.)=	552.0
DRY MOLECULAR WEIGHT=	31.867
WET MOLECULAR WEIGHT=	31.022
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.5572
% ISOKINETIC=	104.5
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	7,044
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	102,460
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	52,865
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	49,646

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.8814
PARTICULATE LOADING, DRY STD. (GR./SCF)=	17.8451
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.6431
EMISSION RATE (LB/HR)=	7592.42

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.8814
PARTICULATE LOADING, DRY STD. (GR./SCF)=	17.8451
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.6431
EMISSION RATE (LB/HR)=	7592.42
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I22
RUN # - 1-2-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	0.610
FINAL METER VOLUME (CUBIC METERS)=	0.734
METER FACTOR= .976	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.121
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.119
BAROMETRIC PRESSURE (MM HG)=	733.81
STATIC PRESSURE (MM H20)=	241.3
PERCENT OXYGEN=	10.67
PERCENT CARBON DIOXIDE=	21.50
MOISTURE COLLECTED (ML)=	5.8
PERCENT WATER=	6.09
AVERAGE METER TEMPERATURE (C.)=	16.0
AVERAGE DELTA H (MM H20)=	46.4
AVERAGE DELTA P (MM H20)=	61.6
AVERAGE STACK TEMPERATURE (C.)=	288.9
DRY MOLECULAR WEIGHT=	31.867
WET MOLECULAR WEIGHT=	31.022
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	7.8481
% ISOKINETIC=	104.5
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351
STACK VELOCITY (ACTUAL, M/MIN)=	2.147
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2.901
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1.497
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1.406

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.8814
PARTICULATE LOADING, DRY STD. (G/CU. M)=	40.9228
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	19.8207
EMISSION RATE (KG/HR)=	3446.96

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.8814
PARTICULATE LOADING, DRY STD. (G/CU. M)=	40.9228
PARTICULATE LOADING, ACTUAL (G/CU. M)=	19.8207
EMISSION RATE (KG/HR)=	3446.96
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I22
RUN # - I-2-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.40	1.80	551	58	60
2	2.45	1.85	553	65	60

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	87.6480	86.8202	0.0000	0.8278
FILTER	5.2192	3.7194	0.1000	1.3998

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	213.4040	210.7480	400.0	2.6538
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I32
RUN # - I-3-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	981.868
FINAL METER VOLUME (CUBIC FEET)=	986.335
METER FACTOR= .976	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	4.360
GAS VOLUME (DRY STANDARD CUBIC FEET)=	4.243
BAROMETRIC PRESSURE (IN. HG)=	28.93
STATIC PRESSURE (INCHES H2O)=	9.50
PERCENT OXYGEN=	10.67
PERCENT CARBON DIOXIDE=	21.50
MOISTURE COLLECTED (ML)=	10.1
PERCENT WATER=	10.08
AVERAGE METER TEMPERATURE (F.)=	67.0
AVERAGE DELTA H (IN. H2O)=	1.98
AVERAGE DELTA P (IN. H2O)=	2.55
AVERAGE STACK TEMPERATURE (F.)=	558.0
DRY MOLECULAR WEIGHT=	31.867
WET MOLECULAR WEIGHT=	30.469
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	1.5969
% ISOKINETIC=	106.5
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	7,306
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	106,261
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	54,577
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	49,075

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.1312
PARTICULATE LOADING, DRY STD. (GR./SCF)=	14.9940
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	6.9220
EMISSION RATE (LB/HR)=	6306.06

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.1312
PARTICULATE LOADING, DRY STD. (GR./SCF)=	14.9940
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	6.9220
EMISSION RATE (LB/HR)=	6306.06
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I32
RUN # - I-3-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	27.803
FINAL METER VOLUME (CUBIC METERS)=	27.929
METER FACTOR= .976	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.123
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.120
BAROMETRIC PRESSURE (MM HG)=	734.82
STATIC PRESSURE (MM H2O)=	241.3
PERCENT OXYGEN=	10.67
PERCENT CARBON DIOXIDE=	21.50
MOISTURE COLLECTED (ML)=	10.1
PERCENT WATER=	10.08
AVERAGE METER TEMPERATURE (C.)=	19.4
AVERAGE DELTA H (MM H2O)=	50.2
AVERAGE DELTA P (MM H2O)=	64.8
AVERAGE STACK TEMPERATURE (C.)=	292.2
DRY MOLECULAR WEIGHT=	31.867
WET MOLECULAR WEIGHT=	30.469
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	8.0480
% ISOKINETIC=	106.5
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351
STACK VELOCITY (ACTUAL, M/MIN)=	2,227
FLOW RATE (ACTUAL, CUBIC M/MIN)=	3,009
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,545
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,390

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.1312
PARTICULATE LOADING, DRY STD. (G/CU. M)=	34.3848
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	15.8737
EMISSION RATE (KG/HR)=	2862.95

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.1312
PARTICULATE LOADING, DRY STD. (G/CU. M)=	34.3848
PARTICULATE LOADING, ACTUAL (G/CU. M)=	15.8737
EMISSION RATE (KG/HR)=	2862.95
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I32
RUN # - I-3-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.55	1.95	564	66	66
2	2.55	2.00	552	70	66

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	99.7367	98.8166	0.0000	0.9201
FILTER	5.1959	3.6716	0.0001	1.5242

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	113.1780	111.4900	225.0	1.6869
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I42
RUN # - I-4-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	1.913
FINAL METER VOLUME (CUBIC FEET)=	6.020
METER FACTOR= .976	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	4.008
GAS VOLUME (DRY STANDARD CUBIC FEET)=	3.879
BAROMETRIC PRESSURE (IN. HG)=	28.88
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	10.67
PERCENT CARBON DIOXIDE=	21.50
MOISTURE COLLECTED (ML)=	5.7
PERCENT WATER=	6.47
AVERAGE METER TEMPERATURE (F.)=	68.5
AVERAGE DELTA H (IN. H20)=	1.53
AVERAGE DELTA P (IN. H20)=	2.13
AVERAGE STACK TEMPERATURE (F.)=	551.0
DRY MOLECULAR WEIGHT=	31.867
WET MOLECULAR WEIGHT=	30.969
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.4577
% ISOKINETIC=	103.1
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	6,598
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	95,964
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	49,546
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	46,338

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.1536
PARTICULATE LOADING, DRY STD. (GR./SCF)=	16.4908
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	7.9598
EMISSION RATE (LB/HR)=	6548.84

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.1536
PARTICULATE LOADING, DRY STD. (GR./SCF)=	16.4908
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	7.9598
EMISSION RATE (LB/HR)=	6548.84
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I42
RUN # - I-4-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	0.054
FINAL METER VOLUME (CUBIC METERS)=	0.170
METER FACTOR= .976	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.114
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.110
BAROMETRIC PRESSURE (MM HG)=	733.55
STATIC PRESSURE (MM H2O)=	241.3
PERCENT OXYGEN=	10.67
PERCENT CARBON DIOXIDE=	21.50
MOISTURE COLLECTED (ML)=	5.7
PERCENT WATER=	6.47
AVERAGE METER TEMPERATURE (C.)=	20.3
AVERAGE DELTA H (MM H2O)=	38.7
AVERAGE DELTA P (MM H2O)=	54.0
AVERAGE STACK TEMPERATURE (C.)=	288.3
DRY MOLECULAR WEIGHT=	31.867
WET MOLECULAR WEIGHT=	30.969
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	7.3466
% ISOKINETIC=	103.1
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	6.0
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351
STACK VELOCITY (ACTUAL, M/MIN)=	2,011
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,717
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,403
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,312

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.1536
PARTICULATE LOADING, DRY STD. (G/CU. M)=	37.8172
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	18.2536
EMISSION RATE (KG/HR)=	2973.17

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.1536
PARTICULATE LOADING, DRY STD. (G/CU. M)=	37.8172
PARTICULATE LOADING, ACTUAL (G/CU. M)=	18.2536
EMISSION RATE (KG/HR)=	2973.17
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I42
RUN # - I-4-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	2.15	1.55	551	68	67
2	2.10	1.50	551	71	68

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	92.3659	91.4846	0.0000	0.8813
FILTER	5.1291	3.6987	0.0001	1.4303

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	92.8654	91.0226	150.0	1.8421
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

E-2 Common Outlet Stack from No. 5 Kiln 10-Cell and 3-Cell Baghouses - EPA Method 17

TABLE E-2. SUMMARY OF TOTAL MASS TEST RESULTS FOR THE COMMON OUTLET STACK FROM NO. 5 KILN 10- AND 3-CELL BAGHOUSES

Run No.	Date	V_m (ft^3)[a]	Avg. Δp (in. H_2O)[b]	Avg. ΔH (in. H_2O)[c]	Avg. T_s (°F)[d]	Avg. T_m (°F)[e]	P_b (in Hg)[f]	$V_{m_{std}}$ (ft^3)[g]	% H_2O[h]	M_d[i]	M_s[j]	Q_s (dscfm)[k]	% Isok.[l]	Total sample time (min)	Total part. col. (g)	Emission rate (gr/dscf)[m]	Emission rate (lb/hr)[n]
0-1-1	11/12/81	36.442	0.42	1.95	410.6	81.6	29.03	34.627	5.00	31.020	30.369	57,388	88.3	50.0	0.1196	0.0532	26.16
0-2-1	11/13/81	15.385	0.41	1.95	409.5	66.0	29.02	15.047	5.11	31.540	30.848	56,015	98.3	20.0	0.0508	0.0520	24.96
0-3-1	11/13/81	24.829	0.45	2.63	405.7	71.7	28.92	23.984	4.70	31.540	30.904	59,505	98.3	30.0	0.0786	0.0504	25.73
0-4-1	11/14/81	33.078	0.45	2.20	414.5	68.8	28.92	32.093	4.20	31.568	30.998	59,200	99.2	40.0	0.1038	0.0498	25.26
0-1-2	11/14/81	29.431	0.41	2.48	405.8	70.3	28.78	28.357	6.00	31.568	30.755	55,812	92.9	40.0	0.1048	0.0569	27.22
0-2-2	11/16/81	31.565	0.40	2.00	412.3	85.5	28.82	29.568	4.20	31.200	30.646	56,115	96.4	40.0	0.1214	0.0632	30.41
0-3-2	11/16/81	22.713	0.43	2.43	413.7	81.5	28.79	21.434	5.42	31.200	30.484	57,287	91.3	30.0	0.1172	0.0842	41.34
0-4-2	11/16/81	24.532	0.43	2.13	412.3	82.8	28.80	23.084	4.43	31.200	30.616	58,266	96.6	30.0	0.1182	0.0789	39.37

[a] V_m (ft^3) = volume of dry gas at the meter.

[b] Avg. Δp (in. H_2O) = average stack gas velocity.

[c] Avg. ΔH (in. H_2O) = average pressure drop across the meter.

[d] Avg. T_s (°F) = average stack temperature.

[e] Avg. T_m (°F) = average meter temperature.

[f] P_b (in. Hg) = barometric pressure (in. of mercury).

[g] $V_{m_{std}}$ (ft^3) = volume of dry gas at the meter at standard conditions.

[h] % H_2O = percent moisture by volume.

[i] M_d = molecular weight, dry stack gas (lb/lb mole).

[j] M_s = molecular weight, stack gas (lb/lb mole).

[k] Q_s = stack flow rate, dry standard conditions (dry standard cubic feet per minute).

[l] % Isok. = percent isokinetic.

[m] gr/dscf = grains per dry standard cubic foot.

[n] lb/hr = particulate emission rate, pounds per hour.

FILE NAME - 011
RUN # - 0-1-1
LOCATION - MONARCH CEMENT
DATE - 11-12-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	983.798
FINAL METER VOLUME (CUBIC FEET)=	1020.460
METER FACTOR= .994	
FINAL LEAK RATE (CU FT/MIN)=	0.005
NET METER VOLUME (CUBIC FEET)=	36.442
GAS VOLUME (DRY STANDARD CUBIC FEET)=	34.627
BAROMETRIC PRESSURE (IN. HG)=	29.03
STATIC PRESSURE (INCHES H20)=	-0.50
PERCENT OXYGEN=	10.30
PERCENT CARBON DIOXIDE=	16.30
MOISTURE COLLECTED (ML)=	38.7
PERCENT WATER=	5.00
AVERAGE METER TEMPERATURE (F.)=	81.6
AVERAGE DELTA H (IN. H20)=	1.95
AVERAGE DELTA P (IN. H20)=	0.42
AVERAGE STACK TEMPERATURE (F.)=	410.6
DRY MOLECULAR WEIGHT=	31.020
WET MOLECULAR WEIGHT=	30.369
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6464
% ISOKINETIC=	88.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	50.0
NOZZLE DIAMETER (INCHES)=	0.3050
STACK AXIS #1 (INCHES)=	82.50
STACK AXIS #2 (INCHES)=	82.50
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	37.122
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,769
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	102,790
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	60,409
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	57,388

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1196
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0532
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0297
EMISSION RATE (LB/HR)=	26.16

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1196
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0532
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0297
EMISSION RATE (LB/HR)=	26.16
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 011
RUN # - 0-1-1
LOCATION - MONARCH CEMENT
DATE - 11-12-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	27.857
FINAL METER VOLUME (CUBIC METERS)=	28.895
METER FACTOR= .994	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	1.032
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.980
BAROMETRIC PRESSURE (MM HG)=	737.36
STATIC PRESSURE (MM H2O)=	-12.7
PERCENT OXYGEN=	10.30
PERCENT CARBON DIOXIDE=	16.30
MOISTURE COLLECTED (ML)=	38.7
PERCENT WATER=	5.00
AVERAGE METER TEMPERATURE (C.)=	27.6
AVERAGE DELTA H (MM H2O)=	49.5
AVERAGE DELTA P (MM H2O)=	10.6
AVERAGE STACK TEMPERATURE (C.)=	210.3
DRY MOLECULAR WEIGHT=	31.020
WET MOLECULAR WEIGHT=	30.369
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.2575
% ISOKINETIC=	88.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	50.0
NOZZLE DIAMETER (MM)=	7.75
STACK AXIS #1 (METERS)=	2.096
STACK AXIS #2 (METERS)=	2.096
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	3.449
STACK VELOCITY (ACTUAL, M/MIN)=	844
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,911
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,711
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,625

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1196
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1220
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0681
EMISSION RATE (KG/HR)=	11.88

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1196
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1220
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0681
EMISSION RATE (KG/HR)=	11.88
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 011
RUN # - 0-1-1
LOCATION - MONARCH CEMENT
DATE - 11-12-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.41	1.95	411	74	71
2	0.40	1.80	412	83	72
3	0.45	2.10	412	92	75
4	0.40	2.00	408	92	78
5	0.43	1.90	410	98	81

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.7024	1.5894	0.0000	0.1130

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	67.7494	67.7427	20.0	0.0066
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 021
RUN # - 0-2-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	661.000
FINAL METER VOLUME (CUBIC FEET)=	675.392
METER FACTOR= 1.069	
FINAL LEAK RATE (CU FT/MIN)=	0.006
NET METER VOLUME (CUBIC FEET)=	15.385
GAS VOLUME (DRY STANDARD CUBIC FEET)=	15.047
BAROMETRIC PRESSURE (IN. HG)=	29.02
STATIC PRESSURE (INCHES H2O)=	-0.50
PERCENT OXYGEN=	13.30
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	17.2
PERCENT WATER=	5.11
AVERAGE METER TEMPERATURE (F.)=	66.0
AVERAGE DELTA H (IN. H2O)=	1.95
AVERAGE DELTA P (IN. H2O)=	0.41
AVERAGE STACK TEMPERATURE (F.)=	409.5
DRY MOLECULAR WEIGHT=	31.540
WET MOLECULAR WEIGHT=	30.848
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.6363
% ISOKINETIC=	98.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	20.0
NOZZLE DIAMETER (INCHES)=	0.3050
STACK AXIS #1 (INCHES)=	82.50
STACK AXIS #2 (INCHES)=	82.50
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	37.122
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,703
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	100,353
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	59,031
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	56,015

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0508
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0520
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0290
EMISSION RATE (LB/HR)=	24.96

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0508
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0520
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0290
EMISSION RATE (LB/HR)=	24.96
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 021
RUN # - 0-2-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	18.717
FINAL METER VOLUME (CUBIC METERS)=	19.124
METER FACTOR= 1.069	
FINAL LEAK RATE (CU M/MIN)=	0.0002
NET METER VOLUME (CUBIC METERS)=	0.436
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.426
BAROMETRIC PRESSURE (MM HG)=	737.11
STATIC PRESSURE (MM H2O)=	-12.7
PERCENT OXYGEN=	13.30
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	17.2
PERCENT WATER=	5.11
AVERAGE METER TEMPERATURE (C.)=	18.9
AVERAGE DELTA H (MM H2O)=	49.5
AVERAGE DELTA P (MM H2O)=	10.3
AVERAGE STACK TEMPERATURE (C.)=	209.7
DRY MOLECULAR WEIGHT=	31.540
WET MOLECULAR WEIGHT=	30.848
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.2068
% ISOKINETIC=	98.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	20.0
NOZZLE DIAMETER (MM)=	7.75
STACK AXIS #1 (METERS)=	2.096
STACK AXIS #2 (METERS)=	2.096
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	3.449
STACK VELOCITY (ACTUAL, M/MIN)=	824
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,842
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,672
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,586

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0508
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1192
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0665
EMISSION RATE (KG/HR)=	11.33

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0503
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1192
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0665
EMISSION RATE (KG/HR)=	11.33
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 021
RUN # - 0-2-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.39	1.95	409	66	61
2	0.42	1.95	410	75	62

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6250	1.5765	0.0000	0.0485

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.0414	68.0390	20.0	0.0023
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 031
RUN # - 0-3-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	28.600
FINAL METER VOLUME (CUBIC FEET)=	53.579
METER FACTOR= .994	
FINAL LEAK RATE (CU FT/MIN)=	0.009
NET METER VOLUME (CUBIC FEET)=	24.829
GAS VOLUME (DRY STANDARD CUBIC FEET)=	23.984
BAROMETRIC PRESSURE (IN. HG)=	28.92
STATIC PRESSURE (INCHES H20)=	-0.50
PERCENT OXYGEN=	13.30
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	25.1
PERCENT WATER=	4.70
AVERAGE METER TEMPERATURE (F.)=	71.7
AVERAGE DELTA H (IN. H20)=	2.63
AVERAGE DELTA P (IN. H20)=	0.45
AVERAGE STACK TEMPERATURE (F.)=	405.7
DRY MOLECULAR WEIGHT=	31.540
WET MOLECULAR WEIGHT=	30.904
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6733
% ISOKINETIC=	98.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	30.0
NOZZLE DIAMETER (INCHES)=	0.3050
STACK AXIS #1 (INCHES)=	82.50
STACK AXIS #2 (INCHES)=	82.50
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	37.122
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,857
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	106,042
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	62,438
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	59,505

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0786
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0504
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0283
EMISSION RATE (LB/HR)=	25.73

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0786
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0504
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0283
EMISSION RATE (LB/HR)=	25.73
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 031
RUN # - 0-3-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	0.810
FINAL METER VOLUME (CUBIC METERS)=	1.517
METER FACTOR= .994	
FINAL LEAK RATE (CU M/MIN)=	0.0003
NET METER VOLUME (CUBIC METERS)=	0.703
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.679
BAROMETRIC PRESSURE (MM HG)=	734.57
STATIC PRESSURE (MM H2O)=	-12.7
PERCENT OXYGEN=	13.30
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	25.1
PERCENT WATER=	4.70
AVERAGE METER TEMPERATURE (C.)=	22.0
AVERAGE DELTA H (MM H2O)=	66.9
AVERAGE DELTA P (MM H2O)=	11.5
AVERAGE STACK TEMPERATURE (C.)=	207.6
DRY MOLECULAR WEIGHT=	31.540
WET MOLECULAR WEIGHT=	30.904
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.3933
% ISOKINETIC=	98.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	30.0
NOZZLE DIAMETER (MM)=	7.75
STACK AXIS #1 (METERS)=	2.096
STACK AXIS #2 (METERS)=	2.096
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	3.449
STACK VELOCITY (ACTUAL, M/MIN)=	871
FLOW RATE (ACTUAL, CUBIC M/MIN)=	3,003
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,768
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,685

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0786
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1157
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0649
EMISSION RATE (KG/HR)=	11.68

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0786
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1157
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0649
EMISSION RATE (KG/HR)=	11.68
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 031
RUN # - 0-3-1
LOCATION - MONARCH CEMENT
DATE - 11-13-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.46	2.70	408	69	64
2	0.45	2.60	404	80	65
3	0.45	2.60	405	84	68

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6460	1.5736	0.0000	0.0724

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	67.6270	67.6207	25.0	0.0062
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 041
RUN # - 0-4-1
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	685.800
FINAL METER VOLUME (CUBIC FEET)=	716.743
METER FACTOR= 1.069	
FINAL LEAK RATE (CU FT/MIN)=	0.003
NET METER VOLUME (CUBIC FEET)=	33.078
GAS VOLUME (DRY STANDARD CUBIC FEET)=	32.093
BAROMETRIC PRESSURE (IN. HG)=	28.92
STATIC PRESSURE (INCHES H20)=	-0.50
PERCENT OXYGEN=	14.00
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	29.9
PERCENT WATER=	4.20
AVERAGE METER TEMPERATURE (F.)=	68.8
AVERAGE DELTA H (IN. H20)=	2.20
AVERAGE DELTA P (IN. H20)=	0.45
AVERAGE STACK TEMPERATURE (F.)=	414.5
DRY MOLECULAR WEIGHT=	31.568
WET MOLECULAR WEIGHT=	30.998
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6708
% ISOKINETIC=	99.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (INCHES)=	0.3050
STACK AXIS #1 (INCHES)=	82.50
STACK AXIS #2 (INCHES)=	82.50
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	37.122
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,856
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	106,027
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	61,798
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	59,200

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1038
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0498
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0278
EMISSION RATE (LB/HR)=	25.26

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1038
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0498
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0278
EMISSION RATE (LB/HR)=	25.26
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 041
RUN # - 0-4-1
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	19.419
FINAL METER VOLUME (CUBIC METERS)=	20.295
METER FACTOR= 1.069	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.937
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.909
BAROMETRIC PRESSURE (MM HG)=	734.57
STATIC PRESSURE (MM H20)=	-12.7
PERCENT OXYGEN=	14.00
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	29.9
PERCENT WATER=	4.20
AVERAGE METER TEMPERATURE (C.)=	20.4
AVERAGE DELTA H (MM H20)=	55.9
AVERAGE DELTA P (MM H20)=	11.4
AVERAGE STACK TEMPERATURE (C.)=	212.5
DRY MOLECULAR WEIGHT=	31.568
WET MOLECULAR WEIGHT=	30.998
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	3.3807
% ISOKINETIC=	99.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (MM)=	7.75
STACK AXIS #1 (METERS)=	2.096
STACK AXIS #2 (METERS)=	2.096
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	3.449
STACK VELOCITY (ACTUAL, M/MIN)=	871
FLOW RATE (ACTUAL, CUBIC M/MIN)=	3,002
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,750
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,676

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1038
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1142
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0637
EMISSION RATE (KG/HR)=	11.47

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1038
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1142
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0637
EMISSION RATE (KG/HR)=	11.47
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 041
RUN # - 0-4-1
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.45	2.10	414	66	60
2	0.44	2.20	414	66	63
3	0.45	2.20	415	78	66
4	0.46	2.30	415	82	69

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6236	1.5250	0.0001	0.0985

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.6354	68.6300	25.0	0.0053
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 012
RUN # - 0-1-2
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	72.900
FINAL METER VOLUME (CUBIC FEET)=	102.509
METER FACTOR= .994	
FINAL LEAK RATE (CU FT/MIN)=	0.011
NET METER VOLUME (CUBIC FEET)=	29.431
GAS VOLUME (DRY STANDARD CUBIC FEET)=	28.357
BAROMETRIC PRESSURE (IN. HG)=	28.78
STATIC PRESSURE (INCHES H20)=	-0.50
PERCENT OXYGEN=	14.00
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	38.4
PERCENT WATER=	6.00
AVERAGE METER TEMPERATURE (F.)=	70.3
AVERAGE DELTA H (IN. H20)=	2.48
AVERAGE DELTA P (IN. H20)=	0.41
AVERAGE STACK TEMPERATURE (F.)=	405.8
DRY MOLECULAR WEIGHT=	31.568
WET MOLECULAR WEIGHT=	30.755
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6403
% ISOKINETIC=	92.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (INCHES)=	0.3050
STACK AXIS #1 (INCHES)=	82.50
STACK AXIS #2 (INCHES)=	82.50
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	37.122
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,730
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	101,336
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	59,372
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	55,812

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1048
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0569
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0313
EMISSION RATE (LB/HR)=	27.22

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1048
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0569
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0313
EMISSION RATE (LB/HR)=	27.22
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 012
RUN # - 0-1-2
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	2.064
FINAL METER VOLUME (CUBIC METERS)=	2.903
METER FACTOR= .994	
FINAL LEAK RATE (CU M/MIN)=	0.0003
NET METER VOLUME (CUBIC METERS)=	0.833
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.803
BAROMETRIC PRESSURE (MM HG)=	731.01
STATIC PRESSURE (MM H2O)=	-12.7
PERCENT OXYGEN=	14.00
PERCENT CARBON DIOXIDE=	18.80
MOISTURE COLLECTED (ML)=	38.4
PERCENT WATER=	6.00
AVERAGE METER TEMPERATURE (C.)=	21.3
AVERAGE DELTA H (MM H2O)=	62.9
AVERAGE DELTA P (MM H2O)=	10.4
AVERAGE STACK TEMPERATURE (C.)=	207.6
DRY MOLECULAR WEIGHT=	31.568
WET MOLECULAR WEIGHT=	30.755
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.2268
% ISOKINETIC=	92.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (MM)=	7.75
STACK AXIS #1 (METERS)=	2.096
STACK AXIS #2 (METERS)=	2.096
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	3.449
STACK VELOCITY (ACTUAL, M/MIN)=	832
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,870
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,681
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,580

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1048
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1305
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0719
EMISSION RATE (KG/HR)=	12.36

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1048
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1305
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0719
EMISSION RATE (KG/HR)=	12.36
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 012
RUN # - 0-1-2
LOCATION - MONARCH CEMENT
DATE - 11-14-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.42	2.50	407	70	64
2	0.42	2.50	406	70	64
3	0.40	2.50	404	77	67
4	0.40	2.40	406	82	68

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6301	1.5286	0.0001	0.1014

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	65.8544	65.8509	20.0	0.0034
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 022
RUN # - 0-2-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	730.400		
FINAL METER VOLUME (CUBIC FEET)=	760.068		
METER FACTOR= 1.069			
FINAL LEAK RATE (CU FT/MIN)=	0.024	LEAK CORRECTION=	0.0040
NET METER VOLUME (CUBIC FEET)=	31.565		
GAS VOLUME (DRY STANDARD CUBIC FEET)=	29.568		
BAROMETRIC PRESSURE (IN. HG)=	28.82		
STATIC PRESSURE (INCHES H20)=	-0.50		
PERCENT OXYGEN=	12.00		
PERCENT CARBON DIOXIDE=	17.00		
MOISTURE COLLECTED (ML)=	27.5		
PERCENT WATER=	4.20		
AVERAGE METER TEMPERATURE (F.)=	85.5		
AVERAGE DELTA H (IN. H20)=	2.00		
AVERAGE DELTA P (IN. H20)=	0.40		
AVERAGE STACK TEMPERATURE (F.)=	412.3		
DRY MOLECULAR WEIGHT=	31.200		
WET MOLECULAR WEIGHT=	30.646		
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6325		
% ISOKINETIC=	96.4		
PITOT COEFFICIENT=	0.8400		
SAMPLING TIME (MINUTES)=	40.0		
NOZZLE DIAMETER (INCHES)=	0.3050		
STACK AXIS #1 (INCHES)=	82.50		
STACK AXIS #2 (INCHES)=	82.50		
CIRCULAR STACK			
STACK AREA (SQUARE FEET)=	37.122		
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,709		
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	100,583		
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	58,573		
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	56,115		

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1214
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0632
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0353
EMISSION RATE (LB/HR)=	30.41

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1214
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0632
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0353
EMISSION RATE (LB/HR)=	30.41
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 022
RUN # - 0-2-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	20.682	
FINAL METER VOLUME (CUBIC METERS)=	21.522	
METER FACTOR= 1.069		
FINAL LEAK RATE (CU M/MIN)=	0.0007	LEAK CORRECTION= 0.0001
NET METER VOLUME (CUBIC METERS)=	0.894	
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.837	
BAROMETRIC PRESSURE (MM HG)=	732.03	
STATIC PRESSURE (MM H2O)=	-12.7	
PERCENT OXYGEN=	12.00	
PERCENT CARBON DIOXIDE=	17.00	
MOISTURE COLLECTED (ML)=	27.5	
PERCENT WATER=	4.20	
AVERAGE METER TEMPERATURE (C.)=	29.7	
AVERAGE DELTA H (MM H2O)=	50.8	
AVERAGE DELTA P (MM H2O)=	10.2	
AVERAGE STACK TEMPERATURE (C.)=	211.3	
DRY MOLECULAR WEIGHT=	31.200	
WET MOLECULAR WEIGHT=	30.646	
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.1875	
% ISOKINETIC=	96.4	
PITOT COEFFICIENT=	0.8400	
SAMPLING TIME (MINUTES)=	40.0	
NOZZLE DIAMETER (MM)=	7.75	
STACK AXIS #1 (METERS)=	2.096	
STACK AXIS #2 (METERS)=	2.096	
CIRCULAR STACK		
STACK AREA (SQUARE METERS)=	3.449	
STACK VELOCITY (ACTUAL, M/MIN)=	826	
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,848	
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,659	
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,589	

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1214
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1450
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0809
EMISSION RATE (KG/HR)=	13.80

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1214
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1450
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0809
EMISSION RATE (KG/HR)=	13.80
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 022
RUN # - 0-2-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.40	2.00	407	78	71
2	0.40	2.00	413	88	72
3	0.40	2.00	415	110	78
4	0.40	2.00	414	105	82

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6392	1.5242	0.0000	0.1150

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.0555	68.0490	20.0	0.0064
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 032
RUN # - 0-3-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	117.600
FINAL METER VOLUME (CUBIC FEET)=	140.450
METER FACTOR= .994	
FINAL LEAK RATE (CU FT/MIN)=	0.001
NET METER VOLUME (CUBIC FEET)=	22.713
GAS VOLUME (DRY STANDARD CUBIC FEET)=	21.434
BAROMETRIC PRESSURE (IN. HG)=	28.79
STATIC PRESSURE (INCHES H20)=	-0.50
PERCENT OXYGEN=	12.00
PERCENT CARBON DIOXIDE=	17.00
MOISTURE COLLECTED (ML)=	26.1
PERCENT WATER=	5.42
AVERAGE METER TEMPERATURE (F.)=	81.5
AVERAGE DELTA H (IN. H20)=	2.43
AVERAGE DELTA P (IN. H20)=	0.43
AVERAGE STACK TEMPERATURE (F.)=	413.7
DRY MOLECULAR WEIGHT=	31.200
WET MOLECULAR WEIGHT=	30.484
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6532
% ISOKINETIC=	91.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	30.0
NOZZLE DIAMETER (INCHES)=	0.3050
STACK AXIS #1 (INCHES)=	82.50
STACK AXIS #2 (INCHES)=	82.50
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	37.122
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,809
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	104,295
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	60,573
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	57,287

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1172
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0842
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0462
EMISSION RATE (LB/HR)=	41.34

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1172
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0842
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0462
EMISSION RATE (LB/HR)=	41.34
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 032
RUN # - 0-3-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	3.330
FINAL METER VOLUME (CUBIC METERS)=	3.977
METER FACTOR= .994	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.643
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.607
BAROMETRIC PRESSURE (MM HG)=	731.27
STATIC PRESSURE (MM H2O)=	-12.7
PERCENT OXYGEN=	12.00
PERCENT CARBON DIOXIDE=	17.00
MOISTURE COLLECTED (ML)=	26.1
PERCENT WATER=	5.42
AVERAGE METER TEMPERATURE (C.)=	27.5
AVERAGE DELTA H (MM H2O)=	61.8
AVERAGE DELTA P (MM H2O)=	10.8
AVERAGE STACK TEMPERATURE (C.)=	212.0
DRY MOLECULAR WEIGHT=	31.200
WET MOLECULAR WEIGHT=	30.484
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.2920
% ISOKINETIC=	91.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	30.0
NOZZLE DIAMETER (MM)=	7.75
STACK AXIS #1 (METERS)=	2.096
STACK AXIS #2 (METERS)=	2.096
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	3.449
STACK VELOCITY (ACTUAL, M/MIN)=	856
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,953
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,715
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,622

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1172
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1931
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.1060
EMISSION RATE (KG/HR)=	18.77

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1172
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1931
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.1060
EMISSION RATE (KG/HR)=	18.77
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 032
RUN # - 0-3-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.42	2.40	413	78	72
2	0.43	2.50	413	88	76
3	0.43	2.40	415	95	80

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6212	1.5231	0.0000	0.0981

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.2068	68.1876	20.0	0.0191
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 042
RUN # - 0-4-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC FEET)=	771.400		
FINAL METER VOLUME (CUBIC FEET)=	794.532		
METER FACTOR= 1.069			
FINAL LEAK RATE (CU FT/MIN)=	0.027	LEAK CORRECTION=	0.0070
NET METER VOLUME (CUBIC FEET)=	24.532		
GAS VOLUME (DRY STANDARD CUBIC FEET)=	23.084		
BAROMETRIC PRESSURE (IN. HG)=	28.80		
STATIC PRESSURE (INCHES H20)=	-0.50		
PERCENT OXYGEN=	12.00		
PERCENT CARBON DIOXIDE=	17.00		
MOISTURE COLLECTED (ML)=	22.7		
PERCENT WATER=	4.43		
AVERAGE METER TEMPERATURE (F.)=	82.8		
AVERAGE DELTA H (IN. H20)=	2.13		
AVERAGE DELTA P (IN. H20)=	0.43		
AVERAGE STACK TEMPERATURE (F.)=	412.3		
DRY MOLECULAR WEIGHT=	31.200		
WET MOLECULAR WEIGHT=	30.616		
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6582		
% ISOKINETIC=	96.6		
PITOT COEFFICIENT=	0.8400		
SAMPLING TIME (MINUTES)=	30.0		
NOZZLE DIAMETER (INCHES)=	0.3050		
STACK AXIS #1 (INCHES)=	82.50		
STACK AXIS #2 (INCHES)=	82.50		
CIRCULAR STACK			
STACK AREA (SQUARE FEET)=	37.122		
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,822		
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	104,773		
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	60,964		
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	58,266		

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1182
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0789
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0438
EMISSION RATE (LB/HR)=	39.37

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1182
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0789
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0438
EMISSION RATE (LB/HR)=	39.37
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 042
RUN # - 0-4-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

INITIAL METER VOLUME (CUBIC METERS)=	21.843	
FINAL METER VOLUME (CUBIC METERS)=	22.498	
METER FACTOR= 1.069		
FINAL LEAK RATE (CU M/MIN)=	0.0008	LEAK CORRECTION= 0.0002
NET METER VOLUME (CUBIC METERS)=	0.695	
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.654	
BAROMETRIC PRESSURE (MM HG)=	731.52	
STATIC PRESSURE (MM H2O)=	-12.7	
PERCENT OXYGEN=	12.00	
PERCENT CARBON DIOXIDE=	17.00	
MOISTURE COLLECTED (ML)=	22.7	
PERCENT WATER=	4.43	
AVERAGE METER TEMPERATURE (C.)=	28.2	
AVERAGE DELTA H (MM H2O)=	54.2	
AVERAGE DELTA P (MM H2O)=	11.0	
AVERAGE STACK TEMPERATURE (C.)=	211.3	
DRY MOLECULAR WEIGHT=	31.200	
WET MOLECULAR WEIGHT=	30.616	
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.3173	
% ISOKINETIC=	96.6	
PITOT COEFFICIENT=	0.8400	
SAMPLING TIME (MINUTES)=	30.0	
NOZZLE DIAMETER (MM)=	7.75	
STACK AXIS #1 (METERS)=	2.096	
STACK AXIS #2 (METERS)=	2.096	
CIRCULAR STACK		
STACK AREA (SQUARE METERS)=	3.449	
STACK VELOCITY (ACTUAL, M/MIN)=	860	
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,967	
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,726	
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,650	

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1182
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1808
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.1005
EMISSION RATE (KG/HR)=	17.88

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1182
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1808
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.1005
EMISSION RATE (KG/HR)=	17.88
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 042
RUN # - 0-4-2
LOCATION - MONARCH CEMENT
DATE - 11-16-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.42	2.10	413	78	70
2	0.43	2.10	410	94	74
3	0.45	2.20	414	103	78

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6408	1.5363	0.0000	0.1045

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.2624	68.2486	20.0	0.0137
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0050
IMPINGER BLANK (MG/ML)= 0.0000

APPENDIX F

PARTICLE SIZE COMPUTER PRINTOUTS

		Page
F-1	Inlet to No. 5 Kiln 10-Cell Baghouse - Andersen High Capacity Stack Sampler with 15 μm Preseparator	F-3
F-2	Common Outlet Stack from No. 5 Kiln 10-Cell and 3-Cell Baghouses - Andersen Mark III Impactor with 15 μm Preseparator	F-20

F-1 Inlet to No. 5 Kiln 10-Cell Baghouse - Andersen High Capacity Stack Sampler with 15 μm Preseparator

INPUT DATA FOR FILE I11
TEST DATE - 11-14-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-1-1

% WATER= 11.57
% CARBON DIOXIDE= 20.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 9.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 540.3 DEGREES F.
BAR. PRESSURE= 29.00 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 3.00 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 66.8 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 490.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.296 CUBIC FEET
DELTA H= 0.42 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.204 CU. FT.
SAMPLE VOL.-WET STD.= 3.623 CU. FT.
STACK VELOCITY= 7884.0 FT./MIN.
NOZZLE VELOCITY= 7508.7 FT./MIN.
MASS COLLECTED= 1941.102 MG.
LOADING= 8.26810 GRAIN/SCF
LOADING(DRY)= 9.34988 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.793 CU. FT/MIN

DRY MOLECULAR WT.= 31.72
WET MOLECULAR WT.= 30.13
% ISOKINETIC= 95.2
SAMPLING RATE-ACTUAL= 0.769 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.200 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	2176.60	1487.60	1502.50	1966.00	24782.80
TARE WT (MG)	1445.00	1446.80	1441.80	1439.40	24201.20
NET WT (MG) CORRECTED	731.60	40.80	60.70	526.60	581.40
FRACTION % OF TOTAL	37.69	2.10	3.13	27.13	29.95
CUM. % WITH FILTER	37.69	39.79	42.92	70.05	100.00
FRACTION % WITHOUT FILTER	53.81	3.00	4.46	38.73	
CUM. % WITHOUT FILTER	53.81	56.81	61.27	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.29	11.04	5.98	2.03	<2.03
DM/DLOGD (GRAINS/SCF)		1.22831	0.97182	4.76845	
GEO MEAN (MICRONS)		13.00	8.13	3.48	<3.48
PARTICLE COUNT		1.17D+07	1.48D+07	1.69D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I21
TEST DATE - 11-12-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-2-1

% WATER= 5.42
% CARBON DIOXIDE= 20.33
% CARBON MONOXIDE= 0.00
% OXYGEN= 12.33

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 530.0 DEGREES F.
BAR. PRESSURE= 29.03 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.68 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 68.3 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 348.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.642 CUBIC FEET
DELTA H= 0.39 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.534 CU. FT.
SAMPLE VOL.-WET STD.= 3.736 CU. FT.
STACK VELOCITY= 7309.8 FT./MIN.
NOZZLE VELOCITY= 7655.3 FT./MIN.
MASS COLLECTED= 5413.798 MG.
LOADING= 22.36278 GRAIN/SCF
LOADING(DRY)= 23.64430 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.781 CU. FT/MIN

DRY MOLECULAR WT.= 31.75
WET MOLECULAR WT.= 31.00
% ISOKINETIC= 104.7
SAMPLING RATE-ACTUAL= 0.784 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= -0.100 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	5198.20	1528.60	1731.70	2484.40	23317.70
TARE WT (MG)	1454.00	1457.60	1454.60	1454.40	23026.30
NET WT (MG) CORRECTED	3744.20	71.00	277.10	1030.00	291.50
FRACTION % OF TOTAL	69.16	1.31	5.12	19.03	5.38
CUM. % WITH FILTER	69.16	70.47	75.59	94.62	100.00
FRACTION % WITHOUT FILTER	73.10	1.39	5.41	20.11	
CUM. % WITHOUT FILTER	73.10	74.48	79.89	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	14.97	10.99	6.05	1.77	<1.77
DM/DLOGD (GRAINS/SCF)		2.18424	4.41255	7.98352	
GEO MEAN (MICRONS)		12.82	8.15	3.27	<3.27
PARTICLE COUNT		2.11D+07	6.70D+07	3.02D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I31
TEST DATE - 11-13-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-3-1

% WATER= 6.82
% CARBON DIOXIDE= 21.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 7.75

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 539.0 DEGREES F.
BAR. PRESSURE= 29.02 INCHES HG
STATIC PRESSURE= 9.50 INCHES H2O
AVE. DELTA P= 2.65 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 60.7 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 539.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.399 CUBIC FEET
DELTA H= 0.42 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.345 CU. FT.
SAMPLE VOL.-WET STD.= 3.590 CU. FT.
STACK VELOCITY= 7330.0 FT./MIN.
NOZZLE VELOCITY= 7425.5 FT./MIN.
MASS COLLECTED= 5200.300 MG.
LOADING= 22.35441 GRAIN/SCF
LOADING(DRY)= 23.99056 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.791 CU. FT/MIN

DRY MOLECULAR WT.= 31.67
WET MOLECULAR WT.= 30.74
% ISOKINETIC= 101.3
SAMPLING RATE-ACTUAL= 0.760 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= -0.100 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	4454.00	1535.00	1848.60	2434.90	24382.00
TARE WT (MG)	1450.50	1452.90	1454.00	1448.90	23648.00
NET WT (MG) CORRECTED	3003.50	82.10	394.60	986.00	734.10
FRACTION % OF TOTAL	57.76	1.58	7.59	18.96	14.12
CUM. % WITH FILTER	57.76	59.34	66.92	85.88	100.00
FRACTION % WITHOUT FILTER	67.25	1.84	8.84	22.08	
CUM. % WITHOUT FILTER	67.25	69.09	77.92	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.38	11.02	5.97	2.12	<2.12
DM/DLOGD (GRAINS/SCF)		2.43907	6.36875	9.43109	
GEO MEAN (MICRONS)		13.02	8.11	3.56	<3.56
PARTICLE COUNT		2.32D+07	9.71D+07	3.28D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I41
TEST DATE - 11-13-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-4-1

% WATER= 3.08
% CARBON DIOXIDE= 21.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 7.75

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 515.7 DEGREES F.
BAR. PRESSURE= 29.09 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.70 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 67.3 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 515.7 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.799 CUBIC FEET
DELTA H= 0.42 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.701 CU. FT.
SAMPLE VOL.-WET STD.= 3.819 CU. FT.
STACK VELOCITY= 7247.6 FT./MIN.
NOZZLE VELOCITY= 7695.9 FT./MIN.
MASS COLLECTED= 5005.300 MG.
LOADING= 20.22844 GRAIN/SCF
LOADING(DRY)= 20.87128 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.765 CU. FT/MIN

DRY MOLECULAR WT.= 31.67
WET MOLECULAR WT.= 31.25
% ISOKINETIC= 106.2
SAMPLING RATE-ACTUAL= 0.788 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= -0.100 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	4356.60	1529.70	1713.80	2372.40	24564.50
TARE WT (MG)	1451.20	1448.10	1447.50	1454.40	23730.60
NET WT (MG) CORRECTED	2905.40	81.60	266.30	918.00	834.00
FRACTION % OF TOTAL	58.05	1.63	5.32	18.34	16.66
CUM. % WITH FILTER	58.05	59.68	65.00	83.34	100.00
FRACTION % WITHOUT FILTER	69.65	1.96	6.38	22.01	
CUM. % WITHOUT FILTER	69.65	71.61	77.99	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	14.72	10.73	5.81	2.03	<2.03
DM/DLOGD (GRAINS/SCF)		2.40406	4.04192	8.11628	
GEO MEAN (MICRONS)		12.57	7.90	3.43	<3.43
PARTICLE COUNT		2.37D+07	6.33D+07	2.92D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I12
TEST DATE - 11-14-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-1-2

% WATER= 4.42
% CARBON DIOXIDE= 20.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 9.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 528.7 DEGREES F.
BAR. PRESSURE= 28.97 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.52 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 67.2 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 451.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.357 CUBIC FEET
DELTA H= 0.43 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.258 CU. FT.
SAMPLE VOL.-WET STD.= 3.408 CU. FT.
STACK VELOCITY= 7070.9 FT./MIN.
NOZZLE VELOCITY= 6989.0 FT./MIN.
MASS COLLECTED= 3842.701 MG.
LOADING= 17.39865 GRAIN/SCF
LOADING(DRY)= 18.20324 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.779 CU. FT/MIN

DRY MOLECULAR WT.= 31.72
WET MOLECULAR WT.= 31.11
% ISOKINETIC= 98.8
SAMPLING RATE-ACTUAL= 0.715 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.200 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3523.00	1528.90	1756.20	2457.60	24182.40
TARE WT (MG)	1436.20	1446.70	1446.70	1438.00	23837.60
NET WT (MG) CORRECTED	2086.80	82.20	309.50	1019.60	344.60
FRACTION % OF TOTAL	54.31	2.14	8.05	26.53	8.97
CUM. % WITH FILTER	54.31	56.44	64.50	91.03	100.00
FRACTION % WITHOUT FILTER	59.66	2.35	8.85	29.15	
CUM. % WITHOUT FILTER	59.66	62.01	70.85	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.83	11.35	6.21	2.02	<2.02
DM/DLOGD (GRAINS/SCF)		2.57629	5.35334	9.44811	
GEO MEAN (MICRONS)		13.41	8.40	3.54	<3.54
PARTICLE COUNT		2.38D+07	7.89D+07	3.30D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I22
TEST DATE - 11-12-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-2-2

% WATER= 4.94
% CARBON DIOXIDE= 20.33
% CARBON MONOXIDE= 0.00
% OXYGEN= 12.33

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	538.3 DEGREES F.	SAMPLING TIME=	9.1 MIN.
BAR. PRESSURE=	29.03 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	9.50 INCHES H20	SAMPLER TEMP. =	294.0 DEGREES F.
AVE. DELTA P=	2.45 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	3.436 CUBIC FEET
METER TEMP.=	65.3 DEGREES F.	DELTA H=	0.39 INCHES H20
PROBE DIA.=	0.137 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	3.353 CU. FT.	DRY MOLECULAR WT.=	31.75
SAMPLE VOL.-WET STD.=	3.527 CU. FT.	WET MOLECULAR WT.=	31.07
STACK VELOCITY=	7009.5 FT./MIN.	% ISOKINETIC=	102.8
NOZZLE VELOCITY=	7207.8 FT./MIN.	SAMPLING RATE-ACTUAL=	0.738 CU. FT/MIN
MASS COLLECTED=	3384.901 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	14.81007 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	15.57971 GRAIN/SCF	FILTER BLANK=	-0.100 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.790 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3391.60	1522.50	1663.40	2333.20	23508.60
TARE WT (MG)	1454.60	1455.20	1456.40	1453.60	23214.70
NET WT (MG) CORRECTED	1937.00	67.30	207.00	879.60	294.00
FRACTION % OF TOTAL	57.22	1.99	6.12	25.99	8.69
CUM. % WITH FILTER	57.22	59.21	65.33	91.31	100.00
FRACTION % WITHOUT FILTER	62.67	2.18	6.70	28.46	
CUM. % WITHOUT FILTER	62.67	64.85	71.54	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.66	11.29	6.33	1.78	<1.78
DM/DLOGD (GRAINS/SCF)		2.06779	3.60777	6.97497	
GEO MEAN (MICRONS)		13.30	8.45	3.35	<3.35
PARTICLE COUNT		1.92D+07	5.28D+07	2.57D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I32
TEST DATE - 11-13-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-3-2

% WATER= 5.07
% CARBON DIOXIDE= 21.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 7.75

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 534.0 DEGREES F.
BAR. PRESSURE= 29.02 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.52 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 61.2 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 534.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.312 CUBIC FEET
DELTA H= 0.41 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.256 CU. FT.
SAMPLE VOL.-WET STD.= 3.430 CU. FT.
STACK VELOCITY= 7099.4 FT./MIN.
NOZZLE VELOCITY= 7059.6 FT./MIN.
MASS COLLECTED= 3718.799 MG.
LOADING= 16.73042 GRAIN/SCF
LOADING(DRY)= 17.62396 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.786 CU. FT/MIN

DRY MOLECULAR WT.= 31.67
WET MOLECULAR WT.= 30.98
% ISOKINETIC= 99.4
SAMPLING RATE-ACTUAL= 0.723 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.200 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3676.20	1521.60	1723.80	1896.30	24149.40
TARE WT (MG)	1448.80	1446.60	1446.30	1446.80	23459.80
NET WT (MG) CORRECTED	2227.40	75.00	277.50	449.50	689.40
FRACTION % OF TOTAL	59.90	2.02	7.46	12.09	18.54
CUM. % WITH FILTER	59.90	61.91	69.37	81.46	100.00
FRACTION % WITHOUT FILTER	73.53	2.48	9.16	14.84	
CUM. % WITHOUT FILTER	73.53	76.00	85.16	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.81	11.29	6.12	2.15	<2.15
DM/DLOGD (GRAINS/SCF)		2.30812	4.69058	4.45738	
GEO MEAN (MICRONS)		13.36	8.31	3.63	<3.63
PARTICLE COUNT		2.14D+07	6.98D+07	1.52D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I42
TEST DATE - 11-13-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-4-2

% WATER= 3.45
% CARBON DIOXIDE= 21.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 7.75

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	521.0 DEGREES F.	SAMPLING TIME=	9.0 MIN.
BAR. PRESSURE=	29.01 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	9.50 INCHES H20	SAMPLER TEMP. =	521.0 DEGREES F.
AVE. DELTA P=	3.12 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	3.387 CUBIC FEET
METER TEMP.=	67.2 DEGREES F.	DELTA H=	0.44 INCHES H20
PROBE DIA.=	0.137 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	3.291 CU. FT.	DRY MOLECULAR WT.=	31.67	
SAMPLE VOL.-WET STD.=	3.409 CU. FT.	WET MOLECULAR WT.=	31.20	
STACK VELOCITY=	7822.6 FT./MIN.	% ISOKINETIC=	88.5	
NOZZLE VELOCITY=	6926.2 FT./MIN.	SAMPLING RATE-ACTUAL=	0.709	CU. FT/MIN
MASS COLLECTED=	3898.699 MG.	CYCLONE BLANK=	0.000	MG.
LOADING=	17.64962 GRAIN/SCF	STAGE BLANK=	0.000	MG.
LOADING(DRY)=	18.28029 GRAIN/SCF	FILTER BLANK=	-0.100	MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.771 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3807.50	1521.60	1698.60	2346.40	23759.60
TARE WT (MG)	1449.20	1449.90	1453.80	1455.20	23427.00
NET WT (MG) CORRECTED	2358.30	71.70	244.80	891.20	332.70
FRACTION % OF TOTAL	60.49	1.84	6.28	22.86	8.53
CUM. % WITH FILTER	60.49	62.33	68.61	91.47	100.00
FRACTION % WITHOUT FILTER	66.13	2.01	6.86	24.99	
CUM. % WITHOUT FILTER	66.13	68.14	75.01	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.81	11.34	6.15	2.13	<2.13
DM/DLOGD (GRAINS/SCF)		2.25269	4.16579	8.78170	
GEO MEAN (MICRONS)		13.39	8.35	3.62	<3.62
PARTICLE COUNT		2.08D+07	6.17D+07	3.00D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I13
TEST DATE - 11-14-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-1-3

% WATER= 3.95
% CARBON DIOXIDE= 20.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 9.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 531.7 DEGREES F.
BAR. PRESSURE= 28.88 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.66 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 68.2 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 463.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.557 CUBIC FEET
DELTA H= 0.43 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.435 CU. FT.
SAMPLE VOL.-WET STD.= 3.576 CU. FT.
STACK VELOCITY= 7290.6 FT./MIN.
NOZZLE VELOCITY= 7377.0 FT./MIN.
MASS COLLECTED= 5540.600 MG.
LOADING= 23.91149 GRAIN/SCF
LOADING(DRY)= 24.89483 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.783 CU. FT/MIN

DRY MOLECULAR WT.= 31.72
WET MOLECULAR WT.= 31.18
% ISOKINETIC= 101.2
SAMPLING RATE-ACTUAL= 0.755 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.200 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	5106.70	1547.20	1831.00	2562.80	23395.90
TARE WT (MG)	1447.20	1449.80	1448.00	1450.40	23107.40
NET WT (MG) CORRECTED	3659.50	97.40	383.00	1112.40	288.30
FRACTION % OF TOTAL	66.05	1.76	6.91	20.08	5.20
CUM. % WITH FILTER	66.05	67.81	74.72	94.80	100.00
FRACTION % WITHOUT FILTER	69.67	1.85	7.29	21.18	
CUM. % WITHOUT FILTER	69.67	71.53	78.82	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.34	11.14	6.04	1.99	<1.99
DM/DLOGD (GRAINS/SCF)		3.02132	6.21962	9.94697	
GEO MEAN (MICRONS)		13.07	8.20	3.47	<3.47
PARTICLE COUNT		2.86D+07	9.38D+07	3.55D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I23
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-2-3

% WATER= 5.43
% CARBON DIOXIDE= 21.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 10.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	525.7 DEGREES F.	SAMPLING TIME=	9.0 MIN.
BAR. PRESSURE=	28.89 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	9.50 INCHES H20	SAMPLER TEMP. =	369.0 DEGREES F.
AVE. DELTA P=	2.40 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	3.321 CUBIC FEET
METER TEMP.=	56.8 DEGREES F.	DELTA H=	0.40 INCHES H20
PROBE DIA.=	0.137 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	3.278 CU. FT.	DRY MOLECULAR WT.=	31.87
SAMPLE VOL.-WET STD.=	3.466 CU. FT.	WET MOLECULAR WT.=	31.11
STACK VELOCITY=	6906.0 FT./MIN.	% ISOKINETIC=	102.9
NOZZLE VELOCITY=	7105.2 FT./MIN.	SAMPLING RATE-ACTUAL=	0.727 CU. FT/MIN
MASS COLLECTED=	4969.299 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	22.12317 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	23.39344 GRAIN/SCF	FILTER BLANK=	0.500 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.776 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	4164.80	1598.00	1870.50	2525.10	24923.20
TARE WT (MG)	1464.90	1462.10	1456.30	1457.50	24271.00
NET WT (MG) CORRECTED	2699.90	135.90	414.20	1067.60	651.70
FRACTION % OF TOTAL	54.33	2.73	8.34	21.48	13.11
CUM. % WITH FILTER	54.33	57.07	65.40	86.89	100.00
FRACTION % WITHOUT FILTER	62.53	3.15	9.59	24.73	
CUM. % WITHOUT FILTER	62.53	65.68	75.27	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.62	11.27	6.24	1.87	<1.87
DM/DLOGD (GRAINS/SCF)		4.26772	7.18122	9.09789	
GEO MEAN (MICRONS)		13.27	8.39	3.42	<3.42
PARTICLE COUNT		3.98D+07	1.06D+08	3.29D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I33
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-3-3

% WATER= 8.59
% CARBON DIOXIDE= 21.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 10.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 532.8 DEGREES F.
BAR. PRESSURE= 28.93 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.34 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 71.1 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 12.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 384.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 4.427 CUBIC FEET
DELTA H= 0.40 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 4.258 CU. FT.
SAMPLE VOL.-WET STD.= 4.658 CU. FT.
STACK VELOCITY= 6880.3 FT./MIN.
NOZZLE VELOCITY= 7202.9 FT./MIN.
MASS COLLECTED= 4172.900 MG.
LOADING= 13.82433 GRAIN/SCF
LOADING(DRY)= 15.12343 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.784 CU. FT/MIN

DRY MOLECULAR WT.= 31.87
WET MOLECULAR WT.= 30.68
% ISOKINETIC= 104.7
SAMPLING RATE-ACTUAL= 0.737 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.500 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3544.30	1524.50	1788.20	1890.10	25370.50
TARE WT (MG)	1444.60	1444.60	1446.60	1447.40	24161.00
NET WT (MG) CORRECTED	2099.70	79.90	341.60	442.70	1209.00
FRACTION % OF TOTAL	50.32	1.91	8.19	10.61	28.97
CUM. % WITH FILTER	50.32	52.23	60.42	71.03	100.00
FRACTION % WITHOUT FILTER	70.84	2.70	11.53	14.94	
CUM. % WITHOUT FILTER	70.84	73.54	85.06	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.59	11.24	6.20	1.67	<1.89
DM/DLOGD (GRAINS/SCF)		1.86385	4.38031	2.84036	
GEO MEAN (MICRONS)		13.24	8.35	3.42	<3.42
PARTICLE COUNT		1.74D+07	6.49D+07	1.03D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I43
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-4-3

% WATER= 6.79
% CARBON DIOXIDE= 21.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 10.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	529.7 DEGREES F.	SAMPLING TIME=	9.0 MIN.
BAR. PRESSURE=	28.89 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	9.50 INCHES H2O	SAMPLER TEMP. =	460.0 DEGREES F.
AVE. DELTA P=	2.72 INCHES H2O	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	3.265 CUBIC FEET
METER TEMP.=	65.8 DEGREES F.	DELTA H=	0.39 INCHES H2O
PROBE DIA.=	0.137 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	3.168 CU. FT.	DRY MOLECULAR WT.=	31.87
SAMPLE VOL.-WET STD.=	3.398 CU. FT.	WET MOLECULAR WT.=	30.93
STACK VELOCITY=	7383.9 FT./MIN.	% ISOKINETIC=	94.7
NOZZLE VELOCITY=	6994.0 FT./MIN.	SAMPLING RATE-ACTUAL=	0.716 CU. FT/MIN
MASS COLLECTED=	1953.798 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	8.87240 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	9.51872 GRAIN/SCF	FILTER BLANK=	0.500 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.781 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	2245.90	1486.20	1502.30	2114.90	24077.20
TARE WT (MG)	1448.10	1451.40	1440.40	1443.50	23688.80
NET WT (MG) CORRECTED	797.80	34.80	61.90	671.40	387.90
FRACTION % OF TOTAL	40.83	1.78	3.17	34.36	19.85
CUM. % WITH FILTER	40.83	42.61	45.78	80.15	100.00
FRACTION % WITHOUT FILTER	50.95	2.22	3.95	42.88	
CUM. % WITHOUT FILTER	50.95	53.17	57.12	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.84	11.35	6.20	2.03	<2.03
DM/DLOGD (GRAINS/SCF)		1.09270	1.07104	6.28880	
GEO MEAN (MICRONS)		13.41	8.39	3.55	<3.55
PARTICLE COUNT		1.01D+07	1.58D+07	2.19D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I14
TEST DATE - 11-14-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-1-4

% WATER= 6.50
% CARBON DIOXIDE= 20.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 9.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 540.3 DEGREES F.
BAR. PRESSURE= 28.88 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.31 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 65.0 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 455.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 2.789 CUBIC FEET
DELTA H= 0.42 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 2.709 CU. FT.
SAMPLE VOL.-WET STD.= 2.898 CU. FT.
STACK VELOCITY= 6862.6 FT./MIN.
NOZZLE VELOCITY= 6029.5 FT./MIN.
MASS COLLECTED= 3969.100 MG.
LOADING= 21.13920 GRAIN/SCF
LOADING(DRY)= 22.60877 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.793 CU. FT/MIN

DRY MOLECULAR WT.= 31.72
WET MOLECULAR WT.= 30.83
% ISOKINETIC= 87.9
SAMPLING RATE-ACTUAL= 0.617 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.300 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3534.20	1528.90	1815.70	2432.00	23804.70
TARE WT (MG)	1447.00	1447.50	1448.40	1449.60	23353.60
NET WT (MG) CORRECTED	2087.20	81.40	367.30	982.40	450.80
FRACTION % OF TOTAL	52.59	2.05	9.25	24.75	11.36
CUM. % WITH FILTER	52.59	54.64	63.89	88.64	100.00
FRACTION % WITHOUT FILTER	59.32	2.31	10.44	27.92	
CUM. % WITHOUT FILTER	59.32	61.64	72.08	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	17.56	12.05	6.74	2.19	<2.19
DM/DLOGD (GRAINS/SCF)		2.64751	7.74841	10.73060	
GEO MEAN (MICRONS)		14.54	9.01	3.84	<3.84
PARTICLE COUNT		2.25D+07	1.06D+08	3.46D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I24
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-2-4

% WATER= 2.68
% CARBON DIOXIDE= 21.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 10.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 550.0 DEGREES F.
BAR. PRESSURE= 28.89 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.66 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 58.0 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 372.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.293 CUBIC FEET
DELTA H= 0.39 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.243 CU. FT.
SAMPLE VOL.-WET STD.= 3.332 CU. FT.
STACK VELOCITY= 7319.1 FT./MIN.
NOZZLE VELOCITY= 6998.8 FT./MIN.
MASS COLLECTED= 2734.899 MG.
LOADING= 12.66597 GRAIN/SCF
LOADING(DRY)= 13.01477 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.804 CU. FT/MIN

DRY MOLECULAR WT.= 31.87
WET MOLECULAR WT.= 31.50
% ISOKINETIC= 95.6
SAMPLING RATE-ACTUAL= 0.716 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.500 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	2864.50	1517.50	1609.70	2248.60	23550.60
TARE WT (MG)	1460.20	1458.50	1459.60	1463.40	23213.80
NET WT (MG) CORRECTED	1404.30	59.00	150.10	785.20	336.30
FRACTION % OF TOTAL	51.35	2.16	5.49	28.71	12.30
CUM. % WITH FILTER	51.35	53.50	58.99	87.70	100.00
FRACTION % WITHOUT FILTER	58.55	2.46	6.26	32.74	
CUM. % WITHOUT FILTER	58.55	61.01	67.26	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	16.13	11.44	6.37	1.92	<1.92
DM/DLOGD (GRAINS/SCF)		1.83222	2.72994	6.98851	
GEO MEAN (MICRONS)		13.58	8.53	3.50	<3.50
PARTICLE COUNT		1.67D+07	3.96D+07	2.47D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I34
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-3-4

% WATER= 9.19
% CARBON DIOXIDE= 21.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 10.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 521.0 DEGREES F.
BAR. PRESSURE= 28.88 INCHES HG
STATIC PRESSURE= 9.50 INCHES H20
AVE. DELTA P= 2.33 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 70.7 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 9.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 427.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 3.390 CUBIC FEET
DELTA H= 0.41 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 3.258 CU. FT.
SAMPLE VOL.-WET STD.= 3.587 CU. FT.
STACK VELOCITY= 6850.1 FT./MIN.
NOZZLE VELOCITY= 7320.6 FT./MIN.
MASS COLLECTED= 3675.399 MG.
LOADING= 15.81147 GRAIN/SCF
LOADING(DRY)= 17.41159 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.771 CU. FT/MIN

DRY MOLECULAR WT.= 31.87
WET MOLECULAR WT.= 30.59
% ISOKINETIC= 106.9
SAMPLING RATE-ACTUAL= 0.749 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.500 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3399.00	1515.90	1693.90	2135.60	24033.60
TARE WT (MG)	1451.00	1445.80	1448.30	1451.10	23305.90
NET WT (MG) CORRECTED	1948.00	70.10	245.60	684.50	727.20
FRACTION % OF TOTAL	53.00	1.91	6.68	18.62	19.79
CUM. % WITH FILTER	53.00	54.91	61.59	80.21	100.00
FRACTION % WITHOUT FILTER	66.07	2.38	8.33	23.22	
CUM. % WITHOUT FILTER	66.07	68.45	76.78	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.27	11.13	6.07	1.93	<1.93
DM/DLOGD (GRAINS/SCF)		2.19574	4.01001	5.91104	
GEO MEAN (MICRONS)		13.03	8.22	3.42	<3.42
PARTICLE COUNT		2.08D+07	6.04D+07	2.14D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I44
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - I-4-4

% WATER= 4.60
% CARBON DIOXIDE= 21.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 10.67

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	542.7 DEGREES F.	SAMPLING TIME=	9.0 MIN.
BAR. PRESSURE=	28.89 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	9.50 INCHES H20	SAMPLER TEMP. =	496.0 DEGREES F.
AVE. DELTA P=	2.43 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	3.393 CUBIC FEET
METER TEMP.=	62.0 DEGREES F.	DELTA H=	0.39 INCHES H20
PROBE DIA.=	0.137 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	3.316 CU. FT.	DRY MOLECULAR WT.=	31.87
SAMPLE VOL.-WET STD.=	3.476 CU. FT.	WET MOLECULAR WT.=	31.23
STACK VELOCITY=	6995.9 FT./MIN.	% ISOKINETIC=	103.6
NOZZLE VELOCITY=	7247.4 FT./MIN.	SAMPLING RATE-ACTUAL=	0.742 CU. FT/MIN
MASS COLLECTED=	3324.700 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	14.76196 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	15.47375 GRAIN/SCF	FILTER BLANK=	0.500 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.795 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3126.80	1533.00	1654.30	2301.20	24361.60
TARE WT (MG)	1447.20	1461.50	1462.60	1460.40	23820.00
NET WT (MG) CORRECTED	1679.60	71.50	191.70	840.80	541.10
FRACTION % OF TOTAL	50.52	2.15	5.77	25.29	16.28
CUM. % WITH FILTER	50.52	52.67	58.44	83.72	100.00
FRACTION % WITHOUT FILTER	60.34	2.57	6.89	30.21	
CUM. % WITHOUT FILTER	60.34	62.91	69.79	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.67	11.25	6.10	2.07	<2.07
DM/DLOGD (GRAINS/SCF)		2.20354	3.20079	7.95727	
GEO MEAN (MICRONS)		13.28	8.28	3.55	<3.55
PARTICLE COUNT		2.05D+07	4.78D+07	2.77D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

F-2 Common Outlet Stack from No. 5 Kiln 10-Cell and 3-Cell Baghouses - Andersen Mark III Impactor with 15 μm Preseparator

INPUT DATA FOR FILE 011
TEST DATE - 11-14-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - O-1-1

% WATER= 4.20
% CARBON DIOXIDE= 18.80
% CARBON MONOXIDE= 0.00
% OXYGEN= 14.00

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 413.5 DEGREES F.
BAR. PRESSURE= 28.92 INCHES HG
STATIC PRESSURE= -0.50 INCHES H20
AVE. DELTA P= 0.55 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 77.9 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 40.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 413.5 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 14.299 CUBIC FEET
DELTA H= 0.43 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 13.576 CU. FT.
SAMPLE VOL.-WET STD.= 14.171 CU. FT.
STACK VELOCITY= 3141.5 FT./MIN.
NOZZLE VELOCITY= 2928.7 FT./MIN.
MASS COLLECTED= 22.800 MG.
LOADING= 0.02483 GRAIN/SCF
LOADING(DRY)= 0.02592 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.647 CU. FT/MIN

DRY MOLECULAR WT.= 31.57
WET MOLECULAR WT.= 31.00
% ISOKINETIC= 93.2
SAMPLING RATE-ACTUAL= 0.607 CU. FT/MIN
CYCLONE BLANK= -1.250 MG.
STAGE BLANK= -0.260 MG.
FILTER BLANK= -0.160 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	254.17	408.26	373.15	398.13	384.97	400.84	390.07	387.91	381.79	450.44
TARE WT (MG)	250.04	408.48	373.60	397.08	382.94	395.36	384.76	385.99	382.04	450.32
NET WT (MG) CORRECTED	5.38	0.04	0.00	1.31	2.29	5.74	5.57	2.18	0.01	0.28
FRACTION % OF TOTAL	23.60	0.18	0.00	5.75	10.04	25.18	24.43	9.56	0.04	1.23
CUM. % WITH FILTER	23.60	23.77	23.77	29.52	39.56	64.74	89.17	98.73	98.77	100.00
FRACTION % WITHOUT FILTER	23.89	0.18	0.00	5.82	10.17	25.49	24.73	9.68	0.04	
CUM. % WITHOUT FILTER	23.89	24.07	24.07	29.88	40.05	65.54	90.28	99.96	100.00	
JET VEL. (CM/SEC)	0	53	99	165	273	486	1176	2143	3626	
D50 SIZE (MICRONS)	15.62	14.22	8.85	5.98	4.06	2.59	1.27	0.76	0.55	<0.55
DM/DLOGD (GRAINS/SCF)		0.00107	0.00000	0.00839	0.01480	0.03195	0.01956	0.01067	0.00008	
GEO MEAN (MICRONS)		14.90	11.22	7.28	4.93	3.24	1.81	0.98	0.65	<0.65
PARTICLE COUNT		8.87D+03	0.00D+00	1.43D+05	3.72D+05	1.22D+06	1.34D+06	1.35D+06	1.51D+04	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 021

TEST DATE - 11-13-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - 0-2-1

% WATER= 1.30
% CARBON DIOXIDE= 18.80
% CARBON MONOXIDE= 0.00
% OXYGEN= 13.30

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 403.7 DEGREES F.
BAR. PRESSURE= 29.92 INCHES HG
STATIC PRESSURE= -0.50 INCHES H20
AVE. DELTA P= 0.49 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 61.3 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 30.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 403.7 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 10.579 CUBIC FEET
DELTA H= 0.36 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 10.719 CU. FT.
SAMPLE VOL.-WET STD.= 10.869 CU. FT.
STACK VELOCITY= 2883.6 FT./MIN.
NOZZLE VELOCITY= 2862.3 FT./MIN.
MASS COLLECTED= 19.820 MG.
LOADING= 0.02814 GRAIN/SCF
LOADING(DRY)= 0.02853 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.636 CU. FT/MIN

DRY MOLECULAR WT.= 31.54
WET MOLECULAR WT.= 31.35
% ISOKINETIC= 99.3
SAMPLING RATE-ACTUAL= 0.594 CU. FT/MIN
CYCLONE BLANK= -0.190 MG.
STAGE BLANK= -0.290 MG.
FILTER BLANK= -0.280 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	244.82	404.28	394.97	404.99	390.06	393.26	375.75	389.52	380.89	439.91
TARE WT (MG)	240.14	404.76	395.20	403.52	387.78	389.47	372.36	388.85	381.66	438.35
NET WT (MG) CORRECTED	4.87	0.00	0.06	1.76	2.57	4.08	3.68	0.96	0.00	1.84
FRACTION % OF TOTAL	24.57	0.00	0.30	8.88	12.97	20.59	18.57	4.84	0.00	9.28
CUM. % WITH FILTER	24.57	24.57	24.87	33.75	46.72	67.31	85.87	90.72	90.72	100.00
FRACTION % WITHOUT FILTER	27.09	0.00	0.33	9.79	14.29	22.69	20.47	5.34	0.00	
CUM. % WITHOUT FILTER	27.09	27.09	27.42	37.21	51.50	74.19	94.66	100.00	100.00	
JET VEL. (CM/SEC)	0	52	97	162	267	475	1149	2094	3594	
D50 SIZE (MICRONS)	15.67	14.33	8.93	6.04	4.10	2.61	1.28	0.77	0.56	<0.56
DM/DLOGD (GRAINS/SCF)		0.00000	0.00041	0.01471	0.02169	0.02968	0.01693	0.00617	0.00000	
GEO MEAN (MICRONS)		14.98	11.31	7.34	4.97	3.27	1.83	1.00	0.66	<0.66
PARTICLE COUNT		0.00D+00	4.54D+03	2.48D+05	5.40D+05	1.12D+06	1.14D+06	7.67D+05	0.00D+00	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 031
TEST DATE - 11-13-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - 0-3-1

% WATER= 3.85
% CARBON DIOXIDE= 18.80
% CARBON MONOXIDE= 0.00
% OXYGEN= 13.30

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 412.0 DEGREES F.
BAR. PRESSURE= 29.02 INCHES HG
STATIC PRESSURE= -0.50 INCHES H2O
AVE. DELTA P= 0.50 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 71.0 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 20.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 412.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.819 CUBIC FEET
DELTA H= 0.41 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.581 CU. FT.
SAMPLE VOL.-WET STD.= 6.844 CU. FT.
STACK VELOCITY= 3000.2 FT./MIN.
NOZZLE VELOCITY= 2814.3 FT./MIN.
MASS COLLECTED= 14.740 MG.
LOADING= 0.03324 GRAIN/SCF
LOADING(DRY)= 0.03457 GRAIN/SCF

DRY MOLECULAR WT.= 31.54
WET MOLECULAR WT.= 31.02
% ISOKINETIC= 93.8
SAMPLING RATE-ACTUAL= 0.584 CU. FT/MIN
CYCLONE BLANK= -0.190 MG.
STAGE BLANK= -0.290 MG.
FILTER BLANK= -0.280 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.646 CU. FT/MIN

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	247.75	394.91	387.93	400.02	373.05	398.57	390.40	410.52	397.47	448.64
TARE WT (MG)	240.46	395.18	388.76	400.06	372.52	395.62	388.16	410.44	398.28	448.89
NET WT (MG) CORRECTED	7.48	0.02	0.00	0.25	0.82	3.24	2.53	0.37	0.00	0.03
FRACTION % OF TOTAL	50.75	0.14	0.00	1.70	5.56	21.98	17.16	2.51	0.00	0.20
CUM. % WITH FILTER	50.75	50.88	50.88	52.58	58.14	80.12	97.29	99.80	99.80	100.00
FRACTION % WITHOUT FILTER	50.85	0.14	0.00	1.70	5.57	22.03	17.20	2.52	0.00	
CUM. % WITHOUT FILTER	50.85	50.99	50.99	52.69	58.26	80.29	97.48	100.00	100.00	
JET VEL. (CM/SEC)	0	51	95	159	263	467	1130	2059	3485	
D50 SIZE (MICRONS)	15.99	14.50	9.03	6.11	4.14	2.64	1.30	0.78	0.57	<0.57
DM/DLOGD (GRAINS/SCF)		0.00106	0.00000	0.00332	0.01098	0.03738	0.01843	0.00376	0.00000	
GEO MEAN (MICRONS)		15.22	11.44	7.42	5.03	3.31	1.85	1.00	0.66	<0.66
PARTICLE COUNT		8.64D+03	0.00D+00	5.53D+04	2.70D+05	1.40D+06	1.23D+06	4.64D+05	0.00D+00	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 041
TEST DATE - 11-12-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - 0-4-1

% WATER= 3.40
% CARBON DIOXIDE= 16.30
% CARBON MONOXIDE= 0.00
% OXYGEN= 10.30

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 409.4 DEGREES F.
BAR. PRESSURE= 29.03 INCHES HG
STATIC PRESSURE= -0.50 INCHES H2O
AVE. DELTA P= 0.53 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 70.2 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 50.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 409.4 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 16.459 CUBIC FEET
DELTA H= 0.33 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 15.910 CU. FT.
SAMPLE VOL.-WET STD.= 16.470 CU. FT.
STACK VELOCITY= 3114.7 FT./MIN.
NOZZLE VELOCITY= 2699.9 FT./MIN.
MASS COLLECTED= 35.270 MG.
LOADING= 0.03305 GRAIN/SCF
LOADING(DRY)= 0.03421 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.643 CU. FT/MIN

DRY MOLECULAR WT.= 31.02
WET MOLECULAR WT.= 30.58
% ISOKINETIC= 86.7
SAMPLING RATE-ACTUAL= 0.560 CU. FT/MIN
CYCLONE BLANK= -0.190 MG.
STAGE BLANK= -0.290 MG.
FILTER BLANK= -0.280 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	226.57	376.11	364.94	374.33	399.27	398.63	400.27	405.46	399.59	441.58
TARE WT (MG)	222.42	375.70	364.46	372.33	395.65	391.46	393.42	401.26	398.96	438.61
NET WT (MG) CORRECTED	4.34	0.70	0.77	2.29	3.91	7.46	7.14	4.49	0.92	3.25
FRACTION % OF TOTAL	12.31	1.98	2.18	6.49	11.09	21.15	20.24	12.73	2.61	9.21
CUM. % WITH FILTER	12.31	14.29	16.47	22.97	34.05	55.20	75.45	88.18	90.79	100.00
FRACTION % WITHOUT FILTER	13.55	2.19	2.40	7.15	12.21	23.30	22.30	14.02	2.87	
CUM. % WITHOUT FILTER	13.55	15.74	18.14	25.30	37.51	60.81	83.10	97.13	100.00	
JET VEL. (CM/SEC)	0	49	91	152	252	448	1084	1976	3343	
D50 SIZE (MICRONS)	16.36	14.79	9.21	6.23	4.23	2.70	1.32	0.79	0.58	<0.58
DM/DLOGD (GRAINS/SCF)		0.01492	0.00351	0.01263	0.02177	0.03579	0.02164	0.01901	0.00630	
GEO MEAN (MICRONS)		15.55	11.67	7.57	5.13	3.38	1.89	1.03	0.68	<0.68
PARTICLE COUNT		1.19D+05	3.72D+04	2.06D+05	5.25D+05	1.31D+06	1.42D+06	2.29D+06	1.15D+06	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 012
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - 0-1-2

% WATER= 2.51
% CARBON DIOXIDE= 17.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 12.00

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 413.3 DEGREES F.
BAR. PRESSURE= 28.80 INCHES HG
STATIC PRESSURE= -0.50 INCHES H2O
AVE. DELTA P= 0.44 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 78.3 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 30.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 413.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 10.423 CUBIC FEET
DELTA H= 0.43 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 9.847 CU. FT.
SAMPLE VOL.-WET STD.= 10.101 CU. FT.
STACK VELOCITY= 2821.3 FT./MIN.
NOZZLE VELOCITY= 2794.3 FT./MIN.
MASS COLLECTED= 30.200 MG.
LOADING= 0.04614 GRAIN/SCF
LOADING(DRY)= 0.04733 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.647 CU. FT/MIN

DRY MOLECULAR WT.= 31.20
WET MOLECULAR WT.= 30.87
% ISOKINETIC= 99.0
SAMPLING RATE-ACTUAL= 0.580 CU. FT/MIN
CYCLONE BLANK= -1.160 MG.
STAGE BLANK= -0.240 MG.
FILTER BLANK= -0.180 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	241.05	388.01	387.49	405.67	383.17	396.46	387.42	393.86	380.85	458.32
TARE WT (MG)	237.60	388.92	387.54	401.48	378.51	389.35	381.18	391.86	381.67	459.04
NET WT (MG) CORRECTED	4.61	0.00	0.19	4.43	4.90	7.35	6.48	2.24	0.00	0.00
FRACTION % OF TOTAL	15.26	0.00	0.63	14.67	16.23	24.34	21.46	7.42	0.00	0.00
CUM. % WITH FILTER	15.26	15.26	15.89	30.56	46.79	71.13	92.58	100.00	100.00	100.00
FRACTION % WITHOUT FILTER	15.26	0.00	0.63	14.67	16.23	24.34	21.46	7.42	0.00	
CUM. % WITHOUT FILTER	15.26	15.26	15.89	30.56	46.79	71.13	92.58	100.00	100.00	
JET VEL. (CM/SEC)	0	51	95	158	261	464	1122	2045	3460	
D50 SIZE (MICRONS)	16.08	14.56	9.07	6.13	4.16	2.65	1.30	0.78	0.57	<0.57
DM/DLOGD (GRAINS/SCF)		0.00000	0.00141	0.03981	0.04445	0.05744	0.03197	0.01541	0.00000	
GEO MEAN (MICRONS)		15.30	11.49	7.45	5.05	3.32	1.86	1.01	0.67	<0.67
PARTICLE COUNT		0.00D+00	1.52D+04	6.61D+05	1.09D+06	2.14D+06	2.13D+06	1.90D+06	0.00D+00	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 022
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - O-2-2

% WATER= 2.69
% CARBON DIOXIDE= 17.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 12.00

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 412.3 DEGREES F.
BAR. PRESSURE= 28.79 INCHES HG
STATIC PRESSURE= -0.50 INCHES H20
AVE. DELTA P= 0.43 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 72.5 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 30.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 412.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 10.861 CUBIC FEET
DELTA H= 0.38 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 10.368 CU. FT. DRY MOLECULAR WT.= 31.29
SAMPLE VOL.-WET STD.= 10.655 CU. FT. WET MOLECULAR WT.= 30.84
STACK VELOCITY= 2788.7 FT./MIN. % ISOKINETIC= 105.6
NOZZLE VELOCITY= 2945.2 FT./MIN. SAMPLING RATE-ACTUAL= 0.611 CU. FT/MIN
MASS COLLECTED= 24.270 MG. CYCLONE BLANK= -1.160 MG.
LOADING= 0.03515 GRAIN/SCF STAGE BLANK= -0.240 MG.
LOADING(DRY)= 0.03612 GRAIN/SCF FILTER BLANK= -0.180 MG.
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.646 CU. FT/MIN

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	246.22	387.30	376.48	422.81	373.11	393.49	388.68	387.91	384.60	437.61
TARE WT (MG)	243.60	387.56	377.15	421.35	369.67	387.37	383.00	385.32	384.96	438.36
NET WT (MG) CORRECTED	3.78	0.00	0.00	1.70	3.68	6.36	5.92	2.83	0.00	0.00
FRACTION % OF TOTAL	15.57	0.00	0.00	7.00	15.16	26.21	24.39	11.66	0.00	0.00
CUM. % WITH FILTER	15.57	15.57	15.57	22.58	37.74	63.95	88.34	100.00	100.00	100.00
FRACTION % WITHOUT FILTER	15.57	0.00	0.00	7.00	15.16	26.21	24.39	11.66	0.00	
CUM. % WITHOUT FILTER	15.57	15.57	15.57	22.58	37.74	63.95	88.34	100.00	100.00	
JET VEL. (CM/SEC)	0	53	100	166	275	489	1182	2155	3647	
D50 SIZE (MICRONS)	15.54	14.17	8.82	5.96	4.05	2.58	1.26	0.76	0.55	<0.55
DM/DLOGD (GRAINS/SCF)		0.00000	0.00000	0.01448	0.03162	0.04707	0.02764	0.01840	0.00000	
GED MEAN (MICRONS)		14.84	11.18	7.25	4.91	3.23	1.80	0.98	0.64	<0.64
PARTICLE COUNT		0.00D+00	0.00D+00	2.47D+05	7.97D+05	1.80D+06	1.90D+06	2.33D+06	0.00D+00	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 032
TEST DATE - 11-16-81
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - 0-3-2

% WATER= 3.71
% CARBON DIOXIDE= 17.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 12.00

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 412.3 DEGREES F.
BAR. PRESSURE= 28.82 INCHES HG
STATIC PRESSURE= -0.50 INCHES H20
AVE. DELTA P= 0.48 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 76.9 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 40.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 412.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 14.049 CUBIC FEET
DELTA H= 0.44 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 13.318 CU. FT.
SAMPLE VOL.-WET STD.= 13.831 CU. FT.
STACK VELOCITY= 2952.6 FT./MIN.
NOZZLE VELOCITY= 2864.2 FT./MIN.
MASS COLLECTED= 32.860 MG.
LOADING= 0.03666 GRAIN/SCF
LOADING(DRY)= 0.03808 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.646 CU. FT/MIN

DRY MOLECULAR WT.= 31.20
WET MOLECULAR WT.= 30.71
% ISOKINETIC= 97.0
SAMPLING RATE-ACTUAL= 0.594 CU. FT/MIN
CYCLONE BLANK= -1.160 MG.
STAGE BLANK= -0.240 MG.
FILTER BLANK= -0.180 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	245.83	391.82	381.44	398.10	392.06	405.24	399.62	404.78	391.51	459.80
TARE WT (MG)	241.02	391.79	382.06	396.74	389.90	399.58	392.29	400.33	389.73	457.54
NET WT (MG) CORRECTED	5.97	0.27	0.00	1.60	2.40	5.90	7.57	4.69	2.02	2.44
FRACTION % OF TOTAL	18.17	0.82	0.00	4.87	7.30	17.95	23.04	14.27	6.15	7.43
CUM. % WITH FILTER	18.17	18.99	18.99	23.86	31.16	49.12	72.15	86.43	92.57	100.00
FRACTION % WITHOUT FILTER	19.63	0.89	0.00	5.26	7.89	19.40	24.88	15.42	6.64	
CUM. % WITHOUT FILTER	19.63	20.51	20.51	25.77	33.66	53.06	77.94	93.36	100.00	
JET VEL. (CM/SEC)	0	52	97	162	267	475	1150	2096	3547	
D50 SIZE (MICRONS)	15.81	14.37	8.95	6.05	4.10	2.62	1.28	0.77	0.56	<0.56
DM/DLOGD (GRAINS/SCF)		0.00723	0.00000	0.01050	0.01589	0.03365	0.02725	0.02353	0.01635	
GEO MEAN (MICRONS)		15.07	11.34	7.36	4.98	3.28	1.83	0.99	0.66	<0.66
PARTICLE COUNT		5.94D+04	0.00D+00	1.77D+05	3.95D+05	1.27D+06	1.84D+06	2.94D+06	3.09D+06	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 042
TEST DATE - 11-14-91
PROJECT # - 4892L-63
TEST SITE - MONARCH CEMENT
RUN ID - 0-4-2

% WATER= 3.35
% CARBON DIOXIDE= 18.80
% CARBON MONOXIDE= 0.00
% OXYGEN= 14.00

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 407.0 DEGREES F.
BAR. PRESSURE= 28.78 INCHES HG
STATIC PRESSURE= -0.50 INCHES H20
AVE. DELTA P= 0.52 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 62.4 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 40.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 407.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 13.932 CUBIC FEET
DELTA H= 0.36 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 13.552 CU. FT.
SAMPLE VOL.-WET STD.= 14.022 CU. FT.
STACK VELOCITY= 3058.9 FT./MIN.
NOZZLE VELOCITY= 2890.2 FT./MIN.
MASS COLLECTED= 37.030 MG.
LOADING= 0.04076 GRAIN/SCF
LOADING(DRY)= 0.04217 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.640 CU. FT/MIN

DRY MOLECULAR WT.= 31.57
WET MOLECULAR WT.= 31.11
% ISOKINETIC= 94.5
SAMPLING RATE-ACTUAL= 0.599 CU. FT/MIN
CYCLONE BLANK= -1.250 MG.
STAGE BLANK= -0.260 MG.
FILTER BLANK= -0.160 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	247.18	389.60	373.18	399.02	399.04	403.73	394.41	393.27	384.88	437.72
TARE WT (MG)	241.85	390.20	373.46	396.72	387.38	397.85	387.66	390.71	385.30	438.28
NET WT (MG) CORRECTED	6.58	0.00	0.00	2.56	11.92	6.14	7.01	2.82	0.00	0.00
FRACTION % OF TOTAL	17.77	0.00	0.00	6.91	32.19	16.58	18.93	7.62	0.00	0.00
CUM. % WITH FILTER	17.77	17.77	17.77	24.68	56.87	73.45	92.38	100.00	100.00	100.00
FRACTION % WITHOUT FILTER	17.77	0.00	0.00	6.91	32.19	16.58	18.93	7.62	0.00	
CUM. % WITHOUT FILTER	17.77	17.77	17.77	24.68	56.87	73.45	92.38	100.00	100.00	
JET VEL. (CM/SEC)	0	52	98	163	270	480	1160	2115	3579	
D50 SIZE (MICRONS)	15.63	14.27	8.89	6.01	4.08	2.60	1.27	0.76	0.56	<0.56
DM/DLOGD (GRAINS/SCF)		0.00000	0.00000	0.01657	0.07787	0.03455	0.02490	0.01397	0.00000	
GEO MEAN (MICRONS)		14.94	11.26	7.31	4.95	3.26	1.82	0.99	0.65	<0.65
PARTICLE COUNT		0.00D+00	0.00D+00	2.81D+05	1.95D+06	1.31D+06	1.69D+06	1.75D+06	0.00D+00	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

APPENDIX G

PRELIMINARY TEST DATA

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G-1 Inlet to No. 5 Kiln 10-Cell Baghouse

G-1-1 EPA Methods 1 and 2 - Velocity Traverse--Raw Field Data

MIDWEST RESEARCH INSTITUTE

RUN 1 - Preliminary Traverse

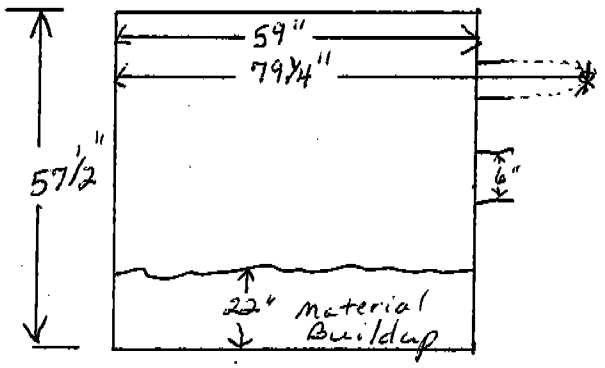
MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Baghouse Inlet - 10 cell
Sampling Date 11-11-81

FIELD CREW

Crew Chief		M. Hansen
Testing Engineer	1	E. Whited
	2	G. Cabb
	3	
Engr. Technician	1	K. Hall
	2	M. Hansen
	3	M. Gabriel
Lab Technician	1	
	2	
	3	
Process Engineer	1	
	2	
Other	1	
	2	

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Monarch
DATE 11-11-81
SAMPLING LOCATION 10 cell Bag Inlet
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE A) 79.25"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE B) 20.25
STACK I.D.. (DISTANCE A - DISTANCE B) 59.0"
NEAREST UPSTREAM DISTURBANCE 15"
NEAREST DOWNSTREAM DISTURBANCE 27-29"
CALCULATOR M. Hansen, E. Whited



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	Decimal Equivalent ~~FRACTION~~ OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
12	56.542"	59"	56 9/16"	20.25	76 13/16"
11	51.625"		51 5/8"		71 7/8"
10	46.71"		46 11/16"		~~66~~ 67"
9	41.792"		41 13/16"		62"
8	36.875"		36 7/8"		57 1/8"
7	31.96		32"		52 3/16
6	27"		27"		47 1/4
5	22.125"		22 1/8"		42 3/8"
4	17.20"		17 3/16"		37 7/16"
3	12.29		12 5/16"		32 1/2"
2	7.375		7 3/8"		27 5/8"
1	2.50		2 1/2"		22 3/4"

FILE NAME - IPRE
RUN # - I-PRE
LOCATION - MONARCH CEMENT
DATE - 11-11-81
PROJECT # - 4892L-63

BAROMETRIC PRESSURE (IN. HG)=	29.12
STATIC PRESSURE (INCHES H20)=	9.50
PERCENT OXYGEN=	3.90
PERCENT CARBON DIOXIDE=	8.90
MOISTURE COLLECTED (ML)=	5.7
PERCENT WATER=	12.00
AVERAGE DELTA P (IN. H20)=	2.33
AVERAGE STACK TEMPERATURE (F.)=	532.0
DRY MOLECULAR WEIGHT=	29.580
WET MOLECULAR WEIGHT=	28.190
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.5247
PITOT COEFFICIENT=	0.8400
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	59.00
STACK AXIS #2 (INCHES)=	35.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	14.545
STACK VELOCITY (ACTUAL, FEET/MIN)=	7,136
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	103,791
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	55,056
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	48,449

* * METRIC UNITS * *

BAROMETRIC PRESSURE (MM HG)=	739.65
STATIC PRESSURE (MM H20)=	241.3
PERCENT OXYGEN=	3.90
PERCENT CARBON DIOXIDE=	8.90
MOISTURE COLLECTED (ML)=	5.7
PERCENT WATER=	12.00
AVERAGE DELTA P (MM H20)=	59.2
AVERAGE STACK TEMPERATURE (C.)=	277.8
DRY MOLECULAR WEIGHT=	29.580
WET MOLECULAR WEIGHT=	28.190
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	7.6842
PITOT COEFFICIENT=	0.8400
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	1.499
STACK AXIS #2 (METERS)=	0.902
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.351

STACK VELOCITY (ACTUAL, M/MIN)=	2,175
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,939
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,559
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,372

FILE NAME - IPRE
RUN # - I-PRE
LOCATION - MONARCH CEMENT
DATE - 11-11-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	STACK T. (F.)
1	2.30	525
2	2.40	530
3	2.40	535
4	2.45	536
5	2.35	531
6	2.30	528
7	2.10	535
8	2.90	535
9	2.00	518
10	2.10	526
11	2.40	532
12	2.60	539
13	2.00	546

G-1-3 EPA Method 3 - Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight--Raw Field Data

MIDWEST RESEARCH INSTITUTE

RUN 1 - Inlet Fyrite

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-12-81

FIELD CREW

Crew Chief M. Hansen

Testing Engineer 1 E. Whited
2
3

Engr. Technician 1 K. Hall
2
3

Lab Technician 1
2
3

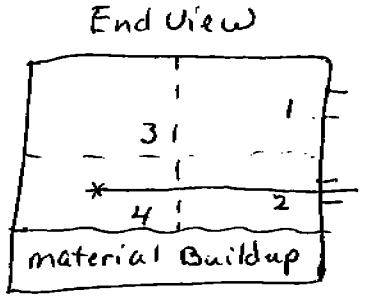
Process Engineer 1
2

Other 1
2

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Monarch
DATE 11-12-81
SAMPLING TIME (24-hr CLOCK) 0820
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 52°F
OPERATOR Whited

COMMENTS:



GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	19.5		20		21.5		20.33	44/100	8.945
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	13		12		12		12.33	32/100	3.946
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	0
N_2 (NET IS 100 MINUS ACTUAL CO READING)							67.34	28/100	18.855
								TOTAL	31.746

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EPA (Dur) 230
4/72

MIDWEST RESEARCH INSTITUTE

RUN 2 - Fyrite

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Gabriel
2 Hall
3

Engr. Technician 1
2
3

Lab Technician 1
2
3

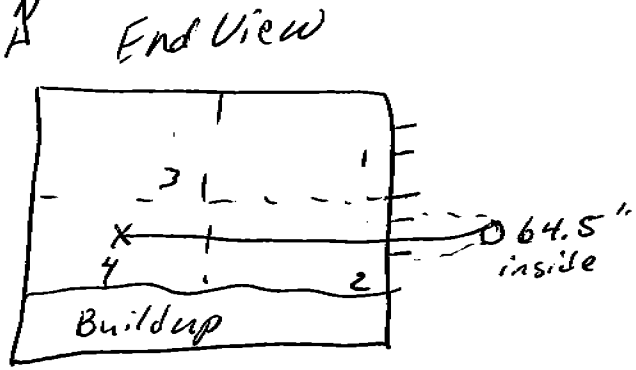
Process Engineer 1
2

Other 1
2

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Monarch
DATE 11-13-81
SAMPLING TIME (24-hr CLOCK) 0940
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS (GRAB)) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 62° F
OPERATOR Gabriel / Hansen

COMMENTS:



GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	21.0 ~~24.0~~		20.5		21.5		21	44/100	9.24
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	7.5		8.0		7.75		7.75	32/100	2.48
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0		0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							71.25	28/100	19.95
								TOTAL	31.67

EPA (Dur) 230
4/72

MIDWEST RESEARCH INSTITUTE

RUN 3 - Fyrite

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bay ~~Seattle~~ Inlet
Sampling Date 11-14-91

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 Gabriel
2
3

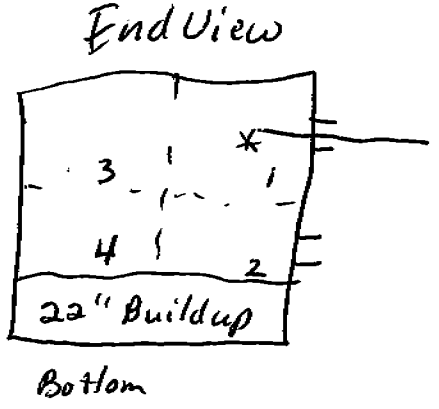
Process Engineer 1
2

Other 1
2

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Monarch
DATE 11-14-81
SAMPLING TIME (24-hr CLOCK) 0826
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS (GRAB)) GRAB
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE ~~50°F~~ 42°F
OPERATOR Hansen, Olson, Hall

COMMENTS:



RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	20.5		20.5		21.5		20.83	44/100	9.17
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	10.0		10.0		9.0		9.67	32/100	3.09
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	0
N_2 (NET IS 100 MINUS ACTUAL CO READING)							69.50	28/100	19.46
								TOTAL	31.72

EPA (Dur) 230
4/72

MIDWEST RESEARCH INSTITUTE

RUN 4 - Fyrite

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-15-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2 Olson
3 Hall

Engr. Technician 1
2
3

Lab Technician 1
2
3

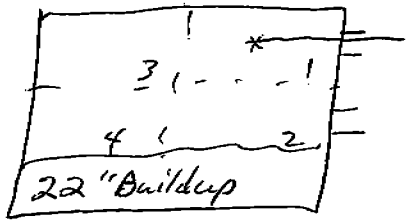
Process Engineer 1
2

Other 1
2

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Monarch
DATE 11-15-81
SAMPLING TIME (24-hr CLOCK) 0953
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS (GRAB)) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 80°F on stack
OPERATOR Hall, Hansen, Olson

COMMENTS: N End View



GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	21.5		22		21		21.5	44/100	9.46
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	11		10		11		10.67	32/100	3.41
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	0
N_2 (NET IS 100 MINUS ACTUAL CO READING)							67.83	28/100	18.99
								TOTAL	31.86

EPA (Dur) 230
4/72

G-2 No. 5 Kiln Common Outlet Stack from the 10-Cell and 3-Cell Baghouses

G-2-1 EPA Methods 1 and 2 - Velocity Traverse--Raw Field Data

MIDWEST RESEARCH INSTITUTE

RUN Pre. Traverse

MRI Project Number 4292-263
Field Dates
Plant Monarch Cement
Sampling Location Outlet
Sampling Date 11-11-81

FIELD CREW

Crew Chief Hanson

Testing Engineer 1 Cobb/Gabriel
2
3

Engr. Technician 1
2
3

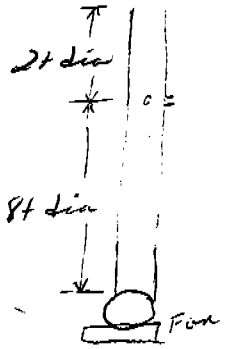
Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Monarch Cement
DATE 11-11-81
SAMPLING LOCATION Outlet
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 87"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 4½"
STACK I.D., (DISTANCE A - DISTANCE B) 82½"
NEAREST UPSTREAM DISTURBANCE 2+
NEAREST DOWNSTREAM DISTURBANCE 8+
CALCULATOR Cobb



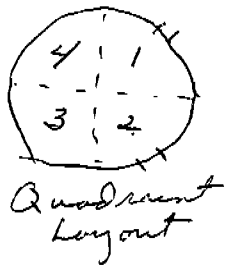
SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	.044	82½"	3.63 3⅝"	4½"	8⅛"
2	.146		12.045 12"		16½"
3	.296		24.42 24⅜"		28⅞"
4	.704		58.08 58⅛"		62⅝"
5	.854		70.455 70½"		75"
6	.956		78.87 78⅞"		83⅜"
Quad 1			12.375 12⅜"		16⅞"
Quad 2			12.375 12⅜"		16⅞"
Quad 3			70.125 70⅛"		74⅝"
Quad 4			70.125 70⅛"		74⅝"

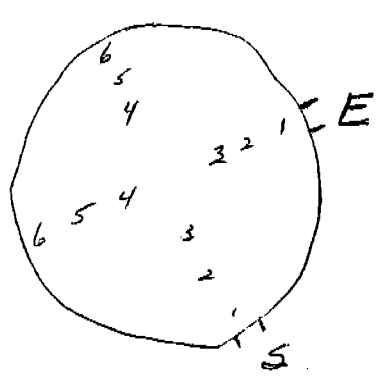
EPA (Dur) 232
4 72

PRELIMINARY VELOCITY TRAVERSE

PLANT Monarch Cement
DATE 11-11-91
LOCATION Outlet
STACK I.D. 52 5"
BAROMETRIC PRESSURE, IN. Hg 29.12
SITE TO BARO. ELEVATION (ft.)
CORRECTED BARO. PRESSURE
PITOT(Cp) .84
TIME (24 HR.) 1345
OPERATORS Cobb / Gabriel
STACK GAUGE PRES. (STATIC, IN. H_2O) -.50
PITOT LEAK CK. AT ≥3" H_2O) OK
REMARKS:



Quadrant Layout



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD ΔPs, IN. H_2O	STACK TEMP. Ts, °F	CYCLONIC FLOW DET. ΔPs AT 0° REFERENCE	CYCLONIC FLOW DET. ANGLE (α) WHICH YIELDS A NULL ΔP
5-1	.35	402	0	0
2	.37	406	0.02 ~~02~~	8Q
3	.41	410	0.02	2
4	.46	413	.01	3
5	.45	411	.04	8
6	.41	409	0	0
~~Point 2~~				
~~Point 4~~				
E-1	.26	403	0	0
2	.40	407	.01	4
3	.42	412	0	0
4	.44	410	.4	6
5	.45	409	.36	2
6	.40	404	.03	5
AVERAGES	0.40	408	N/A	3.2 *

TRAVERSE POINT NUMBER	VELOCITY HEAD ΔPs, IN. H_2O	STACK TEMP. Ts, °F	CYCLONIC FLOW DET. ΔPs AT 0° REFERENCE	CYCLONIC FLOW DET. ANGLE (α) WHICH YIELDS A NULL ΔP
Quad 2	.37	406	0.02	8
4	.45	411	0.04	8
1	.4	407	0.01	4
3	.45	409	0.36	2
AVERAGES				*

* AVERAGE OF α MUST BE ≤10 DEGREES TO BE ACCEPTABLE.

G-2-2 EPA Methods 1 and 2 - Velocity Traverse--Computer Data

FILE NAME - OPRE
RUN # - O-PRE
LOCATION - MONARCH CEMENT
DATE - 11-11-81
PROJECT # - 4892L-63

BAROMETRIC PRESSURE (IN. HG)=	29.12
STATIC PRESSURE (INCHES H20)=	-0.50
PERCENT OXYGEN=	3.30
PERCENT CARBON DIOXIDE=	7.17
MOISTURE COLLECTED (ML)=	5.7
PERCENT WATER=	12.00
AVERAGE DELTA P (IN. H20)=	0.40
AVERAGE STACK TEMPERATURE (F.)=	408.0
DRY MOLECULAR WEIGHT=	29.279
WET MOLECULAR WEIGHT=	27.926
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.6322
PITOT COEFFICIENT=	0.8400
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	82.50
STACK AXIS #2 (INCHES)=	82.50
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	37.122
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,816
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	104,528
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	61,806
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	54,389

* * METRIC UNITS * *

BAROMETRIC PRESSURE (MM HG)=	739.65
STATIC PRESSURE (MM H20)=	-12.7
PERCENT OXYGEN=	3.30
PERCENT CARBON DIOXIDE=	7.17
MOISTURE COLLECTED (ML)=	5.7
PERCENT WATER=	12.00
AVERAGE DELTA P (MM H20)=	10.2
AVERAGE STACK TEMPERATURE (C.)=	208.9
DRY MOLECULAR WEIGHT=	29.279
WET MOLECULAR WEIGHT=	27.926
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	3.1863
PITOT COEFFICIENT=	0.8400
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	2.096
STACK AXIS #2 (METERS)=	2.096
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	3.449
STACK VELOCITY (ACTUAL, M/MIN)=	858
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,960
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,750
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,540

FILE NAME - OPRE
RUN # - O-PRE
LOCATION - MONARCH CEMENT
DATE - 11-11-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H20)	STACK T. (F.)
1	0.35	402
2	0.37	406
3	0.41	410
4	0.46	413
5	0.45	411
6	0.41	409
7	0.26	403
8	0.40	407
9	0.42	412
10	0.44	410
11	0.45	409
12	0.40	404

G-2-3 EPA Method 3 - Gas Analyis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight--Raw Field Data

MIDWEST RESEARCH INSTITUTE

RUN 1-Fyrite

MRI Project Number 4892-L03
Field Dates
Plant Monarch Cement
Sampling Location Inlet
Sampling Date 11-12-81

FIELD CREW

Crew Chief Hanson

Testing Engineer 1 Cobb / Gabriel
2
3

Engr. Technician 1
2
3

Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Monarch Cement
DATE 11-12-81
SAMPLING TIME (24-hr CLOCK) 0800
SAMPLING LOCATION outlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 36° F
OPERATOR Cobb / Gabriel

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	16.0	/	16.5		16.5	/	16.3	44/100	7.17
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	10.0	/	10.5		10.5	/	10.3	32/100	3.30
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0	/	0	/	0	/		28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.4	28/100	20.55
								TOTAL	31.02

EPA (Dur) 230
4/72

MIDWEST RESEARCH INSTITUTE

RUN 2- ~~Fre~~ Fyrite

MRI Project Number 4892-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

MRI - Form PO (10/72)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Monarch Cement

DATE 11-14-81

SAMPLING TIME (24-hr CLOCK) 0945

SAMPLING LOCATION Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab

ANALYTICAL METHOD Fyrite

AMBIENT TEMPERATURE 70°F

OPERATOR Cech

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	19.5		19		18		18.8	44/100	8.27
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	14.5		14		13.5		14	32/100	4.48
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							67.2	28/100	18.82
								TOTAL	31.57

EPA (Dur) 230
4/72

G-3 No. 5 Kiln Bypass to 3-Cell Baghouse

G-3-1 EPA Methods 1 and 2 - Velocity Traverse--Raw Field Data

MIDWEST RESEARCH INSTITUTE

RUN 1 - Preliminary Traverse

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location No. 5 kiln Bypass to 3-cell baghouse
Sampling Date 11-12-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2 Cobb
3

Engr. Technician 1 Whited
2 Hall
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

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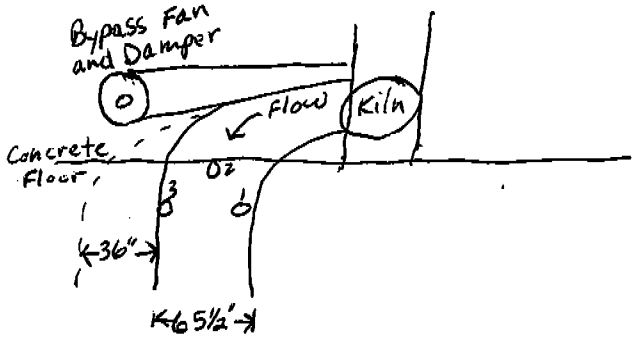
TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Monarch
DATE 11-12-81
SAMPLING LOCATION No. 5 Kiln Bypass to 3-cell Daghouse
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE A) 31
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE. (DISTANCE B) 7
STACK I.D.. (DISTANCE A - DISTANCE B) 24"
NEAREST UPSTREAM DISTURBANCE 36"
NEAREST DOWNSTREAM DISTURBANCE ≥ 36"
CALCULATOR M. Hansen



SCHEMATIC OF SAMPLING LOCATION

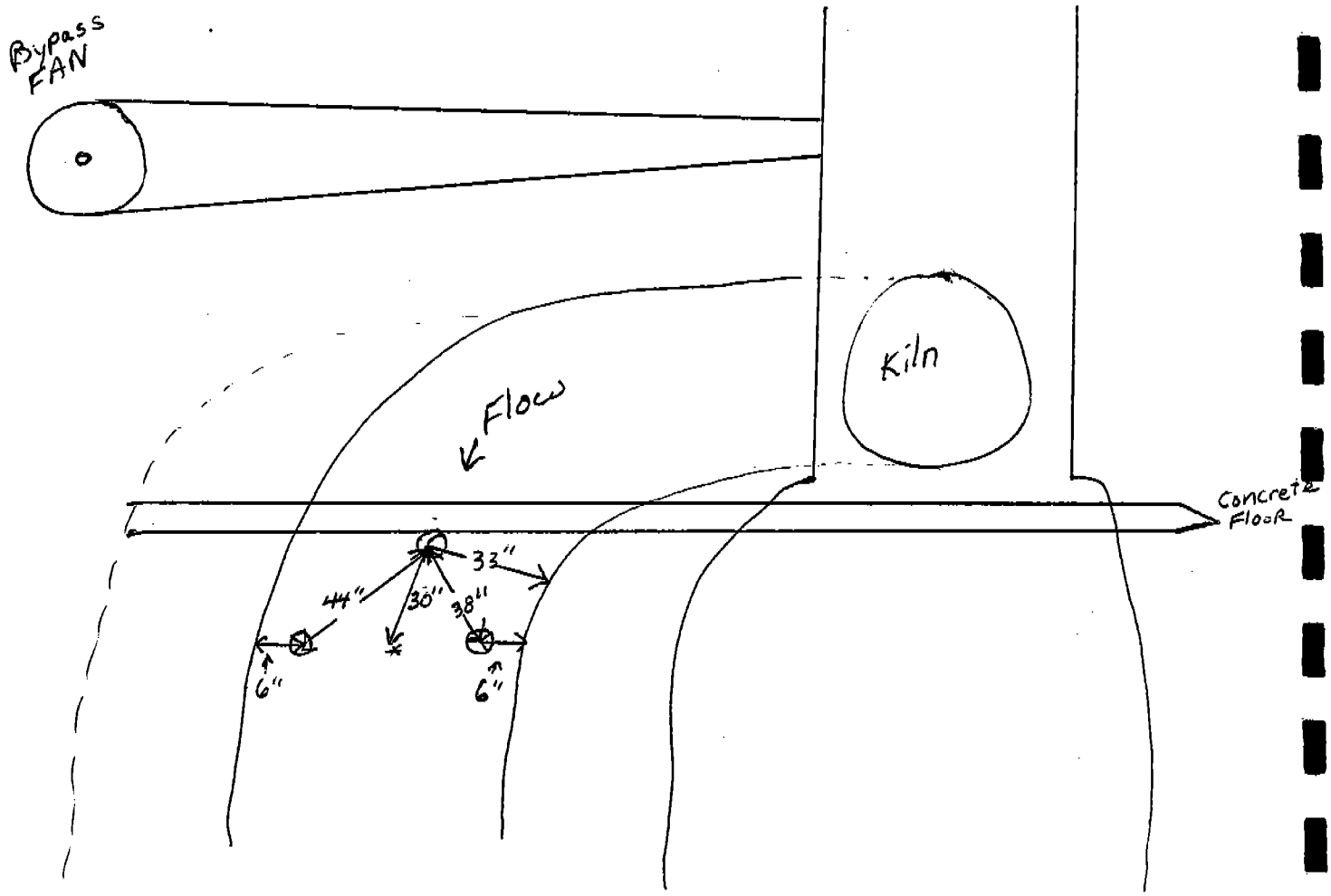
Remarks: Material Buildup on all walls

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	NA	24"	3"	7"	10"
2		↓	9"	↓	16"
3			15"		22"
4			21"		28"

EPA (Dur) 232
4 72

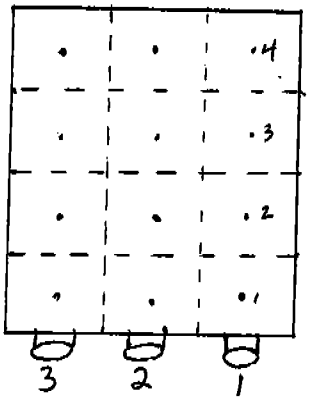
Copied from original

Traverse Point Location For Circular Ducts
Page 2 of 2
No. 5 Kiln Bypass to 3-cell baghouse



PRELIMINARY VELOCITY TRAVERSE

PLANT Monarch
DATE 11-12-81
LOCATION Bypass to 3-cell baghouse
STACK I.D. 24"
BAROMETRIC PRESSURE, IN. Hg 29.11
SITE TO BARO. ELEVATION (ft.) 30 ft
CORRECTED BARO. PRESSURE
PITOT(Cp) .84
TIME (24 HR.) 1002
OPERATORS Hansen, Hall, Gabriel, Whited, Cobb
STACK GAUGE PRES. (STATIC, IN. H_2O) -1.85"
PITOT LEAK CK. AT ≥3" H_2O) Initial 0.00, Final 0.00
REMARKS: Plant operator said the duct had 4" of insulation material as a liner.



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD ΔPs, IN. H_2O	STACK TEMP. Ts, °F	CYCLONIC FLOW DET. ΔPs AT 0° REFERENCE	CYCLONIC FLOW DET. ANGLE (α) WHICH YIELDS A NULL ΔP
1-1	.19	579	.12	11
2	.24	654	.18	15
3	.31	652	.13	15
4	.42	664	.25	19
2-1	.20	799	.14	8
2	.28	825	.28	4
3	.29	848	.10	1
4	.33	650	.22	19
static	2-3 =	-1.85"	H_2O	
3-1	.14	792	.08	8
2	.16	795	.12	9
3	.07	790	.12	19
4	.06	780	.08	24
AVERAGES	0.22	736	0.15	13 *

TRAVERSE POINT NUMBER	VELOCITY HEAD ΔPs, IN. H_2O	STACK TEMP. Ts, °F	CYCLONIC FLOW DET. ΔPs AT 0° REFERENCE	CYCLONIC FLOW DET. ANGLE (α) WHICH YIELDS A NULL ΔP
AVERAGES				*

* AVERAGE OF α MUST BE ≤10 DEGREES TO BE ACCEPTABLE.

Copied from original

G-3-2 EPA Methods 1 and 2 - Velocity Traverse--Computer Data

FILE NAME - BPRE
RUN # - B-PRE
LOCATION - MONARCH CEMENT
DATE - 11-12-81
PROJECT # - 4892L-63

BAROMETRIC PRESSURE (IN. HG)=	29.11
STATIC PRESSURE (INCHES H20)=	-1.85
PERCENT OXYGEN=	18.00
PERCENT CARBON DIOXIDE=	6.83
MOISTURE COLLECTED (ML)=	0.0
PERCENT WATER=	12.00
AVERAGE DELTA P (IN. H20)=	0.22
AVERAGE STACK TEMPERATURE (F.)=	735.7
DRY MOLECULAR WEIGHT=	29.813
WET MOLECULAR WEIGHT=	28.396
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.4586
PITOT COEFFICIENT=	0.8400
NOZZLE DIAMETER (INCHES)=	0.1900
STACK AXIS #1 (INCHES)=	24.00
STACK AXIS #2 (INCHES)=	57.50
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	9.583
STACK VELOCITY (ACTUAL, FEET/MIN)=	2,382
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	22,827
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	9,762
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	8,590

* * METRIC UNITS * *

BAROMETRIC PRESSURE (MM HG)=	739.39
STATIC PRESSURE (MM H20)=	-47.0
PERCENT OXYGEN=	18.00
PERCENT CARBON DIOXIDE=	6.83
MOISTURE COLLECTED (ML)=	0.0
PERCENT WATER=	12.00
AVERAGE DELTA P (MM H20)=	5.7
AVERAGE STACK TEMPERATURE (C.)=	390.9
DRY MOLECULAR WEIGHT=	29.813
WET MOLECULAR WEIGHT=	28.396
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	2.3115
PITOT COEFFICIENT=	0.8400
NOZZLE DIAMETER (MM)=	4.83
STACK AXIS #1 (METERS)=	0.610
STACK AXIS #2 (METERS)=	1.461
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	0.890
STACK VELOCITY (ACTUAL, M/MIN)=	726
FLOW RATE (ACTUAL, CUBIC M/MIN)=	646
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	276
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	243

FILE NAME - BPRE
RUN # - B-PRE
LOCATION - MONARCH CEMENT
DATE - 11-12-81
PROJECT # - 4892L-63

POINT #	DELTA P (IN. H2O)	STACK T. (F.)
1	0.19	579
2	0.24	654
3	0.31	652
4	0.42	664
5	0.20	799
6	0.28	825
7	0.29	848
8	0.33	650
9	0.14	792
10	0.16	795
11	0.07	790
12	0.06	780

G-3-3 EPA Method 3 - Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight--Raw Field Data

MIDWEST RESEARCH INSTITUTE

RUN 1 - Bypass Fyrite

MRI Project Number 4892-463
Field Dates
Plant Monarch
Sampling Location By Pass
Sampling Date 11-12-81

FIELD CREW

Crew Chief Hansen

Testing Engineer
1 Whited
2 Hall
3

Engr. Technician
1 Cobb
2 Hansen
3

Lab Technician
1
2
3

Process Engineer
1
2

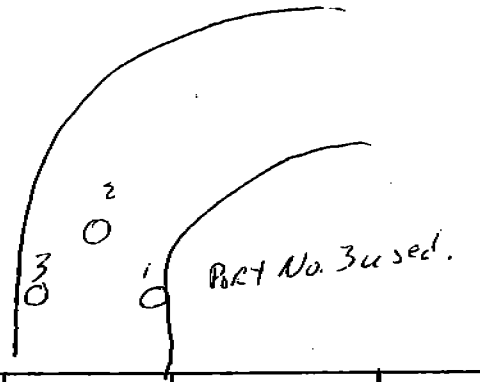
Other
1
2

S

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Monarch
DATE 11-12-81
SAMPLING TIME (24-hr CLOCK) 1108
SAMPLING LOCATION Bypass
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS (GRAB)) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 100°F
OPERATOR Hansen, Whited, Hall, Cobb

COMMENTS:



RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	7.5		6.0		7		6.833	44/100	3.007
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18		18		18		18	32/100	5.760
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	0
N_2 (NET IS 100 MINUS ACTUAL CO READING)							75.167	28/100	21.047
								TOTAL	29.814

EPA (Dur) 230
4/72

APPENDIX H

RAW FIELD DATA

		Page
H-1	Inlet to No. 5 Kiln 10-Cell Baghouse	H-3
H-1-1	Total Mass - EPA Method 5.	H-5
H-1-2	Particle Size - Andersen High Capacity Stack Sampler with 15 μm Preseparator.	H-63
H-2	No. 5 Kiln Common Outlet Stack from the 10-Cell and 3-Cell Baghouse.	H-161
H-2-1	Total Mass - EPA Method 17	H-163
H-2-2	Particle Size - Andersen Mark III Impactor with 15 μm Preseparator	H-221

H-1 Inlet to No. 5 Kiln 10-Cell Baghouse

H-1-1 Total Mass - EPA Method 5

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-1-1

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bay Inlet
Sampling Date 11-14-81

FIELD CREW

Crew Chief: Hansen

Testing Engineer: 1 Hansen; 2; 3

Engr. Technician: 1 Hall; 2; 3

Lab Technician: 1 Gabriel; 2 ~~Walker~~ Olson; 3

Process Engineer: 1; 2

Other: 1; 2

NOMOGRAPH DATA

PLANT Monarch

DATE 11-14-81

SAMPLING LOCATION Bag Inlet

I-1-1

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.858
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	57
PERCENT MOISTURE IN GAS STREAM BY VOLUME (Assumed)	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.02
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O) (+9.5)	P_s	29.72
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.02
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	540
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	2.5
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		.98
CALCULATED NOZZLE DIAMETER, in.		.190
ACTUAL NOZZLE DIAMETER, in.		.190
REFERENCE Δp, in. H_2O		2.45

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch
Sampling Location Bag Inlet
Test Number I-1-1

Date 11-14-81
Initial MOH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

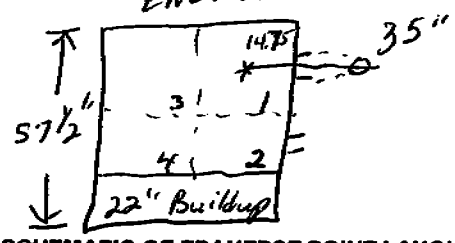
Assumed average meter temperature, °F	Tm_{avg}	57
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.95
Nozzle diameter, inches	Dn	.190
Barometric pressure, inches Hg	Pb	29.02
$\frac{5.168\ (57 + 460)\ (.84)\ (3)\ (.95)\ (.190^2)}{\sqrt{29.02}}$	K	42.86

FIELD DATA

PLANT Monarch
DATE 11-14-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulate
RUN NUMBER I-1-1
OPERATOR Hansen
BAROMETRIC PRESSURE 29.02
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. N/A
STATIC PRESSURE (P_g) +9.5" H_2O
FILTER NUMBER(s) 5

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at 5.5 " Hg, CFM 0.00
Pilot at ≥3" H_2O Initial 0.00
Final

ENDVIEW



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 3 Minutes

PROBE LENGTH AND TYPE 6', SS with Flex line
NOZZLE I.D. .190
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER 6
METER BOX NUMBER 5
TEMPERATURE METER NO. 9517
METER ΔH@ 1.858
METER CORRECTION .976
C FACTOR .98
REFERENCE Δp 2.45

$VM = 42.86 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min	GAS METER READING (V_m), ft^3 Desired	GAS METER READING (V_m), ft^3 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
1	0 0956	942.598										
	3 0959	946.24	946.47	2.25	1.75	1.75	535	63	62	3.0	259	–
	6 1002	948.34	948.598	2.40	1.85	1.75	542	68	62	5.5	256	50

COMMENTS:

6-H

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-14-81
Sampling Location Bay Inlet Name Hansen
Run Number I-1-1

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.25  1.75 535
63  62
2.40  1.75 542
68  62

I. VOL=944.201
F. VOL=948.598
M FACTOR=0.976
LK CK=0.
B. P=29.02
STATIC P=9.5
%02=9.67
%C02=20.83
MLS H20=2.4
% H20=   2.61
CP=   0.84
TIME=   6.00
NOZZLE D=0.19
NET VOL=4.291472
DS VOL=   4.213
STACK P=  29.718
AVE M T=  63.750
√DP=   1.524
DH=   1.750
ST T= 538.500
DRY MW=  31.719
WET MW=  31.361
% ISO= 102.556
STACK V= 6798
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. 6
Sample Type Particulate

Run No. I-1-1
Sample Date 11-14-81
Recovery Date 11-14-81
Cleanup Person Gabriel

Filter No. 5
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	H_2O			
Final Volume (wt)[b]	100	100			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	0	0			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 24

SILICA GEL

	717.7
	715.3
	2.4

Silica Gel Color blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____

Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-L(63)
Source Identification Bag Inlet
Test Run Number I-1-1
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	0956-1002		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-14-81		Hansen	
Train Disassembly	11-14-81		Gabriel	
Train Cleanout	11-1481		Gabriel	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Hall/Cook	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Meth. 5

RUN ~~C-1-1~~ I-2-1

MRI Project Number 4892-L(63)
Field Dates
Plant 11-12-81
Sampling Location Bag ~~Outlet~~ Inlet
Sampling Date 11-12-81

FIELD CREW

Crew Chief M. Hansen

Testing Engineer 1 E. Whited
2
3

Engr. Technician 1 M. Hansen
2 K. Hall
3

Lab Technician 1 M. Gabriel
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Monarch

DATE 11-12-81

SAMPLING LOCATION Baghouse Inlet
~~0-1-1~~ I-2-1

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F (72)	$T_{m_{avg.}}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME (Assumed)	% H_2O	10
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.11
STATIC PRESSURE IN STACK, in. Hg (+9.5") ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.81
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.02
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	550
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	2.31
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	2.90
C FACTOR		.95
CALCULATED NOZZLE DIAMETER, in.		.194
ACTUAL NOZZLE DIAMETER, in.		.190 #43
REFERENCE Δp, in. H_2O		2.60

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch
Sampling Location Bag Inlet
Test Number I-2-1

Date 11-12-81
Initial MDH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	85
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.90
Nozzle diameter, inches	Dn	.190
Barometric pressure, inches Hg	Pb	29.11
$\frac{5.168\ (85 + 460)\ (.84)\ (3)\ (.9)\ (.1902)}{\sqrt{29.11}}$	K	42.74

WET MW= 30.572
% ISO= 90.128
STACK %= 7161

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PROBE LENGTH AND TYPE 8' SS
NOZZLE I.D. .190 10
ASSUMED MOISTURE, % 10
SAMPLE BOX NUMBER 6
METER BOX NUMBER 8
TEMPERATURE METER NO. 95.7
METER ΔH@ 1.957 1.045
METER CORRECTION 1.045
C FACTOR .95
REFERENCE Δp 2.60

$$VM = 43.74 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

METER ATURE	OUTLET (Tm out), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				50
68	67	2.0	370	370
		8.5	369	369
	64.75			

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bay Inlet
Sample Box No. 6
Sample Type Particulate

Run No. I-2-1
Sample Date 11-12-81
Recovery Date M. Gabriel
Cleanup Person M. Gabriel

Filter No. 2
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S	M	M	
Impinger Solution	H2O	H2O			
Final Volume (wt)[b]	104	102			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	4	2			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed
Description of Impinger Solution 2.
Total Moisture, gm 7.5 gm

SILICA GEL

751.5
250.0
1.5
Silica Gel
Color yellow

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked 6 ml Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Kent Hall MKT Cur. Date Shipped: 11-16-81
Remarks:

Date of laboratory custody 11-12-81 Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

102

SAMPLE HANDLING LOG

Project Number 4892-2163

Source Identification Bag Inlet

Test Run Number I-2-1

Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-12-81	1450-1456		Console No. 8 pump quit running.
Probe Technician			Whited, Hall	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-12-81	1515	Whited	
Train Disassembly	11-12-81	1533	Gabriel	
Train Cleanout	11-12-81	1540	Gabriel	
Packing and Storage	11-12-81		Beard	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-13-81
Sampling Location Bag Inlet Name Hansen
Run Number I-3-1

ISOKINETIC EQUATION

$$XI = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.40  1.60 548
64  65
2.40  1.55 539
68  65
2.45  1.45 540
70  65

I. VOL=923.643
F. VOL=929.86
M FACTOR=0.976
LK CK=0.
B. P=29.02
STATIC P=9.5
%O2=7.75
%CO2=21.
MLS H2O=11.2
% H2O=   8.17
CP=   0.84
TIME=   9.00
NOZZLE D=0.19
NET VOL=6.067792
DS VOL=   5.926
STACK P=  29.718
AVE M T=  66.166
√DP=   1.554
DH=   1.533
ST T= 542.333
DRY MW=  31.570
WET MW=  30.552
% ISO=  98.924
STACK V= 7036
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. 6
Sample Type Particulate

Run No. I-3-1
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Gabriel

Filter No. 53
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M	M	
Impinger Solution	H2O	H2O	—	—	
Final Volume (wt)[b]	106	102			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	6	2			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked NA Container(s) Sealed NA
Description of Impinger Solution
Total Moisture, gm 11.2 gm

SILICA GEL

720.5
717.3
3.2
Silica Gel Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. / Liquid Level Marked / Sealed
Impinger Rinse: Sample No. / Liquid Level Marked / Sealed
Water Blank: Sample No. / Liquid Level Marked
Dry Catch: Sample No. / Description / Sealed
Acetone Blank: Sample No. / Liquid Level Marked / Sealed
Filter Blank: Sample No. / Sealed

Sample Disposition
Carrier K. Hood Date Shipped: 11-17-81
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-4463)
Source Identification Bay Inlet
Test Run Number I-3-1
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1656 - 1705		
Probe Technician			Hall, Cobb	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-13-81	1723	Hansen	
Train Disassembly			Gabriel	
Train Cleanout			Gabriel	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Meth. 5

RUN I-4-1

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 011-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 ~~Whited~~ Hall
2
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Monarch

DATE 11-13-81

SAMPLING LOCATION Bag Inlet
I-4-1

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.858
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	65
PERCENT MOISTURE IN GAS STREAM BY VOLUME (Assumed)	% H_2O	6.5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.11
STATIC PRESSURE IN STACK, in. Hg +9.5 ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.81
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.02
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	540
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	2.35
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		.80
CALCULATED NOZZLE DIAMETER, in.		.204
ACTUAL NOZZLE DIAMETER, in.		.190 #43
REFERENCE Δp, in. H_2O		3.00

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch
Sampling Location Bag Inlet
Test Number I-4-1

Date 11-13-81
Initial MDH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	65
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.935
Nozzle diameter, inches	Dn	.190
Barometric pressure, inches Hg	Pb	29.11
$5.168\ (65 + 460)\ (.84)\ (3)\ (.935)\ (.190^2) \Big/ \sqrt{29.11}$	K	42.77

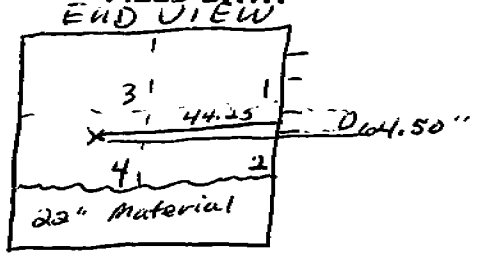
FIELD DATA

PLANT Monarch
DATE 11-13-91
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulate
RUN NUMBER I-4-1
OPERATOR Hansen
BAROMETRIC PRESSURE 29.11
SITE TO BARO. ELEVATION, ft. NONE
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5" H_2O
FILTER NUMBER(s) 4

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at 8.0 " Hg, CFM 0.00
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

N
A

END VIEW



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 3 Minutes

PROBE LENGTH AND TYPE 8', SS
NOZZLE I.D. .190
ASSUMED MOISTURE, % 6.5
SAMPLE BOX NUMBER 6
METER BOX NUMBER 5
TEMPERATURE METER NO. 95,7
METER ΔH@ 1.850
METER CORRECTION 0.976
C FACTOR .80
REFERENCE Δp 2.35

$VM = 42.77 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 904.00 Desired	GAS METER READING (V_m), ft^3 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
4	0 / 1024											
	3 / 1027	905.92	905.89	2.00	1.25	1.25	531	66	66	1.0	333	58
	6 / 1030	907.98	907.79	2.30	1.40	1.40	531	73	66	5.5	347	—
	9 / 1033	910.03	909.695	2.25	1.35	1.40	524	76	67	8.0	350	—

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-13-81
Sampling Location Bag Inlet Name Hansen
Run Number I-4-1

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

I-4-1 Mass

2.00 1.25 531
66 66
2.30 1.40 531
73 66
2.25 1.40 524
76 67

I. VOL=904.
F. VOL=939.695
M FACTOR=0.976
LK CK=0.
B. P=29.11
STATIC P=9.5
%O2=7.75
%CO2=21.
MLS H2O=7.9
% H2O= 5.43
CP= 0.84
TIME= 9.00
NOZZLE D=0.19
NET VOL=5.55932
DS VOL= 5.513
STACK P= 29.508
AVE M T= 69.000
√DP= 1.476
DH= 1.350
ST T= 528.666
DRY MW= 31.670
WET MW= 30.790
% ISO= 92.925
STACK V= 5607

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bay Inlet
Sample Box No. 6
Sample Type Particulate

Run No. I-4-1
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Gabriel

Filter No. 4
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	H_2O			
Final Volume (wt)[b]	104	101			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	4	1			
Sample No.(s)					

Combined impinger contents, Sample No. NA
Liquid Level Marked NA Container(s) Sealed NA
Description of Impinger Solution clear
Total Moisture, gm 7.9 gm

SILICA GEL

	715.3	
	712.4	
	2.9	

Silica Gel Color blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier K. Hall MRT Car Date Shipped: 11-18-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

102

SAMPLE HANDLING LOG

Project Number: 4892-L(63)
Source Identification: Bag Inlet
Test Run Number: I-4-1
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1024 - 1033		
Probe Technician			Hall	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-13-81	1054	Hansen	
Train Disassembly		1100	Gafril	
Train Cleanout		1200	Gafril	
Packing and Storage	11-17-81		Bull	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-1-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 1/14/81

FIELD CREW

Crew Chief: Hansen

Testing Engineer: 1 Hansen; 2; 3

Engr. Technician: 1 Hall; 2 Olson; 3

Lab Technician: 1 Gabriel; 2 Beall; 3

Process Engineer: 1; 2

Other: 1; 2

NOMOGRAPH DATA

PLANT Monarch

DATE 11-14-81

SAMPLING LOCATION Bag Inlet
I-1-2

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.858
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	68
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.94
STATIC PRESSURE IN STACK, in. Hg +9.5 ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.64
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.02
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	530
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	2.55
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		1.00
CALCULATED NOZZLE DIAMETER, in.		~~.212~~ .188
ACTUAL NOZZLE DIAMETER, in.		.190
REFERENCE Δp, in. H_2O		2.50

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch
Sampling Location Bag Inlet
Test Number I-1 & 2

Date 11-14-81
Initial MOH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

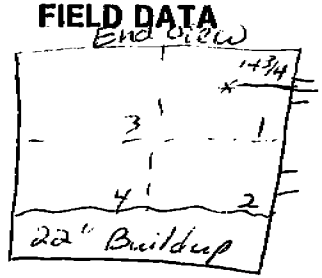
Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	68
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.95
Nozzle diameter, inches	Dn	.190
Barometric pressure, inches Hg	Pb	28.94
$\frac{5.168\ (68 + 460)\ (.84)\ (3)\ (.95)\ (.190^2)}{\sqrt{28.94}}$	K	43.84

FIELD DATA

PLANT Monarch
DATE 11-14-91
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulate
RUN NUMBER 1-1-2
OPERATOR Hanzen
BAROMETRIC PRESSURE 28.94
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 7

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at 5.5 " Hg, CFM 0.00
Pitot at ≥3" H_2O Initial 0.00
Final 0.00



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 3 **Minutes**

PROBE LENGTH AND TYPE 8', SS w/ Flex line
NOZZLE I.D. .190
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER 6
METER BOX NUMBER 5
TEMPERATURE METER NO. 9517
METER ΔH@ 1.858
METER CORRECTION .976
C FACTOR 1.00
REFERENCE Δp 2.50

$VM = 43.84 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 959.772 Desired	GAS METER READING (V_m), ft^3 959.772 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
1	0 / 1500											
	3 / 1503	961.86	961.96	2.30	1.75	1.75	550	67	67	2.0	208	50
	6 / 1506	963.97	964.067	2.35	1.80	1.80	554	70	67	5.5	226	—

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-14-81
Sampling Location Bag Inlet Name Hansen
Run Number I-1-02

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
 2.30  1.75 550
 67  67
 2.35  1.80 554
 70  67

I. VOL=959.772
F. VOL=964.067
M FACTOR=0.976
LK CK=0.
B. P=28.94
STATIC P=9.5
%O2=9.67
%CO2=20.83
MLS H2O=6.6
% H2O=   7.09
CP=   0.84
TIME=   6.00
NOZZLE D=0.19
NET VOL=4.19192
DS VOL=   4.073
STACK P=  29.638
AVE M T=  67.750
√DP=   1.524
DH=   1.775
ST T= 552.000
DRY MW=  31.719
WET MW=  30.746
% ISO= 103.727
STACK V= 6922
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. 6
Sample Type Particulate

Run No. I-1-2
Sample Date 11-14-81
Recovery Date 11-14-81
Cleanup Person Gabriel

Filter No. 7
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type a/	M	S	M		
Impinger Solution	H_2O	H_2O			
Final Volume (wt) b/	104	102			
Initial Volume (wt) b/	100	100			
Net Volume (wt) b/	4	2			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked NA
Container(s) Sealed NA
Description of Impinger Solution clear
Total Moisture, gm 6.6

SILICA GEL

718.3
717.7
.6
Silica Gel
Color blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Cen (MRT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Remarks:

Seal(s) broken by
Date broken

SAMPLE HANDLING LOG

Project Number: 4892-1(63)
Source Identification: Bag Inlet
Test Run Number: I-1-2
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1500-1506		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-14-81		Hall	
Train Disassembly	11-14-81		Gabriel	
Train Cleanout	11-14-81		Gabriel	
Packing and Storage	11-17-81		Beal	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-2-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 1H6-81

FIELD CREW

Crew Chief: Hansen

Testing Engineer: 1 Hansen; 2; 3

Engr. Technician: 1 Hall; 2; 3

Lab Technician: 1 Beall; 2 Olson; 3

Process Engineer: 1; 2

Other: 1; 2

NOMOGRAPH DATA

PLANT Monarch

DATE 11-16-81

SAMPLING LOCATION Bag Inlet
I-2-2

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.858
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	60
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	7.5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.89
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O) +9.5	P_s	29.59
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.02
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	545
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	2.4
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR	1.00	
CALCULATED NOZZLE DIAMETER, in.	~~1.90~~ .190	
ACTUAL NOZZLE DIAMETER, in.	~~1.9~~ .190	
REFERENCE Δp, in. H_2O	2.50	

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch
Sampling Location Bay Inlet
Test Number I-2-2

Date 11-16-81
Initial MOH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

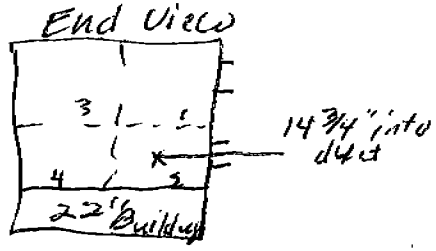
Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	60
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.925
Nozzle diameter, inches	Dn	.190
Barometric pressure, inches Hg	Pb	28.89
$\frac{5.168\ (60 + 460)\ (.84)\ (3)\ (.925)\ (.190^2)}{\sqrt{28.89}}$	K	42.07

PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulate
RUN NUMBER I-2-2
OPERATOR Hansen
BAROMETRIC PRESSURE 28.09
SITE TO BARO. ELEVATION, ft 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) -9.5
FILTER NUMBER(s) 3 6

LEAK CK: Initial at ≥15" Hg, CFM 0.007
Final at 12.5 " Hg, CFM 0.00
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

FIELD DATA



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 3 Minutes

PROBE LENGTH AND TYPE 8', SS w/Flexline
NOZZLE I.D. .190
ASSUMED MOISTURE, % 7.5
SAMPLE BOX NUMBER 2
METER BOX NUMBER 5
TEMPERATURE METER NO. 9517
METER ΔH@ 1.858
METER CORRECTION .996
C FACTOR 1.00
REFERENCE Δp 2.5

$VM = 42.07 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 21.53		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
1	0 2114											
	3 2117	23.58	23.71	2.40	1.80	1.90	551	58	60	9.5	340	60
	6 2120	25.65	25.92	2.45	1.80	1.85	553	65	60	12.5	339	—

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 1-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-2-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.40  1.80 551
58  60
2.45  1.85 555
65  60

I. VOL=21.53
F. VOL=25.92
M FACTOR=0.96
LK CK=0.
B. P=28.89
STATIC P=9.5
%O2=10.67
%CO2=21.5
MLS H2O=5.8
% H2O=   6.03
CP=   0.84
TIME=   6.00
NOZZLE D=0.1
NET VOL=4.28464
DS VOL=   4.112
STACK P=  29.568
AVE M T=  60.750
ΔMP=   1.557
DH=   1.825
ST T= 552.000
DRY MW=  31.856
WET MW=  31.722
% ISO= 104.474
STACK V= 7044
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particulate

Run No. I-2-2
Sample Date 11-16-81
Recovery Date 11-17-81
Cleanup Person Beall

Filter No. 6
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M				
Impinger Solution					
Final Volume (wt)[b]	1030	104 ml			
Initial Volume (wt)[b]	100 ml	100 ml			
Net Volume (wt)[b]	3 ml	1 ml			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 5.8

SILICA GEL

729.3		
720.5		
1.8		

Silica Gel
Color blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-1(63)
Source Identification Bag Inlet
Test Run Number I-2-2
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	2114-2120		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81		Hall, Olson	
Train Disassembly	11-16-81		Olson, Beall	
Train Cleanout	11-16-81		Olson, Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-3-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-16-81

FIELD CREW

Crew Chief: Hansen

Testing Engineer: 1 Hansen; 2; 3

Engr. Technician: 1 Hall; 2 Olson; 3

Lab Technician: 1 ~~Gabriel~~; 2 Beall; 3

Process Engineer: 1; 2

Other: 1; 2

NOMOGRAPH DATA

PLANT Monarch

DATE 11-16-81

SAMPLING LOCATION Bag Inlet
I-3-2

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.858
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	~~78~~ 68
PERCENT MOISTURE IN GAS STREAM BY VOLUME Assumed	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.93
STATIC PRESSURE IN STACK, in. Hg +9.5 ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.63
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.02
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	535
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	2.20
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR	1.00	
CALCULATED NOZZLE DIAMETER, in.	.196	
ACTUAL NOZZLE DIAMETER, in.	.190	
REFERENCE Δp, in. H_2O	2.45	

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch
Sampling Location Bag Inlet
Test Number I-3-2

Date 11-16-81
Initial MDH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	68 ~~75~~
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.95
Nozzle diameter, inches	Dn	.190
Barometric pressure, inches Hg	Pb	28.93
$\frac{5.168\ (\cancel{78}\ 68 + 460)\ (.84)\ (3)\ (.95)\ (.190^2)}{\sqrt{28.93}}$	K	~~44.67~~ 43.84

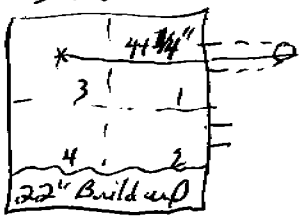
FIELD DATA

PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulate
RUN NUMBER I-3-2
OPERATOR Hansen
BAROMETRIC PRESSURE 28.93
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) + 9.5
FILTER NUMBER(s) B

LEAK CK: Initial at ≈15" Hg, CFM 0.00
Final at 7.0 " Hg, CFM 0.00
Pitot at ≈3" H_2O 0.00 Initial
0.00 Final

N/A

End view



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 3 Minutes

PROBE LENGTH AND TYPE 8' SS w/ Flex Line
NOZZLE I.D. .190
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER 6
METER BOX NUMBER 5
TEMPERATURE METER NO. 9517
METER ΔH@ 1.858
METER CORRECTION .976
C FACTOR 1.00
REFERENCE Δp 2.45

$$VM = 44.67 \times \sqrt{\frac{\Delta Ps}{Ts + 460}} \quad 43.84$$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
3	0 / 1115	981.760	981.868									
	3 / 1118	984.06	984.08	2.55	1.90	1.95	564	66	66	4.0	300	60
	6 / 1121	986.26	986.335	2.55	1.90	2.00	552	70	66	2.0	291	—

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-3-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.55  1.95 564
66  66
2.55  2.00 552
70  66

I. VOL=981.868
F. VOL=986.339
M FACTOR=0.976
LK CK=0.
B. P=28.93
STATIC P=9.5
%O2=10.67
%CO2=21.5
MLS H2O=10.1
% H2O=  10.08
CP=   0.84
TIME=   6.00
NOZZLE D=0.19
NET VOL=4.359792
DS VOL=   4.343
STACK P=  29.628
AVE M T=  67.000
√DP=   1.596
DH=   1.975
ST T= 558.000
DRY MW=  31.966
WET MW=  30.468
% ISO= 106.454
STACK V= 7305
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. 6
Sample Type Particulate

Run No. I-3-2
Sample Date 11-16-81
Recovery Date 11-16-81
Cleanup Person Beall

Filter No. 8
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	water	water			
Final Volume (wt)[b]	102	107			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	2	7			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 10.1

SILICA GEL

719.4	
718.3	
1.1	

Silica Gel Color _____

[a] S = Greenburg-Smith standard, M = Modified, O = Other _____
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____
Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number: 4892-2(63)
Source Identification: Bag Inlet
Test Run Number: I-3-2
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1115 - 1121		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81		Hall	
Train Disassembly	11-16-81		Beall	
Train Cleanout	11-16-81		Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-4-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bay Inlet
Sampling Date 11-16-81

FIELD CREW

Crew Chief: Hansen

Testing Engineer: 1 Hansen; 2; 3

Engr. Technician: 1 Hall; 2 Olson; 3

Lab Technician: 1 Beall; 2; 3

Process Engineer: 1; 2

Other: 1; 2

NOMOGRAPH DATA

PLANT Monarch

DATE 11-16-81

SAMPLING LOCATION Bag Inlet
I-4-2

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.858
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	8
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.88
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in. H_2O) +9.5	P_s	29.58
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.02
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	525
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	2.35
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		1.00
CALCULATED NOZZLE DIAMETER, in.		.191
ACTUAL NOZZLE DIAMETER, in.		.190
REFERENCE Δp, in. H_2O		2.50

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch
Sampling Location Bag Inlet
Test Number I-4-2

Date 11-16-81
Initial MOH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

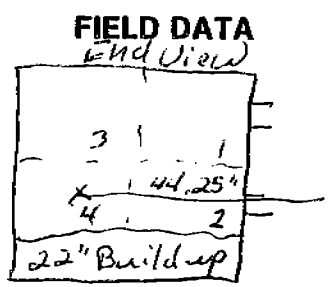
Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.92
Nozzle diameter, inches	Dn	.190
Barometric pressure, inches Hg	Pb	29.88
$\frac{5.168\ (70 + 460)\ (.84)\ (3)\ (.92)\ (.190^2)}{\sqrt{29.88}}$	K	42.66

FIELD DATA

PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulates
RUN NUMBER I-4-2
OPERATOR Hansen
BAROMETRIC PRESSURE 28.88
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_g) -9.5
FILTER NUMBER(s) 9

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at 6.5 " Hg, CFM 0.00
Pitot at ≥3" H_2O 0.00 Initial
Final
5.7



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 3 Minutes

PROBE LENGTH AND TYPE 8'SS w/Flex Line
NOZZLE I.D. .190
ASSUMED MOISTURE, % 8
SAMPLE BOX NUMBER 6
METER BOX NUMBER 5
TEMPERATURE METER NO. 9517
METER ΔH@ 1.858
METER CORRECTION .976
C FACTOR 1.00
REFERENCE Δp 2.50

$VM = 42.66 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 1.913 Desired	GAS METER READING (V_m), ft^3 1.913 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
4	0 / 1652											
	3 / 1655	3.88	3.99	2.15	1.55	1.55	551	68	67	3.0	270	51
	6 / 1658	5.82	6.02	2.10	1.65	1.50	551	71	68	6.5	288	—

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-4-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.15  1.55 551
68  67
2.10  1.50 551
71  68

I. VOL=1.913
F. VOL=6.02
M FACTOR=0.976
LK CK=0.
B. P=28.88
STATIC P=9.5
%02=10.67
%C02=21.5
MLS H20=5.7
% H20=   6.47
CP=   0.84
TIME=   6.00
NOZZLE D=0.19
NET VOL=4.008432
DS VOL=   3.576
STACK P=  29.378
AVE M T=  68.500
JDP=   1.457
DH=   1.525
ST T= 551.001
DRY MW=  31.866
WET MW=  30.969
% ISO= 103.045
STACK V= 559
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. 6
Sample Type Particulate

Run No. I-4-2
Sample Date 11-16-81
Recovery Date 11-16-81
Cleanup Person Beall

Filter No. 9
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]					
Impinger Solution					
Final Volume (wt)[b]	103	101			
Initial Volume (wt)[b]	100 ml	100			
Net Volume (wt)[b]	3 ml	1 ml			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed ____
Description of Impinger Solution
Total Moisture, gm 5.7 gm

SILICA GEL

720.6
718.9
1.7
Silica Gel
Color Blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-L(63)
Source Identification Bag Inlet
Test Run Number I-4-2
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1652 - 1658		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81			
Train Disassembly	11-16-81		Beall, Olson	
Train Cleanout	11-16-81		Beall, Olson	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

H-1-2 Particle Size - Andersen High Capacity Stack Sampler with 15 μm Preseparator

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN T-1-1

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-14-81

FIELD CREW

Crew Chief		Hansen
Testing Engineer	1	Hansen
	2	
	3	
Engr. Technician	1	Hall
	2	Olson
	3	
Lab Technician	1	Gabriel
	2	
	3	
Process Engineer	1	
	2	
Other	1	
	2	

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-1-1

Date 11-14-81
Initial MOH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-1-1
DATE 11-14-8
^PS=2.35
TS=540.
B.P.=29.
PS=29.703
%H20=5.
MF=0.95
MD=31.7196
MS=31.03362
VS=6878.798763
DNC=1.428357241E-01
TM=66.
FS=7.654444445E-01
FM=3.917647368E-01
VISCOSITY=285.08
88889
APPROXIMATE
DELTA H SETTING=

0.5278

COR.FACT.= 0.976
0
CORRECTED CFM
AT METER SHOULD=

0.4013

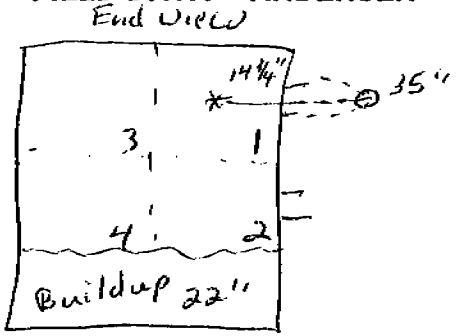
WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-14-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle size
RUN NUMBER I-1-1
OPERATOR Hansen
BAROMETRIC PRESSURE 29.00
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 14

LEAK CK. Initial at ≥15" Hg, CFM 0.005
Final at ____ " Hg, CFM ____
Pitot at ≥3" H_2O 0.00 Initial
0.00 Final

End View



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED)	.4013
PROBE TIP DIAMETER	~~.4~~ .137
CO_2	20.83
O_2	9.67
CO	0
N_2	69.5
% H_2O	5
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9517
METER BOX NO.	5

.5276

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 Desired	GAS METER READING (V_m), ft^3 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, In. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
1	0 / 1123	951.70									NA	NA
	3 / 1126	952.90	952.83	3.05	.42	.42	543	67	65	<1	(480)(500)	↓
	6 / 1129	954.11	954.95	3.05	↓	↓	534	68	66	1	↓	
	9 / 1132	955.31	955.077	2.90			544	69	66	2		

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-14-81
Sampling Location Bag Inlet Name Hansen
Run Number I-1-1

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
3.05  0.42 543
67  65
3.05  0.42 534
68  66
2.90  0.42 544
69  66

I. VOL=951.7
F. VOL=955.077
M FACTOR=0.976
LK CK=0.
B. P=29.
STATIC P=9.5
%O2=9.67
%CO2=20.83
MLS H2O=8.9
% H2O=  11.57
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.295952
DS VOL=   3.203
STACK P=  29.698
AVE M T=  66.833
√DP=   1.731
DH=   0.420
ST T= 540.333
DRY MW=  31.719
WET MW=  30.132
% ISO=  95.146
STACK V= 7888
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. _____
Sample Type Particle Size

Run No. I-1-1
Sample Date 11-14-81
Recovery Date 11-14-81
Cleanup Person Gabriel

Filter No. 14
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H O				
Final Volume (wt)[b]	103	0			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	3				
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 8.9

SILICA GEL

741.8
741.9
5.9
Silica Gel
Color blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other _____
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____
Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number: 4892-2(63)
Source Identification: Bag Inlet
Test Run Number: I-1-1
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1123 - 1132		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-14-81		Hansen	
Train Disassembly	11-14-81		Gabriel	
Train Cleanout	11-14-81		Gabriel	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-1

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-12-81

FIELD CREW

Crew Chief		M. Hansen
Testing Engineer	1	M. Hansen
	2	
	3	
Engr. Technician	1	E. Whited
	2	K. Hall
	3	
Lab Technician	1	M. Gabriel
	2	
	3	
Process Engineer	1	
	2	
Other	1	
	2	

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-2-1

Date 11-12-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)		
Percent moisture in gas stream by volume		
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)		
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)		
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$		
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min		
Actual nozzle diameter, in.		
Assumed meter temperature, °F		
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-2-1
DATE 11-12-8
^PS=2.6
TS=509.
B.P.=29.03
PS=29.733
%H20=8.5
MF=0.915
MD=31.746
MS=30.57759
VS=7171.708359
DNC=1.367047747E-01
TM=70.
FS=0.731
FM=3.746987623E-01
VISCOSITY=278.2
APPROXIMATE DELTA H SETTING=

0.4828

COR.FACT.= 0.9760
CORRECTED CFM AT METER SHOULD=

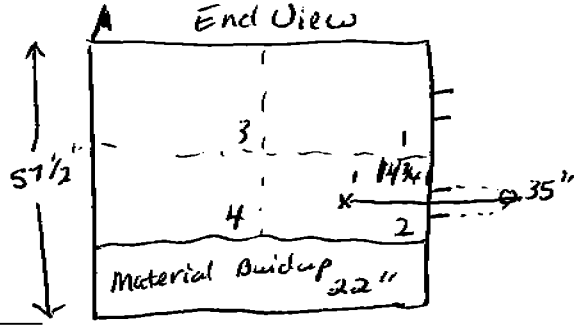
0.3839

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-12-91
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulate
RUN NUMBER I-2-1
OPERATOR M. Hansen
BAROMETRIC PRESSURE 29.03
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) + 4.5 " H_2O
FILTER NUMBER(s) 4

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at 15 " Hg, CFM 0.00
Pitot at ≥3" H_2O Initial 0.00



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) .3839
PROBE TIP DIAMETER .137 60-3.5
CO_2 20.33
O_2 12.33
CO 0
N_2 67.34
% H_2O Assumed 8.5
METER CORRECTION (ΔY) .976
TEMP. METER NO. 9517
METER BOX NO. 5

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
2	0 / 1805	895.40									In stack	Sampler out of stack
	3 / 1808	896.55	896.94	2.70	.39	.39	530	68	68	~~<1~~	~~530~~	298
	6 / 1811	897.70	898.03	2.60	↓	↓	530	68	68	<1		357
	9 / 1814	898.86	899.132	2.75	↓	↓	530	70	68	<1		388

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-12-81
Sampling Location Bag Inlet Name M. Hansen
Run Number I-2-1

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

I-2-1 P.S.

2.70 0.39 530
68 68
2.60 0.39 530
68 68
2.75 0.39 530
70 68

I. VOL=395.4
F. VOL=399.132
M FACTOR=0.975
LK CK=0.
B. P=29.03
STATIC P=9.5
%O2=12.33
%CO2=20.33
MLS H2O=4.3
% H2O= 5.42
CP= 0.84
TIME= 9.00
NOZZLE D=0.137
NET VOL=3.642432
DS VOL= 3.333
STACK P= 29.728
AVE M T= 68.333
√DP= 1.637
DH= 0.390
ST T= 530.002
DRY MW= 31.746
WET MW= 31.020
% ISO= 104.642
STACK V= 7315

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. _____
Sample Type Particulate

Run No. I-2-1
Sample Date 11-12-81
Recovery Date 11-12-81
Cleanup Person Gabriel / Hall

Filter No. 4
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M	M	
Impinger Solution	H_2O	H_2O	—	—	
Final Volume (wt)[b]	100	100	0	0	
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	0	0			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked NA Container(s) Sealed NA
Description of Impinger Solution clear
Total Moisture, gm 4.3 gm

SILICA GEL

737.0	
732.7	
4.3	

Silica Gel Color blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other _____
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked 0 Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____
Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier K Hall Date Shipped: 11-12-81
Remarks: _____

Date of laboratory custody 11-12-81 Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number: 4892-2(63)
Source Identification: Bag Inlet
Test Run Number: I-2-1
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-12-81	1805 - 1814		
Probe Technician			Hall, Whited	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-12-81	1825	Whited	
Train Disassembly		1828	Gabriel	
Train Cleanout		1830	Gabriel	
Packing and Storage	11-17-81		Hall	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-1

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-3-1

Date 11-13-81
Initial MOH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-3-1
DATE 11-13-8
^PS=2.4
TS=540.
B.P.=29.02
PS=29.723
%H20=5.
MF=0.95
MD=31.67
MS=30.9865
VS=6954.534851
DNC=1.420558422E-01
TM=65.
FS=7.654444445E-01
FM=3.910135589E-01
VISCOSITY=285.0888889
APPROXIMATE DELTA H SETTING=

0.5258

COR.FACT.= 0.9760
CORRECTED CFM AT METER SHOULD=

0.4006

WATERPROOF PAPER

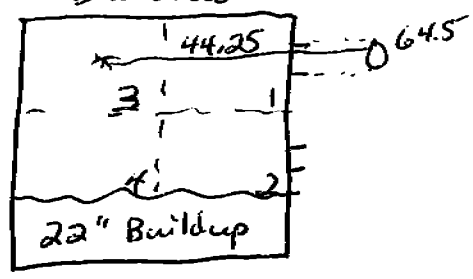
FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-13-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle Size
RUN NUMBER I-3-1
OPERATOR Hansen
BAROMETRIC PRESSURE 29.02
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 23

LEAK CK: Initial at ≈15" Hg, CFM 0.00
Final at _____ " Hg, CFM _____
Pitot at ≈3" H_2O 0.00 Initial
0.00 Final

N

End View



CALCULATED ACFM (DESIRED)	.4006
PROBE TIP DIAMETER	.137
CO_2	21
O_2	7.75
CO	0
N_2	71.25
% H_2O	5
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9517
METER BOX NO.	5

61 - 3.5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

.525"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 932.302 Desired	GAS METER READING (V_m), ft^3 932.302 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
3	0 / 1839										NA	NA
	3 / 1841	933.50	933.48	2.70	.42	.42	536	60	59	<1		
	6 / 1844	934.71	934.62	2.70	↓	↓	539	62	59	<1		
	9 / 1847	935.91	935.78	2.55	↓	↓	542	64	60	<1		

COMMENTS:

H-78

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-13-81
Sampling Location Bay Inlet Name Hansen
Run Number I-3-1

ISOKINETIC EQUATION

$$\%I = \frac{1,039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.70  0.42 536
60  59
2.70  0.42 539
62  59
2.55  0.42 542
64  60

I. VOL=932.302
F. VOL=935.785
M FACTOR=0.976
LK CK=0.
B. P=29.02
STATIC P=9.5
%O2=7.75
%CO2=21.
MLS H2O=5.2
% H2O=   6.82
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.399408
DS VOL=   3.345
STACK P=  29.718
AVE M T=  60.666
√DP=   1.627
DH=   0.420
ST T= 539.000
DRY MW=  31.670
WET MW=  30.737
% ISO= 101.237
STACK V= 7333
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-3-1
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Hall

Filter No. 23
Sample No.
Sample Material Description clear

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H_2O	—			
Final Volume (wt)[b]	105	0	—	—	—
Initial Volume (wt)[b]	100	0	—	—	—
Net Volume (wt)[b]	5				
Sample No.(s)					

Combined impinger contents, Sample No. 105
Liquid Level Marked NA
Container(s) Sealed

Description of Impinger Solution
Total Moisture, gm 5.2 gm

SILICA GEL

741.9
741.7
~~741.7~~ .2
Silica Gel
Color ~~741.9~~
NA

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier K. Hall MAE Owned
Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Remarks:

Seal(s) broken by
Date broken

SAMPLE HANDLING LOG

Project Number: 4892-2663
Source Identification: Bay Inlet
Test Run Number: I-31
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1838 - 1847		
Probe Technician			Hall	
Meter Technician			Hausen	
Other				
Transport of Train to Cleanup Site	11-13-81	1854	Hansen	
Train Disassembly			Gabriel	
Train Cleanout			Gabriel	
Packing and Storage	11-17-81		Ball	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-1

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-4-1

Date 11-13-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

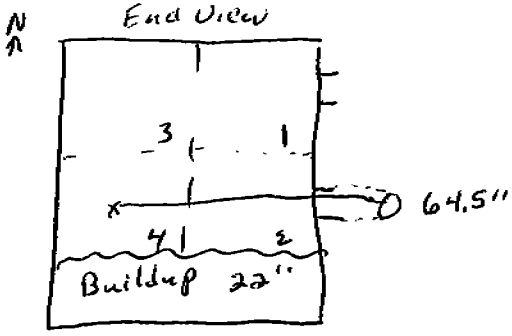
RUN I.D. I-4-1
DATE 11-13-8
^PS=2.18
TS=530.
B.P.=29.09
PS=29.793
%H20=6.43
MF=0.9357
MD=31.67
MS=30.791019
VS=6608.026017
DNC=1.446711996E-01
TM=72.
FS=7.543333335E-01
FM=3.884605182E-01
VISCOSITY=281.66666667
APPROXIMATE DELTA H SETTING=
0.5189
COR.FACT.= 0.376
0
CORRECTED CFM AT METER SHOULD=
0.3960

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-13-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle size
RUN NUMBER I-4-1
OPERATOR Hansen
BAROMETRIC PRESSURE 29.09
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5 " H_2O
FILTER NUMBER(s) 16

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ✓
Pitot at ≥3" H_2O 0.00



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) .3980
PROBE TIP DIAMETER ~~.145~~ .137 (6i-3.5)
CO_2 21
O_2 7.75
CO 0
N_2 71.25
% H_2O 6.43
METER CORRECTION (ΔY) 0.976
TEMP. METER NO. 9517
METER BOX NO. 5

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 913.90 Desired	Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 1252										NA	NA
	3 / 1255	915.09	915.54	2.70	.42	.42	504	67	66	<1	↓	↓
	6 / 1258	916.29	916.67	2.70	↓	↓	517	68	66	<1		
	9 / 1301	917.48	917.792	2.70	↓	↓	526	70	67	↓		

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-13-81
Sampling Location Bag Inlet Name Hansen
Run Number I-4-1

ISOKINETIC EQUATION

$$\%I = \frac{1,039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

I-4-1 P.S.

2.70 0.42 504
67 66
2.70 0.42 517
68 66
2.70 0.42 526
70 67

I. VOL=913.9
F. VOL=917.792
M FACTOR=0.975
LK CK=0.
B. P=29.09
STATIC P=9.5
%O2=7.75
%CO2=21.
MLS H2O=2.5
% H2O= 3.08
CP= 0.84
TIME= 9.00
NOZZLE D=0.137
NET VOL=3.799592
DS VOL= 3.700
STACK P= 29.788
AVE M T= 67.333
√DP= 1.643
DH= 0.420
ST T= 515.666
DRY MW= 31.670
WET MW= 31.248
% ISO= 106.130
STACK V= 7247

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-4-1
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Gabriel/Hall

Filter No. 16
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H2O				
Final Volume (wt)[b]	97	3			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	-3	3			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 2.5 gm

SILICA GEL

740.2
737.7
2.5
Silica Gel Color blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____

Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier K Hood MKT. Car Date Shipped: 11-18-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-2(63)
Source Identification Bay Inlet
Test Run Number I-4-1
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1252 - 1301		
Probe Technician			Hall	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-13-81	1314	Hall	
Train Disassembly	11-13	1400	Hall / Gabriel	
Train Cleanout	11-13	1400	Hall / Gabriel	
Packing and Storage	11-14-81		Gabriel	
Shipment to Analysis Site	11-17-81		Cobb / Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-1-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 Gabriel
2 Dealle
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-1-2

Date 11-14-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-1-2
DATE 11-14-8
^PS=3.
TS=540.
B.P.=28.97
PS=29.673
%H20=5.
MF=0.95
MD=31.7196
MS=31.03362
VS=7776.04437
DNC=1.343426089E-01
TM=68.
FS=7.654444445E-01
FM=3.932639749E-01
VISCOSITY=285.0888889
APPROXIMATE DELTA H SETTING=

0.5318

COR.FACT.= 0.976
0
CORRECTED CFM AT METER SHOULD=

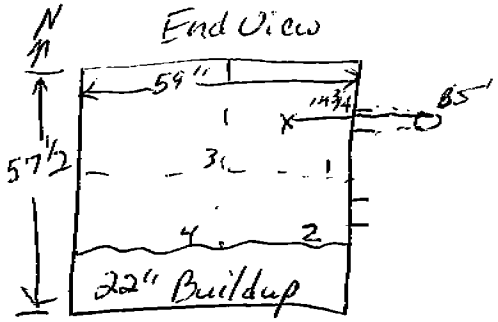
0.4029

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-14-81
SAMPLING LOCATION Gas Inlet
SAMPLE TYPE Particle Size
RUN NUMBER I-1-2
OPERATOR Hansen
BAROMETRIC PRESSURE 28.97
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 3

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≥3" H_2O Initial 0.00 Final 0.00



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED)	.4029
PROBE TIP DIAMETER	.137
CO_2	20.93
O_2	9.67
CO	0
N_2	69.5
% H_2O	5
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	5172
METER BOX NO.	5

.5318

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
								INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F			
1	0 / 1237	Desired	Actual		DESIRED	ACTUAL						NA
	3 / 1240	957.41	957.37	2.55	.43	.43	528	66	67	<1	419	
	6 / 1243	958.62	958.50	2.50	↓	↓	530	67	67	<1	456	
	9 / 1246	959.83	959.64	2.50	↓	↓	528	69	67	<1	479	↓

COMMENTS:

H-90

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-14-81
Sampling Location Bag Inlet Name Hansen
Run Number I-1-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}839(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{O}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
 2.55  0.43 528
 66  67
 2.50  0.43 530
 67  67
 2.50  0.43 528
 69  67

I. VOL=956.2
F. VOL=959.64
M FACTOR=0.976
LK CK=0.
B. P=28.97
STATIC P=9.5
%O2=9.67
%CO2=20.83
MLS H2O=3.2
% H2O=   4.42
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.35744
DS VOL=   3.258
STACK P=  29.668
AVE M T=  67.166
√DP=   1.586
DH=   0.430
ST T= 528.666
DRY MW=  31.719
WET MW=  31.113
% ISO=  98.786
STACK V= 7073
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. _____
Sample Type Particle Size

Run No. I-1-2
Sample Date 11-14-81
Recovery Date 11-14-81
Cleanup Person Gabriel

Filter No. 3
Sample No. _____
Sample Material Description good loading

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	water				
Final Volume (wt)[b]	103	0			
Initial Volume (wt)[b]	100				
Net Volume (wt)[b]	3				
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution Clear
Total Moisture, gm 3.2

SILICA GEL

748.0
~~747.8~~
747.8
~~x2~~
Silica Gel
Color blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other _____
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____
Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier Courier Date Shipped: 11-12-81
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number 4892-L(63)
Source Identification Bag Inlet
Test Run Number I-1-2
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1237-1246		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-14-81		Olson	
Train Disassembly	11-14-81		Gabriel	
Train Cleanout	11-14-81		Gabriel	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-12-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 White
2 Hall
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-2-2

Date 11-12-81
Initial MDH

See sampling calculations for run I-2-1

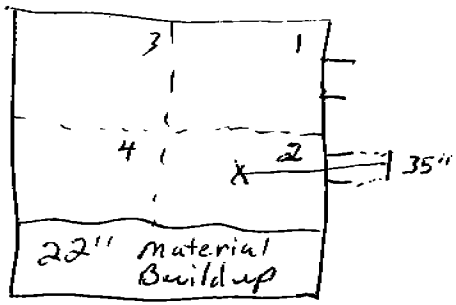
Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ \left(\sqrt{\Delta Ps}\right)\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-12-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particulate
RUN NUMBER I-2-2
OPERATOR Hansen
BAROMETRIC PRESSURE 23.03
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. N/A
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 1

LEAK CK: Initial at ≥15" Hg, CFM 0.005
Final at 15 " Hg, CFM 0.000
Pitot at ≥3" H_2O Initial 0.00, Final 0.00



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED)	3839
PROBE TIP DIAMETER	.137
CO_2	20.33
O_2	12.33
CO	0
N_2	67.34
% H_2O	8.5
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9517, 2
METER BOX NO.	5

60-3.5

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F P.S.	IMPINGER TEMPERATURE, °F
		900.00						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
2	0 / 1917	Desired	Actual		DESIRED	ACTUAL					In stack	
	3 / 1920	901.15	901.28	2.45	.39	.39	545	65	65	<1	265	
	6 / 1923	902.30	902.39	2.45	↓	↓	530	66	65	<1	292	
	9 / 1926	903.46	903.52	—	↓	↓	540	66	65	<1	326	
	Ran an extra 6 seconds.											

COMMENTS:

H-96

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-12-81
Sampling Location Inlet Name Hansen
Run Number I-2-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

I-2-2 P.S.

2.45 0.39 545
65 65
2.45 0.39 530
66 65
2.45 0.39 540
66 65

I. VOL=900.
F. VOL=903.52
M FACTOR=0.976
LK CK=0.
B. P=29.03
STATIC P=9.5
%O2=12.33
%CO2=20.33
MLS H2O=3.7
% H2O= 4.94
CP= 0.84
TIME= 9.10
NOZZLE D=0.137
NET VOL=3.43752
DS VOL= 3.352
STACK P= 29.728
AVE M T= 65.333
√DP= 1.565
DH= 0.390
ST T= 533.333
DRY MW= 31.
WET MW= 31.
% ISO= 102.753
STACK V= 701

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. NA
Sample Type Particle Size

Run No. I-2-2
Sample Date 11-12-81
Recovery Date 11-12-81
Cleanup Person Reed/Cobb

Filter No. 1
Sample No.
Sample Material Description normal color (gray)

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M	M	
Impinger Solution	H2O	H2O	Dry	Dry	
Final Volume (wt)[b]	103	102	0	0	
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	3	2	0	0	
Sample No.(s)	N/A	N/A	N/A	N/A	

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed
Description of Impinger Solution Clear
Total Moisture, gm 3.7

SILICA GEL

	737.7	
	737.0	
	.7	

Silica Gel Color
N/A

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. / Liquid Level Marked / Sealed
Impinger Rinse: Sample No. / Liquid Level Marked / Sealed
Water Blank: Sample No. / Liquid Level Marked
Dry Catch: Sample No. / Description / Sealed
Acetone Blank: Sample No. / Liquid Level Marked / Sealed
Filter Blank: Sample No. / Sealed

Sample Disposition
Carrier Car (MRS) Date Shipped: 11-12-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Seal(s) broken by
Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-4(63)
Source Identification Bag Inlet
Test Run Number I-2-2
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-12-81	1917-1926		
Probe Technician			Hull, Whited	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-12-81	1930	Hall, Cobb	
Train Disassembly		2009	Gabriel	
Train Cleanout		2100	Gabriel	
Packing and Storage	11-17-81		Bull	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bay Inlet
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bay Inlet
Test No. I-3-2

Date 11-13-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-3-2
DATE 11-13-8
^PS=2.65
TS=539.
B.P.=29.02
PS=29.723
%H20=5.
MF=0.95
MD=31.67
MS=30.9865
VS=7304.124178
DNC=1.385139874E-01
TM=60.
FS=7.643333335E-01
FM=3.871145493E-01
VISCOSITY=284.6666667
APPROXIMATE DELTA H SETTING=

0.5153

COR.FACT.= 0.9760
CORRECTED CFM AT METER SHOULD=

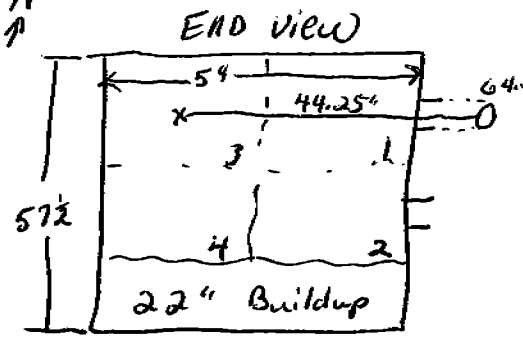
0.3966

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-13-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle size
RUN NUMBER I-3-2
OPERATOR Hansen
BAROMETRIC PRESSURE 29.02
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 15

LEAK CK: Initial at ≈15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≈3" H_2O Initial 0.02
Final



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) 3466
PROBE TIP DIAMETER .137
CO_2 21
O_2 7.75
CO 0
N_2 71.25
% H_2O 5
METER CORRECTION (ΔY) .976
TEMP. METER NO. 9517
METER BOX NO. 5

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
3	0 / 2006	936.80									NA	NA
	3 / 2009	937.99	937.94	2.55	.41	.41	532	60	60	<1		
	6 / 2012	939.18	939.05	2.50	↓	↓	535	62	60	<1		
	9 / 2015	940.37	940.194	2.50	↓	↓	535	65	60	<1	↓	↓

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-13-81
Sampling Location Dry Inlet Name Hansen
Run Number I-3-2

ISOKINETIC EQUATION

$$\%I = \frac{1,039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.55  0.41  552
60  60
2.50  0.41  535
62  60
2.50  0.41  538
65  60

I. VOL=936.8
F. VOL=940.1
M FACTOR=0.9
LK CK=0.
B. P=29.02
STATIC P=9.5
%O2=7.75
%CO2=21.
MLS H2O=3.7
% H2O=  5.0
CP=  0.84
TIME=  9.00
NOZZLE D=0.1
NET VOL=3.31
DS VOL=  3.
STACK P=  29
AVE M T=  61
ΔDP=  1.586
DH=  0.410
ST T= 534.00
DRY MW=  31.
WET MW=  30.
% ISO=  99.4
STACK V=  7
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-3-2
Sample Date 11-13-81
Recovery Date 11-14-81
Cleanup Person Cadmus

Filter No. 15
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H_2O				
Final Volume (wt)[b]	103	0			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	3				
Sample No.(s)					

Combined impinger contents, Sample No. 103
Liquid Level Marked ____ Container(s) Sealed ____
Description of Impinger Solution
Total Moisture, gm 3.7

SILICA GEL

742.6	
741.9	
0.7	

Silica Gel Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-L(63)

Source Identification Bag Inlet

Test Run Number I-3-2

Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	2006-2015		
Probe Technician			Hall	
Meter Technician			Hassan	
Other				
Transport of Train to Cleanup Site			Hall	
Train Disassembly			Gabriel	
Train Cleanout			Gabriel	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-2

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2
3

Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-4-2

Date 11-13-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-4-2
DATE 11-13-8
^PS=2.7
TS=520.
B.P.=29.01
PS=29.713
%H20=3.
MF=0.97
MD=31.67
MS=31.2599
VS=7271.481879
DNC=1.368939281E-01
TM=66.
FS=0.743222222
FM=3.963226227E-01
VISCOSITY=230.64
44444
APPROXIMATE
DELTA H SETTING=

0.5402

COR.FACT.= 0.976
0
CORRECTED CFM
AT METER SHOULD=

0.4060

WATERPROOF PAPER

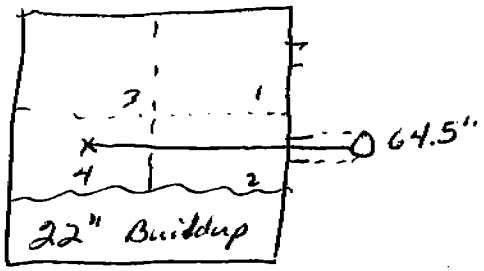
FIELD DATA - ANDERSEN

PLANT Monarch
DATE 11-13-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle Size
RUN NUMBER I-4-2
OPERATOR Hansen
BAROMETRIC PRESSURE 29.01
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 12

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

N

End View



CALCULATED ACFM (DESIRED)	.4060
PROBE TIP DIAMETER	.137 61-3.5
CO_2	21
O_2	7.75
CO	0
N_2	71.25
% H_2O	3
METER CORRECTION (ΔY)	.45 .976
TEMP. METER NO.	9517
METER BOX NO.	5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

.54

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
			Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4	0	1502	920.00									NA	NA
	3	1505	921.22	921.17	3.20	.44	.44	524	66	66	<1		
	6	1508	922.44	922.32	3.15	.44	.44	514	68	66	<1		
	9	1511	923.65	923.47	3.00	.44	.44	525	70	67	<1		
						.44	.44						

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COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-13-81
Sampling Location Bag Inlet Name Hansen
Run Number I-4-2

ISOKINETIC EQUATION

$$XI = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
3.20  0.44 524
66  66
3.15  0.44 514
68  66
3.00  0.44 525
70  67

I. VOL=920.
F. VOL=923.47
M FACTOR=0.976
LK CK=0.
B. P=29.01
STATIC P=9.5
%O2=7.75
%CO2=21.
MLS H2O=2.5
% H2O=   3.45
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.38672
DS VOL=   3.291
STACK P=  29.708
AVE M T=  67.166
√DP=   1.765
DH=   0.440
ST T= 521.000
DRY MW=  31.670
WET MW=  31.197
% ISO=  88.494
STACK V= 7824
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-4-2
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Gabriel

Filter No. 12
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H2O				
Final Volume (wt)[b]	99	2			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	-1	2			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked NA
Container(s) Sealed NA
Description of Impinger Solution clear
Total Moisture, gm 2.5 gm

SILICA GEL

741.7
740.2
1.5
Silica Gel Color blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. / Liquid Level Marked / Sealed
Impinger Rinse: Sample No. / Liquid Level Marked / Sealed
Water Blank: Sample No. / Liquid Level Marked
Dry Catch: Sample No. / Description / Sealed
Acetone Blank: Sample No. / Liquid Level Marked / Sealed
Filter Blank: Sample No. / Sealed

Sample Disposition
Carrier K. Hall MRI Van
Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Seal(s) broken by
Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-1(63)
Source Identification Bag Inlet
Test Run Number I-4-2
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1502-1511		
Probe Technician			Hall, Cobb	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-13-81	1520	Hansen	
Train Disassembly			Gabriel	
Train Cleanout			Gabriel	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	/		Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-1-3

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 ~~Bo~~ Gabriel
2 Beulle
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-1-3

Date 11-14-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-3-1
DATE 11-14-8
^PS=2.35
TS=552.
B.P.=28.88
PS=29.583
%H2O=5.
MF=0.95
MD=31.7196
MS=31.03362
VS=6933.969253
DNC=0.143500074
TM=68.
FS=0.778777778
FM=3.953990218E-01
VISCOSITY=287.7555556
APPROXIMATE DELTA H SETTING=

0.5376

COR.FACT.= 0.976
0
CORRECTED CFM AT METER SHOULD=

0.4051

WATERPROOF PAPER

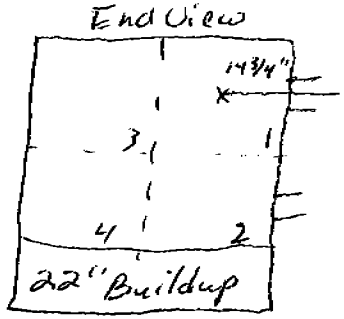
FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-14-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle Size
RUN NUMBER I-1-3
OPERATOR Hansen
BAROMETRIC PRESSURE 28.88
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) -9.5
FILTER NUMBER(s) 17

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

N ↑

End View



CALCULATED ACFM (DESIRED)	.4051
PROBE TIP DIAMETER	.137
CO_2	20.83
O_2	9.67
CO	0
N_2	69.5
% H_2O	5
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9517.2
METER BOX NO.	5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS .5376

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
1	0 / 1557	970.501										NA
	3 / 1600	971.72	971.71	2.75	.43	.43	541	67	68	<1	463	↓
	6 / 1603	972.93	972.90	2.60	↓	↓	528	68	68	<1	463	
a/	9 / 1606	974.15	974.145	2.65	↓	↓	526	70	68	<1	463	↓

COMMENTS: a/ Cobb thinks process is upset. My ΔP is going up to near 4.0

H-114

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-14-81
Sampling Location Bag Inlet Name Hansen
Run Number I-1-3

ISOKINETIC EQUATION

$$XI = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.75  0.43 541
67  68
2.60  0.43 528
68  68
2.65  0.43 526
70  68

I. VOL=970.501
F. VOL=974.145
M FACTOR=0.976
LK CK=0.
B. P=28.88
STATIC P=9.5
%O2=9.67
%CO2=20.83
MLS H2O=3.
% H2O=   3.95
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.556544
DS VOL=   3.434
STACK P=  29.578
AVE M T=  63.166
√DP=   1.632
DH=   0.430
ST T= 531.666
DRY MW=  31.719
WET MW=  31.177
% ISO= 101.073
STACK V= 7294
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-1-3
Sample Date 11-14-81
Recovery Date 11-14-81
Cleanup Person Bell

Filter No. 17
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	water				
Final Volume (wt)[b]	103				
Initial Volume (wt)[b]	100				
Net Volume (wt)[b]	3				
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed

SILICA GEL

748.0	
748.0	
0.0	

Silica Gel Color

Description of Impinger Solution
Total Moisture, gm 3.0

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed
Filter Blank: Sample No. ____ Sealed

Sample Disposition
Carrier Car (UPS) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-2(63)
Source Identification Bag Inlet
Test Run Number I-1-3
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1557-1606		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-14-81		Olson	
Train Disassembly	11-14-81		Gabriel	
Train Cleanout	11-14-81		Gabriel	
Packing and Storage				
Shipment to Analysis Site				
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-3

MRI Project Number 4892-L (63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 Beall
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-2-3

Date 11-16-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	

RUN I.D. I-2-3
DATE 11-16-8
^PS=2.4
TS=550.
B.P.=28.89
PS=29.593
%H2O=5.
MF=0.95
MD=31.8668
MS=31.17346
VS=6983.519603
DNC=1.427859228E-01
TM=64.
FS=7.765555558E-01
FM=3.920554558E-01
VISCOSITY=287.31
11111
APPROXIMATE
DELTA H SETTING=

0.5286

COR.FACT.= 0.976
0
CORRECTED CFM
AT METER SHOULD=

0.4016

WATERPROOF PAPER

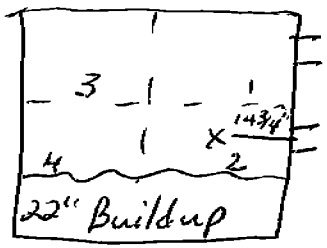
FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle Size
RUN NUMBER I-2-3
OPERATOR Hansen
BAROMETRIC PRESSURE 28.89
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_g) +9.5
FILTER NUMBER(s) 13

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

N

End View



CALCULATED ACFM (DESIRED) .4016
PROBE TIP DIAMETER .137
CO_2 21.5
O_2 10.67
CO 0
N_2 67.83
% H_2O 5
METER CORRECTION (ΔY) .976
TEMP. METER NO. 9517.2
METER BOX NO. 5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

.5286

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min	GAS METER READING (V_m), ft^3 27.60		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
2	0 2159											NA
	3 2202	28.80	28.75	2.40	.40	.40	526	54	57	4	325	
	6 2205	30.01	29.87	2.40	↓	↓	524	57	57	4	371	
	9 2208	31.21	31.003	2.40	↓	↓	527	59	57	4	411	↓

COMMENTS:

H-120

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-2-3

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.40  0.40 826
54  57
2.40  0.40 824
57  57
2.40  0.40 827
59  57

I. VOL=27.6
F. VOL=31.003
M FACTOR=0.976
LK CK=0.
B. P=28.89
STATIC P=9.5
%O2=10.67
%CO2=21.5
MLS H2O=4.
% H2O=   5.47
CP=   0.84
TIME=   9.00
NOZZLE D=0.187
NET VOL=3.32[illegible]
DS VOL=   3.[illegible]
STACK P=  29.[illegible]
AVE M T=  56.[illegible]
DP=   1.549
DH=   0.400
ST T= 525.66[illegible]
DRY MW=  31.[illegible]
WET MW=  31.[illegible]
% ISO= 102.854
STACK V= 690[illegible]
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-2-3
Sample Date 11-16-81
Recovery Date 11-16-81
Cleanup Person Beall

Filter No. 13
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]					
Impinger Solution					
Final Volume (wt)[b]	102	0 ml			
Initial Volume (wt)[b]	100	0 ml			
Net Volume (wt)[b]	2 ml	0 ml			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 46 gm

SILICA GEL

Final Volume (wt)[b]	778.4	
Initial Volume (wt)[b]	776.4	
Net Volume (wt)[b]	2 ml	

Silica Gel Color Blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. / Liquid Level Marked / Sealed
Impinger Rinse: Sample No. / Liquid Level Marked / Sealed
Water Blank: Sample No. / Liquid Level Marked
Dry Catch: Sample No. / Description / Sealed
Acetone Blank: Sample No. / Liquid Level Marked / Sealed
Filter Blank: Sample No. / Sealed

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892.4(63)
Source Identification Bag Inlet
Test Run Number I-2-3
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	2159 - 2208		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81		Hansen	
Train Disassembly	11-16-81		Beall, Olson	
Train Cleanout	11-16-81		Beall, Olson	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-3

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bay Inlet
Sampling Date 11-6-81

FIELD CREW

Crew Chief: Hansen

Testing Engineer: 1 Hansen; 2; 3

Engr. Technician: 1 Hall; 2 Olson; 3

Lab Technician: 1 ~~Gabriel~~; 2 Beall; 3

Process Engineer: 1; 2

Other: 1; 2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-3-3

Date 11-16-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	

RUN I.D. I-3-3
DATE 11-16-8
^PS=2.4
TS=530.
B.P.=28.93
PS=29.633
%H2O=6.
MF=0.94
MD=31.8668
MS=31.034792
VS=6924.780919
DNC=1.413236794E-01
TM=70.
FS=7.5433333335E-01
FM=3.888293235E-01
VISCOSITY=282.8666667
APPROXIMATE DELTA H SETTING=

0.5199

COR.FACT.= 0.976
0
CORRECTED CFM AT METER SHOULD=

0.3983

WATERPROOF PAPER

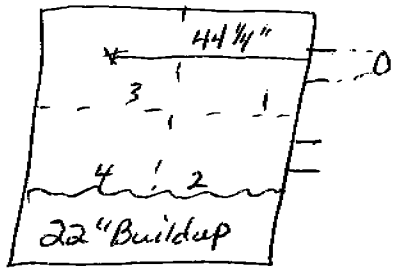
FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Boy Inlet
SAMPLE TYPE Particle size
RUN NUMBER I-3-3
OPERATOR Hansen
BAROMETRIC PRESSURE 28.93
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) -19.5
FILTER NUMBER(s) 20

LEAK CK: Initial at ≥15" Hg. CFM 0.00
Final at ____ " Hg. CFM ____
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

N

End View



.3983

CALCULATED ACFM (DESIRED)	~~.4064~~
PROBE TIP DIAMETER	.137
CO_2	21.5
O_2	18.67
CO	0
N_2	67.83
% H_2O	5 Assumed
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9519, 2
METER BOX NO.	5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

~5400, 5199

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
									INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
3	0	1247	990.30			DESIRED	ACTUAL						NA
	3	1250	991.49	991.42	2.50	.40	.40	537	70	69	1.0	383	
	6	1253	992.69	992.55	2.30			527	71	69	2.0	320 a/	
	9	1256	993.88	993.70	2.35			528	75	70	2.5	390	
	12	1259	995.08	994.836	2.20	↓	↓	539	75	70	2.5	442	↓

H-126

COMMENTS: a/ May be bad thermocouple

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-3-3

ISOKINETIC EQUATION

$$ZI = \frac{1,039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.50  0.40 537
70  69
2.30  0.40 527
71  69
2.35  0.40 528
75  70
2.20  0.40 539
75  70

I. VOL=990.3
F. VOL=994.836
M FACTOR=0.976
LK CK=0.
B. P=28.93
STATIC P=9.5
%02=10.67
%C02=21.5
MLS H20=8.5
% H20=   8.5
CP=   0.84
TIME=  12.00
NOZZLE D=0.157
NET VOL=4.427136
DS VOL=   4.358
STACK P=  29.628
AVE M T=  71.125
√DP=   1.528
DH=   0.400
ST T= 532.75
DRY MW=  31.366
WET MW=  30.675
% ISO= 104.628
STACK V= 6883
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-3-3
Sample Date 11-16-81
Recovery Date 11-16-81
Cleanup Person Beall

Filter No. 20
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H_2O				
Final Volume (wt)[b]	103				
Initial Volume (wt)[b]	100				
Net Volume (wt)[b]	3				
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed ____
Description of Impinger Solution
Total Moisture, gm 8.5

SILICA GEL

773.5		
768.0		
5.5		

Silica Gel Color blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number: 4892-4(63)
Source Identification: Bag Inlet
Test Run Number: I-3-3
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-15-81	1247-1259		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81			
Train Disassembly	11-16-81		Beall	
Train Cleanout	11-16-81		Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-3

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bay Inlet
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 Beall
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-4-3

Date 11-16-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-4-3
DATE 11-16-8
^PS=2.2
TS=545.
B.P.=28.89
PS=29.593
%H2O=7.5
MF=0.925
MD=31.8668
MS=30.82679
VS=6707.038081
DNC=1.451770971E-01
TM=70.
FS=0.771
FM=3.852541901E-01
VISCOSITY=286.2
APPROXIMATE DELTA H SETTING=

0.5104

COR.FACT.= 0.9760
CORRECTED CFM AT METER SHOULD=

0.3947

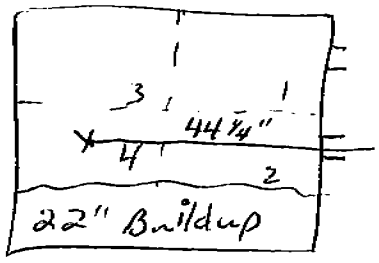
WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle Size
RUN NUMBER I-4-3
OPERATOR Hunsen
BAROMETRIC PRESSURE 28.99
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) -9.5
FILTER NUMBER(s) 5

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

End View



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED)	.3947
PROBE TIP DIAMETER	.137
CO_2	21.5
O_2	10.67
CO	0
N_2	67.83
% H_2O	7.5
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9519.2
METER BOX NO.	5

.5104

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (ΔP_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4	0 1817	9.567										NA
	3 1820	10.75	10.69	2.70	.385	.385	534	65	65	21	446	
	6 1823	11.94	11.80	2.75	↓	↓	533	66	65	1	459	
	9 1826	13.12	12.912	2.70	↓	↓	522	68	66	1.5	474	↓

COMMENTS:

H-132

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-4-3

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
 2.70  0.38 534
 65  65
 2.75  0.38 533
 66  65
 2.70  0.38 522
 68  66

I. VOL=9.567
F. VOL=12.912
M FACTOR=0.976
LK CK=0.
B. P=28.89
STATIC P=9.5
%O2=10.67
%CO2=21.5
MLS H2O=4.9
% H2O=   6.79
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.26472
DS VOL=   3.167
STACK P=  29.588
AVE M T=  65.333
√DP=   1.648
DH=   0.385
ST T= 529.666
DRY MW=  31.366
WET MW=  30.424
% ISO=  94.662
STACK V= 7384
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bay Inlet
Sample Box No. _____
Sample Type Particle Size

Run No. I-4-3
Sample Date 11-16-81
Recovery Date 11-16-81
Cleanup Person Beall

Filter No. 5
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]					
Impinger Solution					
Final Volume (wt)[b]	103 ml	10 ml			
Initial Volume (wt)[b]	100 ml	0 ml			
Net Volume (wt)[b]	3 ml	1 ml			
Sample No.(s)	3				

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 4.9 gm.

SILICA GEL

776.4	
775.5	
.9	

Silica Gel Color _____

[a] S = Greenburg-Smith standard, M = Modified, O = Other _____
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____
Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number 4892-L(63)
Source Identification Bay Inlet
Test Run Number I-4-3
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1817 - 1826		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81			
Train Disassembly	11-16-81		Beall, Olson	
Train Cleanout	11-16-81		Beall, Olson	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-1-4

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 Gabriel
2 Bealle
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-1-4

Date 11-14-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-1-4
DATE 11-14-8
^PS=2.6
TS=530.
B.P.=28.88
PS=29.583
%H20=5.
MF=0.95
MD=31.7196
MS=31.03362
VS=7213.765085
DNC=1.384640267E-01
TM=67.
FS=7.543333335E-01
FM=3.907575247E-01
VISCOSITY=282.6666667
APPROXIMATE DELTA H SETTING=

0.5251

COR.FACT.= 0.9760
CORRECTED CFM AT METER SHOULD=

0.4003

WATERPROOF PAPER

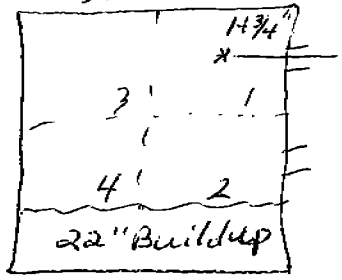
FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-14-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle Size
RUN NUMBER I-1-4
OPERATOR Hansen
BAROMETRIC PRESSURE 28.88
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 9.5
FILTER NUMBER(s) 22

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pilot at ≥3" H_2O Initial 0.00
Final 0.00

N

End View



CALCULATED ACFM (DESIRED)	.4003
PROBE TIP DIAMETER	.137
CO_2	20.83
O_2	9.67
CO	0
N_2	69.5
% H_2O	5
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9517, 2
METER BOX NO.	5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS .525'

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 978.70 Desired	GAS METER READING (V_m), ft^3 978.70 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, In. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
1	0	1648						540					NA
	3	1651	979.90	979.65	2.35	.42	.42	~~530~~	64	63	<1	434	↓
	6	1654	981.10	980.59	2.35	↓	↓	543	66	64	<1	456	
	9	1657	982.30	981.558	2.25			538	69	64	<1	475	

COMMENTS:

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ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-14-81
Sampling Location Bag Inlet Name Hansen
Run Number I-1-4

ISOKINETIC EQUATION

$$\%I = \frac{1,039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.35  0.42 540
64  63
2.35  0.42 543
66  64
2.25  0.42 539
69  64

I. VOL=978.7
F. VOL=981.558
M FACTOR=0.978
LK CK=0.
B. P=28.88
STATIC P=9.5
%O2=9.67
%CO2=20.83
MLS H20=4.
% H2O=   6.50
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=2.789408
DS VOL=   2.709
STACK P=  29.578
AVE M T=  65.000
√DP=   1.521
DH=   0.420
ST T= 540.333
DRY MW=  31.719
WET MW=  30.327
% ISO=  87.779
STACK V= 6867
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-1-4
Sample Date 11-14-81
Recovery Date 11-15-81
Cleanup Person Gabriel

Filter No. 22
Sample No.
Sample Material Description ok

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H_2O				
Final Volume (wt)[b]	102				
Initial Volume (wt)[b]	100				
Net Volume (wt)[b]	2				
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked ____ Container(s) Sealed ____
Description of Impinger Solution
Total Moisture, gm 4.0gm

SILICA GEL

750.0	
748.0	
2.0	

Silica Gel Color blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

Copied from original

SAMPLE HANDLING LOG

Project Number 4892-L(63)
Source Identification Bag Inlet
Test Run Number I-1-4
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1648-1657		
Probe Technician			Hall/Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-14-81	1905	Hansen	
Train Disassembly	11-14-81		Beall	
Train Cleanout	11-14-81		Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HC SS

RUN I-2-4

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 10-6-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 Beall
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-24

Date 11-16-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔP	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	%	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_n	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-3-4
DATE 11-16-8
^PS=2.4
TS=525.
B.P.=28.89
PS=29.583
%H2O=5.
MF=0.95
MD=31.8668
MS=31.17346
VS=6896.548344
DNC=1.410902121E-01
TM=57.
FS=0.748777773
FM=3.824479325E-01
VISCOSITY=281.75
55556
APPROXIMATE
DELTA H SETTING=
0.5030
COR.FACT.= 0.976
0
CORRECTED CF
AT METER SHOULD=
0.3918

WATERPROOF PAPER

FIELD DATA – ANDERSEN

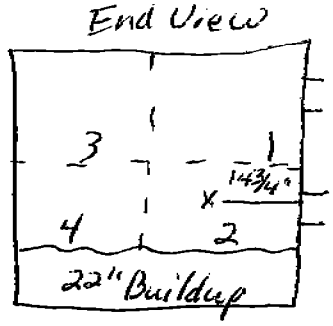
PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle size
RUN NUMBER I-2-4
OPERATOR Hansen
BAROMETRIC PRESSURE 28.89
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_g) +9.5
FILTER NUMBER(s) 19

LEAK CK: Initial at ≈15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≈3" H_2O Initial 0.00
Final 0.00

1.9ml.

N ↑

End View



CALCULATED ACFM (DESIRED)	.3918
PROBE TIP DIAMETER	.137
CO_2	21.5
O_2	10.69
CO	0
N_2	67.83
% H_2O	5 assumed
METER CORRECTION (ΔY)	.970
TEMP. METER NO.	951722
METER BOX NO.	5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

.5030

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³ Desired	GAS METER READING (V_m), ft³ Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
2	0 / 2330	32.404										NA
	3 / 2333	33.58	33.54	2.65	.39	.39	554	54	58	<1	354	↓
	6 / 2336	34.75	34.66	2.70	↓	↓	540	58	58	1.0	370	
	9 / 2339	35.93	35.778	2.65			556	61	59	1.0	392	

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COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-2-4

ISOKINETIC EQUATION

$$\%I = \frac{1{,}839(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.65  0.39  [illegible]
54  58
2.70  0.39  540
58  58
2.65  0.39  [illegible]
61  59

I. VOL=32.40
F. VOL=35.77
M FACTOR=0.9[illegible]
LK CK=0.
B. P=28.89
STATIC P=9.5
%O2=10.67
%CO2=21.5
MLS H2O=1.9
% H2O=   2.6
CP=   0.84
TIME=   9.00
NOZZLE D=0.1[illegible]
NET VOL=3.29[illegible]
DS VOL=   3.[illegible]
STACK P=  29.[illegible]
AVE M T=  56.[illegible]
ΔP=   1.632
DH=   0.390
ST T= 550.00
DRY MW=  31.[illegible]
WET MW=  31.[illegible]
% ISO=  95.5[illegible]
STACK V= 732
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bug Inlet
Sample Box No. _____
Sample Type Particle Size

Run No. I-2-4
Sample Date 11-16-81
Recovery Date 11-16-81
Cleanup Person Beall

Filter No. 19
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]					
Impinger Solution	101 ml	0 ml			
Final Volume (wt)[b]	100 ml	0 ml			
Initial Volume (wt)[b]	1 ml	0 ml			
Net Volume (wt)[b]					
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 1.9 gm.

SILICA GEL

	779.3	
	778.4	
	.9	

Silica Gel Color Blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other _____
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____
Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number: 4892-L(63)
Source Identification: Bag Inlet
Test Run Number: I-2-4
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	2330 – 2339		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81		Hall, Olson	
Train Disassembly	11-16-81		Olson, Beall	
Train Cleanout	11-16-81		Olson, Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-4

MRI Project Number 4892-463)
Field Dates
Plant Monarch
Sampling Location Bay Inlet
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 ~~Gabriel~~
2 Beall
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-3-4

Date 11-16-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-3-4
DATE 11-16-8
^PS=2.35
TS=530.
B.P.=28.88
PS=29.583
%H2O=6.
MF=0.94
MD=31.8668
MS=31.034792
VS=6858.056335
DNC=0.14200951
TM=72.
FS=7.5433333356-01
FM=3.9031263356-01
VISCOSITY=283.66666667
APPROXIMATE DELTA H SETTING=

0.5239

COR.FACT.= 0.9760
CORRECTED CFM AT METER SHOULD=

0.3999

WATERPROOF PAPER

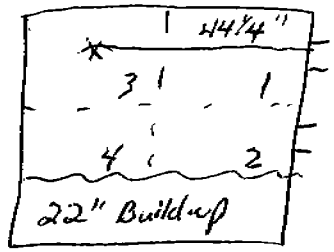
FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-16-81
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle size
RUN NUMBER I-3-4
OPERATOR Hansen
BAROMETRIC PRESSURE 28.88
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_s) 79.5
FILTER NUMBER(s) 21

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at _____" Hg, CFM _____
Pilot at ≥3" H_2O Initial 0.00
Final 0.00

N

End View



CALCULATED ACFM (DESIRED)	.3999
PROBE TIP DIAMETER	.137
CO_2	21.5
O_2	10.67
CO	0
N_2	67.83
% H_2O	6 Assumed
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	9517
METER BOX NO.	5

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

.5239

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
								INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
3	0 / 1500	Desired	Actual		DESIRED	ACTUAL						NA
	3 / 1503	999.50	999.48	2.30	.41	.41	521	69	70	41	410	
	6 / 1506	1000.70	1000.63	2.35	↓	↓	520	71	70	↓	436	
	9 / 1509	1001.90	1001.772	2.35	↓	↓	522	73	71	↓	435	↓

H-150

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bag Inlet Name Hansen
Run Number I-3-4

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.30  0.41 521
69  70
2.35  0.41 520
71  70
2.35  0.41 522
73  71

I. VOL=998.299
F. VOL=1001.772
M FACTOR=0.976
LK CK=0.
B. P=28.88
STATIC P=9.5
%O2=10.67
%CO2=21.5
MLS H2O=7.
% H2O=   9.19
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.389648
DS VOL=   3.257
STACK P=  29.578
AVE M T=  70.666
DP=   1.527
DH=   0.410
ST T= 521.000
DRY MW=  31.866
WET MW=  30.592
% ISO= 106.797
STACK V= 6852
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bay Inlet
Sample Box No.
Sample Type Particle Size

Run No. I-3-4
Sample Date 11-16-81
Recovery Date 11-16-81
Cleanup Person Beall

Filter No. 21
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution					
Final Volume (wt)[b]	103ml	2ml			
Initial Volume (wt)[b]	100ml	0ml			
Net Volume (wt)[b]	3ml	2ml			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 70gm

SILICA GEL

775.5
773.5
2.0gm
Silica Gel
Color Blue

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Car (MRT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number: 4892-L(63)
Source Identification: Bag Inlet
Test Run Number: I-3-4
Pollutant(s) in Sample: Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1500-1509		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81			
Train Disassembly	11-16-81		Beall	
Train Cleanout	11-16-81		Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-4

MRI Project Number 4892-L(63)
Field Dates
Plant Monarch
Sampling Location Bag Inlet
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Hansen
2
3

Engr. Technician 1 Hall
2 Olson
3

Lab Technician 1 Beall
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch
Sampling Location Bag Inlet
Test No. I-4-4

Date 11-16-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. I-4-4
DATE 11-16-8
^PS=2.7
TS=530.
B.P.=28.89
PS=29.593
%H2O=7.5
MF=0.925
MD=31.8668
MS=30.82679
VS=7374.556041
DNC=1.369462091E-01
TM=66.
FS=7.543333335E-01
FM=3.797493454E-01
VISCOSITY=282.8666667
APPROXIMATE DELTA H SETTING=

0.4959

COR.FACT.= 0.976
0
CORRECTED CFM AT METER SHOULD=

0.3890

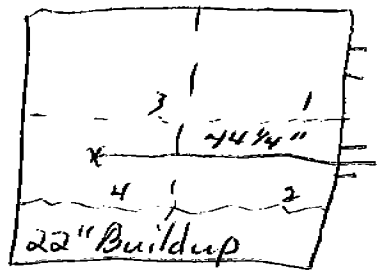
WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch
DATE 11-16-91
SAMPLING LOCATION Bag Inlet
SAMPLE TYPE Particle size
RUN NUMBER I-4-4
OPERATOR Hansen
BAROMETRIC PRESSURE 28.89
SITE TO BARO. ELEVATION, ft. 0
CORRECTED B.P. NA
STATIC PRESSURE (P_g) +9.5
FILTER NUMBER(s) 2

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at ____ " Hg, CFM ____
Pitot at ≥3" H_2O Initial 0.00
Final 0.00

End View



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS .4959

CALCULATED ACFM (DESIRED)	.3890
PROBE TIP DIAMETER	.137
CO_2	21.5
O_2	10.67
CO	0
N_2	67.83
% H_2O	7.5 assumed
METER CORRECTION (ΔY)	.976
TEMP. METER NO.	95A.2
METER BOX NO.	5

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4	0 / 1946	18.007										NA
	3 / 1949	19.17	19.14	2.35	.39	.39	547	61	60	2	482	↓
	6 / 1952	20.34	20.26	2.60	↓	↓	535	64	60	1	497	
	9 / 1955	21.51	21.483	2.35			546	66	61	1	510	

H-156

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Date 11-16-81
Sampling Location Bay Inlet Name Hansen
Run Number I-4-4

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
2.35  0.39 547
61  60
2.60  0.39 535
64  60
2.35  0.39 546
66  61

I. VOL=18.007
F. VOL=21.483
M FACTOR=0.976
LK CK=0.
B. P=28.89
STATIC P=9.5
%O2=10.67
%CO2=21.5
MLS H2O=3.4
% H2O=   4.60
CP=   0.84
TIME=   9.00
NOZZLE D=0.137
NET VOL=3.392576
DS VOL=   3.315
STACK P=  29.588
AVE M T=  62.000
DP=   1.559
DH=   0.390
ST T= 542.666
DRY MW=  31.566
WET MW=  31.227
% ISO= 103.507
STACK V= 6998
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch
Sample Location Bag Inlet
Sample Box No. _____
Sample Type Particle Size

Run No. I-4-4
Sample Date 11-16-81
Recovery Date 11-17-81
Cleanup Person Beall

Filter No. 2
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]					
Impinger Solution					
Final Volume (wt)[b]	102 ml	0 ml			
Initial Volume (wt)[b]	100 ml	0 ml			
Net Volume (wt)[b]	2 ml	0 ml			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 3.4 gm.

SILICA GEL

	777.8 gm	
	776.4	
	1.4 g	

Silica Gel
Color _____

[a] S = Greenburg-Smith standard, M = Modified, O = Other _____
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____
Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number 4892-L(63)
Source Identification Bag Inlet
Test Run Number J-4-4
Pollutant(s) in Sample Particulate

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1946-1955		
Probe Technician			Hall, Olson	
Meter Technician			Hansen	
Other				
Transport of Train to Cleanup Site	11-16-81			
Train Disassembly	11-16-81		Beall, Olson	
Train Cleanout	11-16-81		Beall, Olson	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site	11-17-81		Cobb, Hall	
Lab Analysis				
Write Up				

H-2 No. 5 Kiln Common Outlet Stack from the 10-Cell and 3-Cell Baghouse

H-2-1 Total Mass - EPA Method 17

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN 0-1-1

MRI Project Number 4892-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet-Quad 1
Sampling Date 11-12-21

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel Hunt
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-12-81

SAMPLING LOCATION Outlet - Quad 1

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70 ~~45~~
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	12
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.03
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in. H_2O)	P_s	28.99
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	410
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.4
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.46
C FACTOR		.86
CALCULATED NOZZLE DIAMETER, in.		.310
ACTUAL NOZZLE DIAMETER, in.		.305
REFERENCE Δp, in. H_2O		.43

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet - Quad
Test Number 1-1-1

Date 11-12-71
Initial RS

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	T
Pitot coefficient	C
Sampling time interval, minutes	θ
Mole fraction dry gas	M
Nozzle diameter, inches	D
Barometric pressure, inches Hg	P
$\frac{5.168\ (\_\_\_\_ + 460)\ (\_\_)\ (\_\_)\ (\_\_)\ (\_\_^2)}{\sqrt{\_\_\_\_}}$	K

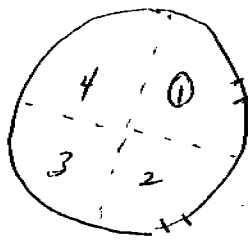
% H2O=12.
M FACTOR=0.994
DELTA H CAL=1.84
BAR. P.=29.03
STATIC P.=-0.5
CP=0.84
I. VOL.=0.
INT.=10.
% O2=10.3
% CO2=16.3
METER T=70.
NOZZLE D.=0.305
DRY MW= 31.02
WET MW= 29.45
K FACT= 351.68
N FACT= 4145.23

STACK T=410.
DELTA P= 0.400
DELTA H= 1.905
M. V. INC= 7.540
M. VOL= 7.540

FIELD DATA

PLANT Monarch Cement
DATE 11-12-81
SAMPLING LOCATION Outlet - Quad 1
SAMPLE TYPE ~~0-1-1~~ Mess (Meth 17)
RUN NUMBER 0-1-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.13
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 29.03
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 22

LEAK CK: Initial at ≥15" Hg, CFM 0.0
Final at 20" " Hg, CFM .005
Pitot at ≥3" H_2O Pre-OK Post-OK



N

SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

PROBE LENGTH AND TYPE Meth 17 Nozzle only
NOZZLE I.D. .305
ASSUMED MOISTURE, % 12
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 6
TEMPERATURE METER NO. 9516
METER ΔH@ 1.
METER CORRECTION .994
C FACTOR .86
REFERENCE Δp .43

$$VM = \cancel{335.07}\ 351.69\ \text{dc} \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 983.798 Desired	Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1433											
Quad 1	10	1443	991.43	—	.41	1.9	1.95	411	74	71	9	N/A	N/A
	20	1453	998.96	997.83	.40	1.9	1.8	412	83	72	9.5		
	30	1503	1006.95	1005.42	.45	2.1	2.1	412	92	75	15		
	40	1513	1014.49	1012.86	.40	1.9	2.0	408	92	78	17.5		
a]	50	1523	1022.31	1020.46	.43	2.0	1.9	410	98	81	20		

COMMENTS: N = ~~2949.76~~ DC 4145.29
a] max. on vacuum + ΔH

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-12-81
Sampling Location Outlet-Quad I Name Cobb
Run Number 0-1-1

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.41  1.95 411
74  71
0.40  1.80 412
83  72
0.45  2.10 412
92  75
0.40  2.00 408
92  78
0.43  1.90 410
98  81
                5
```

```
I. VOL=983.798
F. VOL=1020.46
M FACTOR=0.984
LK CK=0.005
B. P=29.03
STATIC P=-0.3
%O2=10.3
%CO2=16.3
MLS H2O=38.7
% H2O=   5.00
CP=   0.84
TIME=  50.00
NOZZLE D=0.305
NET VOL=36.44202
8
DS VOL=  34.626
STACK P=  28.993
AVE M T=  81.600
√DP=   0.646
DH=   1.950
ST T= 410.600
DRY MW=  31.020
WET MW=  30.368
% ISO=  88.296
STACK V= 2768
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch Cement
Sample Location Outlet - Run 1
Sample Box No.
Sample Type Mass (with 17)

Run No. 1-1-1
Sample Date 11-12-81
Recovery Date
Cleanup Person Gabriel/Hall

Filter No. 22
Sample No.
Sample Material Description light brown sample - adequate amt.

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution					
Final Volume (wt)[b]	175	49	3		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	75	-51	3		
Sample No.(s)					

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed
Description of Impinger Solution Clear
Total Moisture, gm 38.7

SILICA GEL

	728.3	
	716.6	
	11.7	

Silica Gel
Color Good
N/A

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. / Liquid Level Marked / Sealed
Impinger Rinse: Sample No. / Liquid Level Marked / Sealed
Water Blank: Sample No. / Liquid Level Marked
Dry Catch: Sample No. / Description / Sealed
Acetone Blank: Sample No. / Liquid Level Marked / Sealed
Filter Blank: Sample No. / Sealed

Sample Disposition
Carrier Car Truck Cmct Date Shipped: 11-17-81
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks: moisture done on stock except S.i. gel

SAMPLE HANDLING LOG

Project Number 4892-263

Source Identification Outlet Kiln/Baghouse

Test Run Number 0-1-1

Pollutant(s) in Sample Mass (Meth 17)

Task	Date	Time	Personnel	Remarks
Sampling	11-12-81	1423-1523		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1700-1715	Cobb	
Train Disassembly		1800-1815	Gabriel/Cobb	moisture done on stack
Train Cleanout		1800-1815	Gabriel/Hall	
Packing and Storage	11-17-81		Gabriel/Hall	
Shipment to Analysis Site	11-17-81		Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN ~~0-1-1~~ 0-2-1

MRI Project Number 4892-163
Field Dates
Plant Monarch Cement
Sampling Location Outlet - Duct 2
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Cabriel
2 Hall
3

Process Engineer 1
2

Other 1
2.

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-13-81

SAMPLING LOCATION Outlet - Quad 2

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.816
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	65
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg 29.12	P_m	29.02
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	28.98
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	410
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.39
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR	.88	
CALCULATED NOZZLE DIAMETER, in.	.3	
ACTUAL NOZZLE DIAMETER, in.	.305	
REFERENCE Δp, in. H_2O	—	

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet - Duct 2
Test Number 2-1-2 0-2-1

Date 11-13-81
Initial BE

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

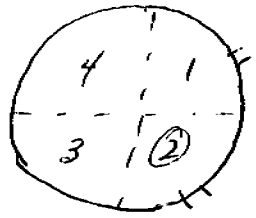
Assumed average meter temperature, °F	
Pitot coefficient	
Sampling time interval, minutes	
Mole fraction dry gas	
Nozzle diameter, inches	
Barometric pressure, inches Hg	
$5.168\ (\_\_\_\_\_ + 460)\ (\_\_)\ (\_\_)\ (\_\_)\ (\_\_^2)$ / $\sqrt{\_\_\_\_}$	

% H2O=5.
M FACTOR=1.069
DELTA H CAL=1.81
6
BAR. P.=29.01
STATIC P.=-0.5
CP=0.84
I. VOL.=0.
INT.=10.
% O2=10.3
% CO2=16.3
METER T=65.
NOZZLE D.=0.305
DRY MW= 31.02
WET MW= 30.36
K FACT= 349.75
N FACT= 4259.78
STACK T=410.
DELTA P= 0.390
DELTA H= 1.909
M. V. INC= 7.405
M. VOL= 7.405

FIELD DATA

PLANT Bronwick Cement
DATE 11-13-81
SAMPLING LOCATION Outlet - Quad 2
SAMPLE TYPE Mass
RUN NUMBER Grab 0-2-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.12
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 29.02
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 21

LEAK CK: Initial at ≥15" Hg, CFM 0.0
Final at 20 " Hg, CFM 0.026
Pitot at ≥3" H_2O Pre-OK Post-OK



1
N

SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

PROBE LENGTH AND TYPE Mills 17 - Nomple
NOZZLE I.D. .305
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 9
TEMPERATURE METER NO. 85 IE
METER ΔH@ 1.816
METER CORRECTION 1.069
C FACTOR 1.069
REFERENCE Δp .88

$VM = 349.75 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 661.0		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 1026	Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
Quad 2	10 / 1036	668.40	668.20	.39	1.9	1.95	409	66	61	14.5	N/A	N/A
	20 / 1046	676.08	675.32	.42	2.1	1.95	410	75	62	20		
	30											
	40											

COMMENTS: N = 4259.78
Δ no longer installed

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ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-13-81
Sampling Location Outlet Quad 2 Name Cobb
Run Number ~~0-1-2~~ 0-2-1

ISOKINETIC EQUATION

$$\%I = \frac{1{,}839(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
 0.39  1.95 409
 66  61
 0.42  1.95 410
 75  62

I. VOL=661.
F. VOL=675.392
M FACTOR=1.069
LK CK=0.006
B. P=29.02
STATIC P=-0.5
%02=13.3
%C02=18.8
MLS H20=17.2
% H20=   5.10
CP=   0.84
TIME=  20.00
NOZZLE D=0.305
NET VOL=15.39504
8
DS VOL=  15.046
STACK P=  28.993
AVE M T=  66.000
√DP=   0.636
DH=   1.950
ST T= 409.500
DRY MW=  31.540
WET MW=  30.048
% ISO=  98.275
STACK V= 2703
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch Cement
Sample Location Outlet - Duct 2
Sample Box No. N/A
Sample Type Mass

Run No. 0-2-1
Sample Date 11-13-81
Recovery Date
Cleanup Person

Filter No. 21
Sample No.
Sample Material Description Normal Brown

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H2O	H2O	Dry		
Final Volume (wt)[b]	111	102	1		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	11	2	1		
Sample No.(s)	N/A	N/A	N/A		

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 17.2

SILICA GEL

	742.0	
	738	
	3.2	

Silica Gel Color OK

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Truck Car MRT Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet-Baghouse

Test Run Number 0-2-1

Pollutant(s) in Sample Mass

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1026-1046		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1100-1115	Cobb	
Train Disassembly	11-14-81		Cobb/Gabriel/Hall	moisture on stack
Train Cleanout			Gabriel/Hall	
Packing and Storage	11-17-81		Gabriel/Hall	
Shipment to Analysis Site				
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Meth. 17

RUN ~~0-1-3~~ 0-3-1

MRI Project Number 4892-163
Field Dates
Plant Monarch Cement
Sampling Location Outlet - Duct 3
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2 Hall
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-13-81

SAMPLING LOCATION Outlet-Quad 3

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.959
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	80
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.92
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	28.88
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	411
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.44
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		1.09
CALCULATED NOZZLE DIAMETER, in.		.28
ACTUAL NOZZLE DIAMETER, in.		.305
REFERENCE Δp, in. H_2O		.31

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet - Quad 3
Test Number 0-1-3 0-3-1

Date 11-13-81
Initial BC

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}
Pitot coefficient	Cp
Sampling time interval, minutes	θi
Mole fraction dry gas	Mf
Nozzle diameter, inches	Dn
Barometric pressure, inches Hg	Pb
$\frac{5.168\ (\_\_\_\_ + 460)\ (\_\_)\ (\_\_)\ (\_\_)\ (\_\_^2)}{\sqrt{\_\_\_\_}}$	K

% H2O=5.
M FACTOR=0.994
DELTA H CAL=1.959
BAR. P.=28.92
STATIC P.=-0.5
CP=0.84
I. VOL.=0.
INT.=10.
% O2=13.3
% CO2=18.8
METER T=80.
NOZZLE D.=0.305
DRY MW= 31.54
WET MW= 30.86
K FACT= 387.55
N FACT= 5085.60

STACK T=411.
DELTA P= 0.440
DELTA H= 2.569
M. V. INC= 8.710
M. VOL= 8.710

PLANT Monarch Cement
DATE 11-13-81
SAMPLING LOCATION Outlet - Quad 3
SAMPLE TYPE Mass (Method 17)
RUN NUMBER ~~1 2 3~~ 0-3-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.02
SITE TO BARO. ELEVATION, ft. 100
CORRECTED B.P. 28.92
STATIC PRESSURE (P_g) -.5
FILTER NUMBER(s) 23

LEAK CK: Initial at ≥15" Hg, CFM 0.00
Final at 19" Hg, CFM 0.009
Pitot at ≥3" H_2O Pre-ck Post-ok

FIELD DATA

N ↑

SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

PROBE LENGTH AND TYPE N/A
NOZZLE I.D. .305
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 6
TEMPERATURE METER NO. 9516
METER ΔH@ 1.959
METER CORRECTION .994
C FACTOR 1.09
REFERENCE Δp .31

$VM = 387.55 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		28.6						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1830	Desired	Actual		DESIRED	ACTUAL						
Quad 3	10 / 1840	37.52	36.93	.46	2.7	2.7	408	69	64	10	N/A	N/A
	20 / 1850	46.36	45.24	.45 ck	2.6	2.6	404	80	65	13.5		
	~~30~~ / 1900	55.20	53.579	.45	2.6	2.6	405	84	68	19		
	~~40~~											

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COMMENTS: N = 5085.60
ck .45

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-13-81
Sampling Location Outlet - Quad 3 Name Cobb
Run Number ~~[illegible]~~ 0-3-1

ISOKINETIC EQUATION

$$\%I = \frac{1.039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.46  2.70 408
69  64
0.45  2.60 404
80  65
0.45  2.60 405
84  68

I. VOL=28.6
F. VOL=53.579
M FACTOR=0.994
LK CK=0.009
B. P=28.92
STATIC P=-0.5
%O2=13.3
%CO2=18.8
MLS H2O=25.1
% H2O=   4.69
CP=   0.84
TIME=  30.00
NOZZLE D=0.305
NET VOL=24.82912
6
DS VOL=  23.983
STACK P=  28.883
AVE M T=  71.666
√DP=   0.673
DH=   2.633
ST T= 405.666
DRY MW=  31.540
WET MW=  30.903
% ISO=  98.303
STACK V= 2856
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-3-1

Plant Monarch Cement
Sample Location Outlet - Quad 3
Sample Box No. NA
Sample Type Mass

Run No. ~~0-1-3~~
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Gabriel / Hall

Filter No. 23
Sample No.
Sample Material Description Normal

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	H_2O	Dry		
Final Volume (wt)[b]	110	102	2		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	10	2	2		
Sample No.(s)	NA	NA	NA		

Combined impinger contents, Sample No. NA
Liquid Level Marked NA Container(s) Sealed NA
Description of Impinger Solution Clear
Total Moisture, gm 25.1

SILICA GEL

	749.9	
	738.8	
	11.1	

Silica Gel
Color OK

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Con CMRT Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet-Baghouse

Test Run Number ~~0-1-3~~ 0-3-1

Pollutant(s) in Sample Mass

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1830-1900		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1900-2000	Cobb	
Train Disassembly		2100	Cobb/Gabriel/Hall	moisture loss on stack
Train Cleanout		2200	Gabriel/Hall	
Packing and Storage	11-17-81		DeBeall/Cobb	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN ~~2-4~~ 0-4-1

MRI Project Number 4892-163
Field Dates _____
Plant Monsanto Cement
Sampling Location Outlet Duct
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2 _____
3 _____

Engr. Technician 1 _____
2 _____
3 _____

Lab Technician 1 Schmid
2 _____
3 _____

Process Engineer 1 _____
2 _____

Other 1 _____
2 _____

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-14-81

SAMPLING LOCATION Outlet - Duct 4

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.816
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	75
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.82
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	1 28.88
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	415
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.48
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR	1.0	
CALCULATED NOZZLE DIAMETER, in.	.28	
ACTUAL NOZZLE DIAMETER, in.	.305	
REFERENCE Δp, in. H_2O	.33	

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet - Run 04
Test Number ~~Run 4~~ 0-4-1

Date 11-14-81
Initial DC

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

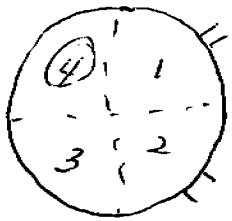
Assumed average meter temperature, °F	Tm_{avg}
Pitot coefficient	Cp
Sampling time interval, minutes	θi
Mole fraction dry gas	Mf
Nozzle diameter, inches	Dn
Barometric pressure, inches Hg	Pb
$5.168\ (\_\_\_\_ + 460)\ (\_\_)\ (\_\_)\ (\_\_)\ (\_\_^2) \Big/ \sqrt{\_\_\_\_}$	K

% H2O=5.
M FACTOR=1.069
DELTA H CAL=1.816
BAR. P.=28.92
STATIC P.=-0.5
CP=0.84
I. VOL.=0.
INT.=10.
% O2=14.
% CO2=18.8
METER T=75.
NOZZLE D.=0.305
DRY MW= 31.56
WET MW= 30.88
K FACT= 357.02
N FACT= 4345.14

FIELD DATA

PLANT Monarch Cement
DATE 11-14-81
SAMPLING LOCATION Outlet - Quad 4
SAMPLE TYPE Mass
RUN NUMBER ~~[illegible]~~ 0-4-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.02
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.92
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 24

LEAK CK: Initial at ≥15" Hg, CFM 0.0
Final at 20" " Hg, CFM .003
Pitot at ≥3" H_2O Pre - OK Post OK



↑ N

PROBE LENGTH AND TYPE N/A (Meth 17)
NOZZLE I.D. .305
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 9
TEMPERATURE METER NO. 9516
METER ΔH@ 1.816
METER CORRECTION 1.069
C FACTOR 1.0
REFERENCE Δp .33

SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

$$VM = 357.02 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 685.8 Desired	Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1038											
Quad 4	10	1048	693.90	—	.45	2.2	2.1	414	66	60	7	N/A	N/A
	20	1058	701.91	701.02	.44	2.2	2.2	414	66	63	10		
	30	1108	710.01	708.78	.45	2.2	2.2	415	78	66	13		
	40	1118	718.20	716.743	.46	2.3	2.3	415	82	69	20		

COMMENTS: N = 4343.14

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-14-81
Sampling Location [illegible] Name [illegible]
Run Number ~~[illegible]~~ 0-4-1

ISOKINETIC EQUATION

$$\%I = \frac{1.039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

0.45 2.10 414
66 60
0.44 2.20 414
66 63
0.45 2.20 415
78 66
0.46 2.30 415
82 69

I. VOL=685.8
F. VOL=716.743
M FACTOR=1.069
LK CK=0.003
B. P=28.92
STATIC P=-0.5
%O2=14.
%CO2=18.8
MLS H2O=29.9
% H2O= 4.20
CP= 0.84
TIME= 40.00
NOZZLE D=0.305
NET VOL=33.07806
7
DS VOL= 32.092
STACK P= 28.883
AVE M T= 68.750
√DP= 0.670
DH= 2.200
ST T= 414.500
DRY MW= 31.568
WET MW= 30.997
% ISO= 99.162
STACK V= 2856

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

O-4-1

Plant Monarch Cement
Sample Location Outlet Quad 4
Sample Box No. N/A
Sample Type mass

Run No. O-1-4
Sample Date 11-14-81
Recovery Date 11-14-81
Cleanup Person Gabriel / Cobb

Filter No. 24
Sample No. _____
Sample Material Description normal

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	HCl	H_2O	Dry		
Final Volume (wt)[b]	117	104	2		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	17	4	2		
Sample No.(s)	N/A	N/A	N/A		

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A
Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 299

SILICA GEL

	740.3
	733.4
	6.9

Silica Gel Color _____

[a] S = Greenburg-Smith standard, M = Modified, O = Other _____
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Impinger Rinse: Sample No. _____ Liquid Level Marked _____ Sealed _____
Water Blank: Sample No. _____ Liquid Level Marked _____

Dry Catch: Sample No. _____ Description _____ Sealed _____
Acetone Blank: Sample No. _____ Liquid Level Marked _____ Sealed _____
Filter Blank: Sample No. _____ Sealed _____

Sample Disposition _____
Carrier Car (MKE) Date Shipped: 11-17-81
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

SAMPLE HANDLING LOG

Project Number 4892-263

Source Identification Outlet-Baghouse

Test Run Number ~~A-1-4~~ 0-4-1

Pollutant(s) in Sample Mass

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1038-1118		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1118-1230	Cobb	
Train Disassembly		1300	Cobb/Gabriel	moisture done on Stack
Train Cleanout		1400	Gabriel	
Packing and Storage	11-17-81		Gabriel Beall	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Meth 17.

RUN ~~0-2-1~~ 0-1-2

MRI Project Number 4892-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet-Duct 1
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-14-81

SAMPLING LOCATION Outlet - Baghouse

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.957
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	80
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.78
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	28.74
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	409
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.41
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		1.8
CALCULATED NOZZLE DIAMETER, in.		.284
ACTUAL NOZZLE DIAMETER, in.		.305
REFERENCE Δp, in. H_2O		.31

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet-Quad 1
Test Number 0-2-1 0-1-2

Date 11-14-81
Initial Cebb

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

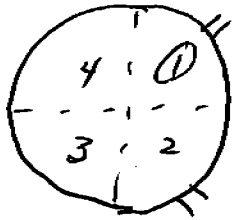
Assumed average meter temperature, °F	Tm_{avg}
Pitot coefficient	Cp
Sampling time interval, minutes	θi
Mole fraction dry gas	Mf
Nozzle diameter, inches	Dn
Barometric pressure, inches Hg	Pb
5.168 (_____ + 460) (___) (___) (___) (___^{2}) / √_____	K

% H2O=5.
M FACTOR=0.994
DELTA H CAL=1.959
BAR. P.=28.79
STATIC P.=-0.5
CP=0.84
I. VOL.=72.9
INT.=10.
% O2=14.
% CO2=18.8
METER T=80.
NOZZLE D.=0.305
DRY MW= 31.56
WET MW= 30.88
K FACT= 388.49
N FACT= 5085.70

FIELD DATA

PLANT Monarch Cement
DATE 11-14-81
SAMPLING LOCATION Outlet - Quad 1
SAMPLE TYPE Mass (M-17)
RUN NUMBER Run-1 0-1-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.88
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.78
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 25

LEAK CK: Initial at ≥15" Hg, CFM .007
Final at 19" " Hg, CFM .011
Pitot at ≥3" H_2O Pre-OK Post-OK



N

SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

PROBE LENGTH AND TYPE N/A (M-17)
NOZZLE I.D. .305
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 6
TEMPERATURE METER NO. 9518
METER ΔH@ 1.959
METER CORRECTION .994
C FACTOR 1.8
REFERENCE Δp .31

$$VM = 388.49 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		72.9						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1815	Desired	Actual		DESIRED	ACTUAL						
Quad 1	10 / 1825	81.45	79.0	.42	2.5	2.5	407	70	64	2	N/A	N/A
	20 / 1835	90.00	86.43	.42	2.5	2.5	406	70	64	8		
	30 / 1845	98.36	94.49	.4	2.4	2.5	404	77	67	12		
	40 / 1855	106.71	102.509	.4	2.3	2.4	406	82	68	19		

COMMENTS: N= 5085.7

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-14-81
Sampling Location Outlet-Quad 1 Name Cash
Run Number a-2-1 0-1-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.42  2.50  407
70  64
0.42  2.50  406
70  64
0.40  2.50  404
77  67
0.40  2.40  406
82  68

I. VOL=72.9
F. VOL=102.509
M FACTOR=0.994
LK CK=0.011
B. P=28.78
STATIC P=-0.5
%O2=14.
%CO2=18.8
MLS H2O=38.4
% H2O=   5.99
CP=   0.84
TIME=  40.00
NOZZLE D=0.305
NET VOL=29.431346
DS VOL=  28.356
STACK P=  28.743
AVE M T=  70.250
FDP=   0.640
DH=   2.475
ST T= 405.750
DRY MW=  31.568
WET MW=  30.754
% ISO=  92.957
STACK V= 2729
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-1-2

Plant Monarch Cement
Sample Location Outlet - Quad 1
Sample Box No. N/A
Sample Type Mass

Run No. 1-2-4
Sample Date 11-14-81
Recovery Date
Cleanup Person

Filter No. 25
Sample No.
Sample Material Description Normal

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H2O	H2O	Dry		
Final Volume (wt)[b]	169	58	1		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	69	-42	1		
Sample No.(s)	N/A	N/A	N/A		

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A
Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 28.4

SILICA GEL

	736.3	
	725.9	
	10.4	

Silica Gel
Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Car (UPS) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Seal(s) broken by
Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet-Baghouse

Test Run Number A-2-1 / 0-1-2

Pollutant(s) in Sample Mass

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1815-1855		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1900-2000	Cobb	
Train Disassembly		2200	Cobb / Gabriel	moisture down stack
Train Cleanout		2400	Gabriel	
Packing and Storage	11-17-81		Gabriel Beall	
Shipment to Analysis Site			Hall / Cobb	
Lab Analysis				
Write Up				

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meth 17

RUN ~~0-2-2~~ 0-2-2

MRI Project Number 4892-163
Field Dates _____
Plant Monarch Cement
Sampling Location Outlet-Quad 2
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2 _____
3 _____

Engr. Technician 1 _____
2 _____
3 _____

Lab Technician 1 Gabriel
2 Bell
3 _____

Process Engineer 1 _____
2 _____

Other 1 _____
2 _____

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-16-81

SAMPLING LOCATION Outlet - Quad 2

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.816
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.82
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	28.78
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	408
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.48
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR	1.0	
CALCULATED NOZZLE DIAMETER, in.	.279	
ACTUAL NOZZLE DIAMETER, in.	.305	
REFERENCE Δp, in. H_2O	.32	

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet - Aux O2
Test Number 0-2-2

Date 11-18-81
Initial Cobb

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

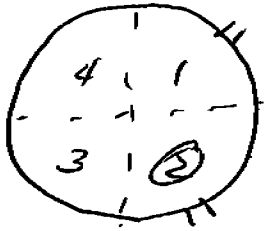
Assumed average meter temperature, °F	Tm_{avg}
Pitot coefficient	Cp
Sampling time interval, minutes	θi
Mole fraction dry gas	Mf
Nozzle diameter, inches	Dn
Barometric pressure, inches Hg	Pb
$\frac{5.168\ (\_\_\_\_\_ + 460)\ (\_\_)\ (\_\_)\ (\_\_)\ (\_\_^2)}{\sqrt{\_\_\_\_\_}}$	K

% H2O=5.
M FACTOR=1.059
DELTA H CAL=1.816
BAR. P.=28.82
STATIC P.=-0.5
CP=0.84
I. VOL.=730.4
INT.=10.
% O2=12.
% CO2=17.
METER T=85.
NOZZLE D.=0.305
DRY MW= 31.20
WET MW= 30.54
K FACT= 364.33
N FACT= 4422.78

FIELD DATA

PLANT Monarch Cement
DATE 11-16-81
SAMPLING LOCATION Outlet - Quad 2
SAMPLE TYPE Mass
RUN NUMBER 0-2-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.92
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.82
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 26

LEAK CK: Initial at ≥15" Hg, CFM 0.002
Final at ____ " Hg, CFM 0.024
Pitot at ≥3" H_2O Pre-OK Post-OK



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

PROBE LENGTH AND TYPE 4 (meth 17)
NOZZLE I.D. .305
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 9
TEMPERATURE METER NO. 9516
METER ΔH@ 1.816
METER CORRECTION 1.069
C FACTOR 1
REFERENCE Δp .32

$$VM = 364.33 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 730.4 Desired	Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1130											
Quad 2	10	1140	738.03	737.74	.4	1.9	2.0	407	78	71	9	N/A	N/A
	20	1150	745.83	748.12	.4	2.0	2.0	413	88	72	12		
	30	1200	753.62	752.61	.4	2.0	2.0	415	110	78	14		
	40	1210	761.41	760.068	.4	2.0	2.0	414	105	82	18		

COMMENTS: N = 4422.78
at 19

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cogenerating Date 11-16-81
Sampling Location Outlet-Quad 2 Name Cobb
Run Number 0-2-2

ISOKINETIC EQUATION

$$\%I = \frac{1,039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
 0.40  2.00 407
 78  71
 0.40  2.00 413
 88  72
 0.40  2.00 415
110  78
 0.40  2.00 414
105  82

I. VOL=760.068
F. VOL=730.4
M FACTOR=1.069
LK CK=0.024
HIGH LK RATE
B. P=28.82
STATIC P=-0.5
%O2=12.
%CO2=17.
MLS H2O=27.5
% H2O=  -4.24
CP=   0.84
TIME=  40.00
NOZZLE D=0.305
NET VOL=-33.9436
9568
DS VOL= -31.795
STACK P=  28.783
AVE M T=  85.500
√DP=   0.632
DH=   2.000
ST T= 412.250
DRY MW=  31.200
WET MW=  31.760
% ISO= -96.958
STACK V= 2661
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch Cement
Sample Location Outlet - Quad 2
Sample Box No. N/A
Sample Type Mass

Run No. 2-2-2
Sample Date 11-16-81
Recovery Date
Cleanup Person

Filter No. 26
Sample No.
Sample Material Description Normal

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	Gel	Dry		
Final Volume (wt)[b]	118	104	1		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	18	4	1		
Sample No.(s)	N/A	N/A	N/A		

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 27.5

SILICA GEL

204.1	
699.6	
4.5	

Silica Gel
Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Seal(s) broken by
Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892 ~~2184~~ - L63

Source Identification Outlet - Baghouse

Test Run Number 0-2-2

Pollutant(s) in Sample MASS

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1130-1210		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1230-1300	Cobb	
Train Disassembly		1300	Cobb/Gabriel/Beall	
Train Cleanout		1500	Gabriel/Beall	
Packing and Storage	11-17-81	12	Beall	
Shipment to Analysis Site			Hull/Cobb	
Lab Analysis				
Write Up				

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Meth 17

RUN ~~4892-163~~ 0-3-2

MRI Project Number 4892-163
Field Dates
Plant Monarch Cement
Sampling Location Outlet - Quad 3
Sampling Date 11-16-81

FIELD CREW

Crew Chief Eberson

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Bull
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-16-81

SAMPLING LOCATION Outlet - Quad 3

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.959
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	80
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.79
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in. H_2O)	P_s	28.75
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	412
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.43
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		1.8
CALCULATED NOZZLE DIAMETER, in.		.28
ACTUAL NOZZLE DIAMETER, in.		.305
REFERENCE Δp, in. H_2O		.31

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet - Quad 3
Test Number ~~Q-2-3~~ Q-3-2

Date 11-16-81
Initial CAB

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

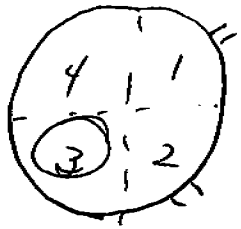
Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	% H2O=5. M FACTOR=0.994 DELTA H CAL=1.95 9 BAR. P.=28.79 STATIC P.=-0.5 CP=0.84 I. VOL.=0. INT.=10. % O2=12. % CO2=17. METER T=80. NOZZLE D.=0.305 DRY MW= 31.20 WET MW= 30.54 K FACT= 388.42 N FACT= 5083.96
Pitot coefficient	Cp	
Sampling time interval, minutes	θi	
Mole fraction dry gas	Mf	
Nozzle diameter, inches	Dn	
Barometric pressure, inches Hg	Pb	
$5.168\ (\_\_\_\_ + 460)\ (\_\_)\ (\_\_)\ (\_\_)\ (\_\_^2) \Big/ \sqrt{\_\_\_\_}$	K	

FIELD DATA

PLANT Monarch Cement
DATE 11-16-81
SAMPLING LOCATION Outlet - Quad 3
SAMPLE TYPE Mass
RUN NUMBER ~~Q-2-3~~ Q-3-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.89
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.79
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 27

LEAK CK: Initial at ≥15" Hg, CFM 0.0
Final at 19 " Hg, CFM 0.001
Pitot at ≥3" H_2O Pre-OK Post-OK



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

PROBE LENGTH AND TYPE N/A (metal)
NOZZLE I.D. .175 .305
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 6
TEMPERATURE METER NO. 9518
METER ΔH@ 1.959
METER CORRECTION .994
C FACTOR 1.6
REFERENCE Δp .31

$VM = 388.42 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1805	117.6										
Quad 3	10 / 1815	126.12	125.17	.42	2.4	2.4	413	78	72	7	N/R	N/R
	20 / 1825	134.74	132.90	.43	2.5	2.5	413	88	76	12		
	30 / 1835	143.35	140.45	.43	2.5	2.4	415	95	80	19		
	~~40~~											

COMMENTS: N = 5083.96
at vacuum to high to maintain ΔH

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-16-81
Sampling Location Outlet - Duct 3 Name Cobb
Run Number ~~0-2-2~~ 0-3-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.42  2.40 413
78  72
0.43  2.50 413
88  76
0.43  2.40 415
95  80

I. VOL=117.6
F. VOL=140.45
M FACTOR=0.994
LK CK=0.001
B. P=28.79
STATIC P=-0.5
%02=12.
%C02=17.
MLS H20=26.1
% H2O=   5.42
CP=   0.84
TIME=  30.00
NOZZLE D=0.305
NET VOL=22.7129
DS VOL=  21.434
STACK P=  28.783
AVE M T=  81.500
√DP=   0.653
DH=   2.433
ST T= 413.666
DRY MW=  31.200
WET MW=  30.384
% ISO=  91.254
STACK V= 2809
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-3-2

Plant Monarch Cement
Sample Location Outlet - Run 3
Sample Box No. N/A
Sample Type Mass

Run No. 0-2-3
Sample Date 11-16-81
Recovery Date
Cleanup Person

Filter No. 27
Sample No.
Sample Material Description OK

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	H_2O	Dry		
Final Volume (wt)[b]	116	103	1		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	16	3	1		
Sample No.(s)	N/A	N/A	N/A		

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 26.1

SILICA GEL

	747.3	
	741.2	
	6.1	

Silica Gel Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ; Liquid Level Marked ; Sealed
Impinger Rinse: Sample No. ; Liquid Level Marked ; Sealed
Water Blank: Sample No. ; Liquid Level Marked
Dry Catch: Sample No. ; Description ; Sealed
Acetone Blank: Sample No. ; Liquid Level Marked ; Sealed
Filter Blank: Sample No. ; Sealed

Sample Disposition
Carrier Car (MRT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ; Seal(s) broken by
Personnel accepting custody ; Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-L63

Source Identification Outlet-Baghouse

Test Run Number ~~0-2-3~~ 0-3-2

Pollutant(s) in Sample Mass

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1805-1835		
Probe Technician				
Meter Technician			Cabb	
Other				
Transport of Train to Cleanup Site		1900-1930	Cabb	
Train Disassembly		2000	Cabb/Beall	
Train Cleanout		2100	Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Cabb-Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN ~~0-2-4~~ 0-4-2

MRI Project Number 4892-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet - Quad 4
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Beall
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Monarch Cement

DATE 11-16-81

SAMPLING LOCATION Outlet - Quad 4

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.816
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.8
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	28.76
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	412
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.42
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		1.0
CALCULATED NOZZLE DIAMETER, in.		.298
ACTUAL NOZZLE DIAMETER, in.		.305
REFERENCE Δp, in. H_2O		.32

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Monarch Cement
Sampling Location Outlet - Quad 4
Test Number 0-2-4 0-4-2

Date 11-16-81
Initial CAH

Isokinetic sampling equation:

$$Vm_i = K \sqrt{\frac{\Delta Ps}{Ts + 460}}$$

Where:

$$K = \frac{5.168\ (Tm_{avg} + 460)\ (Cp)\ (\theta i)\ (Mf)\ (Dn^2)}{\sqrt{Pb}}$$

Vm_i = Volume of the meter per sampling interval, ft^3

K = Constant of fixed and assumed parameters, dimensionless

ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

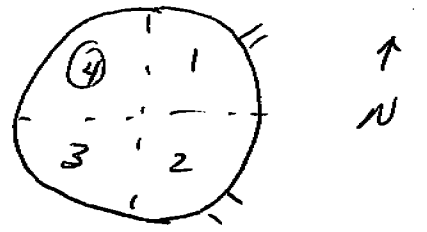
Assumed average meter temperature, °F	Tm_{avg}
Pitot coefficient	Cp
Sampling time interval, minutes	θi
Mole fraction dry gas	Mf
Nozzle diameter, inches	Dn
Barometric pressure, inches Hg	Pb
$\frac{5.168\ (\_\_\_\_ + 460)\ (\_\_)\ (\_\_)\ (\_\_)\ (\_\_^2)}{\sqrt{\_\_\_\_}}$	K

% H2O=5.
M FACTOR=1.089
DELTA H CAL=1.81
6
BAR. P.=28.8
STATIC P.=-0.5
CP=0.84
I. VOL.=0.
INT.=10.
% O2=12.
% CO2=17.
METER T=70.
NOZZLE D.=0.305
DRY MW= 31.20
WET MW= 30.54
K FACT= 354.42
N FACT= 4301.05

FIELD DATA

PLANT Monarch Cement
DATE 11-16-81
SAMPLING LOCATION Outlet - Quad 4
SAMPLE TYPE Mass
RUN NUMBER ~~0-3-4~~ 0-4-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.9
SITE TO BARO. ELEVATION, ft. 100
CORRECTED B.P. 28.8
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 28

LEAK CK: Initial at ≥15" Hg, CFM .006
Final at 20 " Hg, CFM 0.027
Pitot at ≥3" H_2O Pre - OK Post - OK



SCHEMATIC OF TRAVERSE POINT LAYOUT
Read and Record All Data
Every 10 Minutes

PROBE LENGTH AND TYPE NA (Mark 17)
NOZZLE I.D. .305
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER N/A
METER BOX NUMBER 9
TEMPERATURE METER NO. 9516
METER ΔH@ 1.816
METER CORRECTION 1.069
C FACTOR 1.0
REFERENCE Δp .32

$VM = 354.42 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F			
	0 / 2212	771.4										
Quad 4	10 / 2222	779.17	778.92	.42	2.1	2.1	413	78	70	7	N/A	N/A
	20 / 2232	787.05	786.62	.43	2.1	2.1	410	94	74	11		
	30 / 2242	795.09	794.532	.45	2.2	2.2	414	103	78	20		
	~~40~~											

COMMENTS: N = 4301.05
a vacuum to high to maintain ΔH

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-16-81
Sampling Location Outlet-Quad 4 Name Cobb
Run Number ~~Q-2-4~~ Q-4-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}839(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
  0.42  2.10  413
  78   70
  0.43  2.10  413
  94   74
  0.45  2.20  414
 103   78

I. VOL=771.4
F. VOL=794.5[illegible]
M FACTOR=1.0[illegible]
LK CK=0.027
HIGH LK RATE
B. P=28.8
STATIC P=-0.[illegible]
%O2=12.
%CO2=17.
MLS H2O=22.7
% H2O=   4.4
CP=   0.84
TIME=  30.00
NOZZLE D=0.3[illegible]
NET VOL=24.3[illegible]0
8
DS VOL=  23.[illegible]1
STACK P=  28.[illegible]
AVE M T=  82.[illegible]
ΔP=   0.658
ΔH=   2.133
ST T= 411.33[illegible]
DRY MW=  31.[illegible]
WET MW=  30.[illegible]
% ISO=  96.5[illegible]
STACK V= 2821
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch Cement
Sample Location Outlet - Quad 4
Sample Box No. NA
Sample Type Mass

Run No. 0-4-2
Sample Date 11-16-81
Recovery Date
Cleanup Person

Filter No. 28
Sample No.
Sample Material Description OC

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	H_2O	Dry		
Final Volume (wt)[b]	112	103	1		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	12	3	1		
Sample No.(s)	NA	NA	NA		

Combined impinger contents, Sample No. NA
Liquid Level Marked NA Container(s) Sealed NA
Description of Impinger Solution Clear
Total Moisture, gm 22.7

SILICA GEL

754.0	
747.3	
6.7	

Silica Gel Color Spent

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MKT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-L63

Source Identification Outlet-Baghouse

Test Run Number ~~0-2-4~~ 0-4-2

Pollutant(s) in Sample Mass

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	2212-2242		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		2300-2400	Cobb	
Train Disassembly	11-17-81	0000, 0100	Cobb / Beall	
Train Cleanout			Beall	
Packing and Storage			Beall	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

H-2-2 Particle Size - Andersen Mark III Impactor
with 15 μm Preseparator

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN 0-1-1

MRI Project Number 4892-163
Field Dates
Plant Monarch Cement
Sampling Location Outlet-Run 1
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monsanto Cement
Sampling Location Control - Quad 1
Test No. C-1-1

Date 11-14-81
Initial RE

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg		
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)		
Percent moisture in gas stream by volume		
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)		
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)		
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$		
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min		
Actual nozzle diameter, in.		
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	

RUN I.D. C-1-1
DATE 11-14-8
^PS=0.5
TS=413.
B.P.=28.92
PS=28.883
%H2O=5.
MF=0.95
MD=31.568
MS=30.8896
VS=3013.421493
DNC=1.949012507E-01
TM=70.
FS=6.243333335E-01
FM=3.596215972E-01
VISCOSITY=256.866667
APPROXIMATE DELTA H SETTING=

0.4288

COR.FACT.= 0.994
0
CORRECTED CFM AT METER SHOULD=

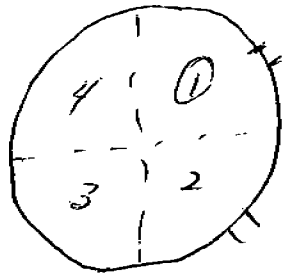
0.3617

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch Quarry
DATE 11-14-81
SAMPLING LOCATION Outlet-Quad 1
SAMPLE TYPE Part. S.R.
RUN NUMBER Q-1-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.02
SITE TO BARO. ELEVATION, ft. Low
CORRECTED B.P. 28.92
STATIC PRESSURE (P_g) -.5
FILTER NUMBER(s) 49

LEAK CK: Initial at ≈15" Hg, CFM 0.0
Final at 1 " Hg, CFM 0.0
Pilot at ≈3" H_2O Pre - OK Post - OK



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) .3617
PROBE TIP DIAMETER .195 ø
CO_2 18.8
O_2 14
CO 0
N_2 67.2
% H_2O 5.15 Assumed
METER CORRECTION (ΔY) .994
TEMP. METER NO. 95-18
METER BOX NO. 6

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, In. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1045	54.8										
Quad 1	10 / 1055	58.42	58.37	.54	.43	.43	413	75	68	1	NA	NA
	20 / 1105	62.03	61.94	.55		.43	414	84	72	1		
	30 / 1115	65.65	65.55	.56		.43	414	85	76	1		
	40 / 1125	69.27	69.185	.53		.43	413	84	79	1		

COMMENTS: @ .195

H-224

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-14-81
Sampling Location Outlet - Unit 01 Name Cobb
Run Number 8-1-1

ISOKINETIC EQUATION

$$\%I = \frac{1,039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.54  0.43 413
75  68
0.55  0.43 414
84  72
0.56  0.43 414
85  76
0.53  0.43 413
84  79

I. VOL=54.8
F. VOL=69.185
M FACTOR=0.994
LK CK=0.
B. P=28.92
STATIC P=-0.5
%O2=14.
%CO2=18.8
% H2O=   4.20
CP=   0.84
TIME=  40.00
NOZZLE D=0.195
NET VOL=14.29869
DS VOL=  13.576
STACK P=  28.885
AVE M T=  77.875
√DP=   0.738
DH=   0.430
ST T= 413.500
DRY MW=  31.568
WET MW=  30.998
% ISO=  93.199
STACK V= 3141
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch Cement
Sample Location Outlet - Quad 1
Sample Box No. N/A
Sample Type Part. Siz.

Run No. 0-1-1
Sample Date 11-14-81
Recovery Date 11-14-81
Cleanup Person Gabriel / Cobb

Filter No. 49
Sample No.
Sample Material Description good

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type a/	M	M			
Impinger Solution	H_2O	Dry			
Final Volume (wt) b/					
Initial Volume (wt) b/	100	0			
Net Volume (wt) b/	ad				
Sample No.(s)	N/A	N/A			

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm ad

SILICA GEL

749.9

Silica Gel Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks: ad spilled H_2O using Meth. 17 which was run at same time for moisture (4.2%

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet-Baghouse

Test Run Number 0-1-1

Pollutant(s) in Sample Part. Size

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1045-1125		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1125-1230	Cobb	
Train Disassembly		1300	Cobb / Gabriel	moisture on stack
Train Cleanout		1400	Gabriel	
Packing and Storage	11-17-81		Gabriel / Beall	
Shipment to Analysis Site			Cobb / Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~0-1-2~~ 0-2-1

MRI Project Number 4592-163
Field Dates
Plant Monarch Cement
Sampling Location Outlet-Quad 2
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2 Hall
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch Cement — Date 11-13-81
Sampling Location Outlet - Quad 2 — Initial RE
Test No. ~~Outlet 2~~ 0-2-1

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	

RUN I.D. ~~0-1-2~~ 0-2-1
DATE 11-13-8
^PS=0.51
TS=408.
B.P.=28.92
PS=28.883
%H20=5.
MF=0.95
MD=31.54
MS=30.863
VS=3035.986115
DNC=1.933097544E-01
TM=62.
FS=0.618777778
FM=3.530637286E-01
VISCOSITY=255.7555556
APPROXIMATE DELTA H SETTING=

0.3573

COR.FACT.= 1.0690
CORRECTED CFM AT METER SHOULD=

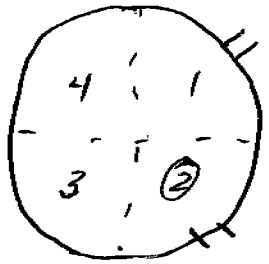
0.3302

WATERPROOF PAPER

FIELD DATA - ANDERSEN

PLANT Monarch Cement
DATE 11-13-81
SAMPLING LOCATION Outlet - Quad 2
SAMPLE TYPE Part. 5:2
RUN NUMBER 0-1-2 0-2-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.02
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.92
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 48

LEAK CK: Initial at ≥15" Hg, CFM 0.008
Final at 1" " Hg, CFM 0.00
Pitot at ≥9" H_2O Pos - OK Pos - OK



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) 3302
PROBE TIP DIAMETER .195
CO_2 18.8
O_2 13.3
CO 0
N_2 67.9
% H_2O 5 assumed
METER CORRECTION (ΔY) 1.069
TEMP. METER NO. 9518
METER BOX NO. 9

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 675.9		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
Quad 2	0 / 1835											
	10 / 1845	679.20	679.13	.47	.36	.36	403	60	60	1	N/A	N/A
	20 / 1855	682.50	682.38	.49		.36	405	63	60	1		
	30 / 1905	685.81	685.796	.50		.36	403	63	62	1		
	~~40~~	~~689.11~~										
		~~692.41~~										

COMMENTS:

H-230

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-13-81
Sampling Location Outlet Cyclone 2 Name Cobb
Run Number 6-2 0-2-1

ISOKINETIC EQUATION

$$\%I = \frac{1,039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
 0.47  0.36 403
 60  60
 0.49  0.36 405
 63  60
 0.50  0.36 403
 63  62

I. VOL=675.9
F. VOL=685.796
M FACTOR=1.069
LK CK=0.
B. P=29.92
STATIC P=-0.5
%O2=13.3
%CO2=18.8
MLS H2O=3.2
% H2O=   1.38
CP=   0.84
TIME=  30.00
NOZZLE D=0.195
NET VOL=10.57862
4
DS VOL=  10.719
STACK P=  29.883
AVE M T=  61.333
√DP=   0.697
DH=   0.360
ST T= 403.666
DRY MW=  31.540
WET MW=  31.352
% ISO=  99.168
STACK V= 2885
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-2-1

Plant Monarch Cement
Sample Location Outlet - Quad 2
Sample Box No. N/A
Sample Type Part. 5:2

Run No. 0-2-2
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Gabriel / Hall

Filter No. 48
Sample No.
Sample Material Description OK

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	M			
Impinger Solution	H_2O	Dry			
Final Volume (wt)[b]	102	0			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	2	0			
Sample No.(s)	N/A	N/A			

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 3.2

SILICA GEL

	733.4	
	732.2	
	1.2	
Silica Gel		
Color		

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Client (MRE) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet-Baghouse

Test Run Number A+2 0-2-1

Pollutant(s) in Sample Part. Sing.

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1835-1845		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1845-2000	Cobb	
Train Disassembly		2000	Cobb/Gabriel/Hall	moisture on stack
Train Cleanout		2100	Gabriel/Hall	
Packing and Storage	11-17-81		Gabriel/Hall/Bowell	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~1-1-3~~ 0-3-1

MRI Project Number 4892-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet - Quad 3
Sampling Date 11-13-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2 Hall
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch Cement
Sampling Location Outlet - Quad 3
Test No. ~~0-3-3~~ 0-3-1

Date 11-13-81
Initial CEH

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	

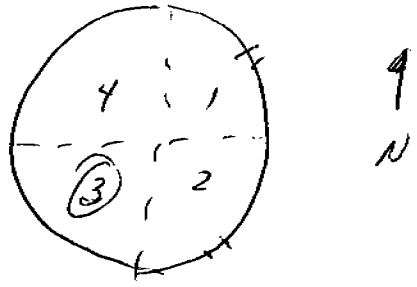
0-3-1
RUN I.D. ~~0-1-3~~
DATE 11-13-8
^PS=0.47
TS=410.
B.P.=29.02
PS=28.983
%H20=5.
MF=0.95
MD=31.02
MS=30.369
VS=2936.409977
DNC=1.969127145E-01
TM=60.
FS=0.621
FM=3.521642188E-01
VISCOSITY=25[illegible]
APPROXIMATE
DELTA H SETTING=
0.4112
COR.FACT.= 0.994
0
CORRECTED OR
AT METER SHOULD=
0.3542

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch Cement
DATE 11-13-91
SAMPLING LOCATION Outlet - Quad 3
SAMPLE TYPE Part 5.2.
RUN NUMBER ~~2-4-3~~ 0-3-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.12
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 29.02
STATIC PRESSURE (P_g) -.5
FILTER NUMBER(s) 47

LEAK CK: Initial at ≥15" Hg, CFM 0.002
Final at 1" " Hg, CFM 0.0
Pitot at ≥3" H_2O Pre - OK Post - OK



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) .3542
PROBE TIP DIAMETER .195
CO_2 18.8
O_2 13.3
CO 0
N_2 67.9
% H_2O 5 assumed
METER CORRECTION (ΔY) .944
TEMP. METER NO. 9516
METER BOX NO. 6

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		21.10						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1031	Desired	Actual		DESIRED	ACTUAL						
Quad 3	10 / 1041	24.64	24.77	.51	.41	.41	412	70	69	1	N/A	N/A
	20 / 1051	28.18	28.323	.5		.41	412	75	70	1		
	30											
	40											

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-13-81
Sampling Location Outlet - Quad 3 Name Cobb
Run Number ~~Q-3~~ Q-3-1

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

0.51 0.41 412
70 69

I. VOL=21.1
F. VOL=28.323
M FACTOR=0.944
LK CK=0.
B. P=29.02
STATIC P=-0.5
%O2=13.3
%CO2=18.8
ML% H2O=5.6
% H2O= 3.85
CP= 0.84
TIME= 20.00
NOZZLE D=0.1[illegible]
NET VOL=6.81[illegible]512
DS VOL= 6.[illegible]80
[illegible]
DH= 0.410
ST T= 412 [illegible]
DRY MW= [illegible]
WET MW= [illegible]
% ISO= [illegible]
STACK V= [illegible]

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-3-1

Plant Monarch Cement
Sample Location Outlet - Quad 3
Sample Box No. N/A
Sample Type Part. Siz.

Run No. ~~0-1-3~~
Sample Date 11-13-81
Recovery Date 11-13-81
Cleanup Person Gabriel

Filter No. 47
Sample No.
Sample Material Description light loading

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type a/	M	M			
Impinger Solution	H_2O	Dry			
Final Volume (wt) b/	97	6			
Initial Volume (wt) b/	100	0			
Net Volume (wt) b/	-3	6			
Sample No.(s)					

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 5.6

SILICA GEL

GC
~~732.2~~ 730.9
~~728.3~~ 728.3
2.6
Silica Gel
Color blue

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier K. Hall Car (MRI) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet-Baghouse 3

Test Run Number ~~A-1~~ 0-3-1

Pollutant(s) in Sample Part. Size

Task	Date	Time	Personnel	Remarks
Sampling	11-13-81	1031-1041		
Probe Technician				
Meter Technician			Cobb	
Other			~~Cobb~~	
Transport of Train to Cleanup Site		1100-1115	Cobb/~~Gabriel/Hall~~	
Train Disassembly		1145	Cobb/Gabriel/Hall	Moisture done on Stack
Train Cleanout		1230	Gabriel/Hall	
Packing and Storage	11-17-81		Gabriel/Hall/Bell	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~0-1-4~~ 0-4-1

MRI Project Number 4892-163
Field Dates
Plant ~~Green Mountain Cement~~
Sampling Location Outlet Duct 4
Sampling Date 11-12-81

FIELD CREW

Crew Chief Henson

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2 Hall
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch Cement
Sampling Location Outlet - Run 4
Test No. ~~4~~ 0-4-1

Date 11-12-81
Initial RC

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F		
Barometric pressure, in. Hg		
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)		
Percent moisture in gas stream by volume		
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)		
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)		
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$		
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min		
Actual nozzle diameter, in.		
Assumed meter temperature, °F		
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$		
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

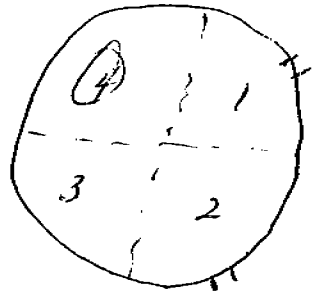
0-4-1
RUN I.D. ~~0-1-4~~
DATE 11-12-8
^PS=0.5
TS=411.
B.P.=29.03
PS=28.993
%H20=12.
MF=0.88
MD=31.02
MS=29.4576
VS=3076.407571
DNC=1.925521395E-01
TM=70.
FS=0.622111111
FM=3.327012744E-01
VISCOSITY=256.42
22222
APPROXIMATE
DELTA H SETTING=
0.3173
COR.FACT.= 1.069
0
CORRECTED CFM
AT METER SHOULD=
0.3112

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch Cement
DATE 11-12-81
SAMPLING LOCATION Outlet, Quad 4
SAMPLE TYPE Part. Sizing
RUN NUMBER ~~[illegible]~~ 0-4-1
OPERATOR Cobb
BAROMETRIC PRESSURE 29.13
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 29.03
STATIC PRESSURE (P_S) -.5
FILTER NUMBER(s) 46

LEAK CK: Initial at ≥15" Hg, CFM 0.005
Final at 1" " Hg, CFM .004
Pitot at ≥3" H_2O Pre - OK Post - OK



4
N

CALCULATED ACFM (DESIRED) ~~.2965~~ Gc .3112
PROBE TIP DIAMETER .195
CO_2 16.3
O_2 10.3
CO 0
N_2 73.4
% H_2O 12 assumed
METER CORRECTION (ΔY) 1.069
TEMP. METER NO. 9518
METER BOX NO. 9

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³ 645.30 Desired	Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1438											
Quad 4	10	1448	648.41	648.41	.55	.32	.35	412	66	68	1	N/A	N/A
	20	1458	651.52	651.48	.54		.32	410	70	69	1		
	30	1508	654.63	654.54	.53		.32	408	72	70	1		
	40	1518	657.65	657.61	.53		.32	409	72	71	1		
	50	1528	660.76	660.697	.52		.32	408	72	72	1		

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-12-81
Sampling Location Outlet-Quad 4 Name Cobb
Run Number A-1-4 0-4-1

ISOKINETIC EQUATION

$$I = \frac{1,839(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.55  0.35 412
66  68
0.54  0.32 410
70  69
0.53  0.32 408
72  70
0.53  0.32 409
72  71
0.52  0.32 408
72  72
                5
```

```
I. VOL=645.3
F. VOL=660.697
M FACTOR=1.069
LK CK=0.004
B. P=29.03
STATIC P=-0.5
%02=10.3
%C02=16.3
MLS H20=11.9
% H20=   3.40
CP=   0.84
TIME=  50.00
NOZZLE D=0.195
NET VOL=16.45939
3
DS VOL=  15.910
STACK P=  28.993
AVE M T=  70.200
VDP=   0.730
DH=   0.326
ST T= 409.400
DRY MW=  31.020
WET MW=  30.576
% ISO=  86.577
STACK V= 3117
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-4-1

Plant Monarch Cement
Sample Location Outlet - Quad 4
Sample Box No. N/A
Sample Type Part. Sizing

Run No. ~~A-1-4~~
Sample Date 11-12-81
Recovery Date 11-12-81
Cleanup Person Cobb/Bakrell/Hall

Filter No. 46
Sample No.
Sample Material Description 1 stage overloaded

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type a/	m	m			
Impinger Solution					
Final Volume (wt) b/	105	1			
Initial Volume (wt) b/	100	0			
Net Volume (wt) b/	5	1			
Sample No.(s)					

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A
Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm ~~14.5 SEC~~ 11.9

SILICA GEL

~~778.8~~ GC	776.2
~~770.3~~	770.3
~~8.5~~	5.9

Silica Gel Color OK

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Impinger Rinse: Sample No. ____ Liquid Level Marked ____ Sealed ____
Water Blank: Sample No. ____ Liquid Level Marked ____
Dry Catch: Sample No. ____ Description ____ Sealed ____
Acetone Blank: Sample No. ____ Liquid Level Marked ____ Sealed ____
Filter Blank: Sample No. ____ Sealed ____

Sample Disposition
Carrier Car (MRI) Date Shipped: 11-12-81
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet

Test Run Number ~~1-1-4~~ 0-4-1

Pollutant(s) in Sample Final Sizing

Task	Date	Time	Personnel	Remarks
Sampling	11-12-81	1438-1558		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1700-1715	Cobb/Hall	
Train Disassembly			Gabriel/Cobb	moisture dew on stack
Train Cleanout		17:30	Gabriel/Hall	
Packing and Storage	11-12-81		~~Gabriel/Hall~~ Beall	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~0-2-1~~ 0-1-2

MRI Project Number 4892-463
Field Dates
Plant Monarch Cement
Sampling Location Outlet-Quad 1
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Bell
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch Cement
Sampling Location Outlet - Quad 1
Test No. ~~0-2-1~~ 0-1-2

Date 11-16-81
Initial Cobb

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg		
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)		
Percent moisture in gas stream by volume		
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)		
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)		
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$		
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min		
Actual nozzle diameter, in.		
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	

~~RUN I.D. 0-2-1~~
~~DATE 11-16-81~~
~~^PS= 0.5100~~ 0-1-2
RUN I.D. ~~0-2-1~~
DATE 11-16-81
^PS=0.51
TS=412.
B.P.=28.8
PS=28.763
%H2O=5.
MF=0.95
MD=31.2
MS=30.54
VS=3065.397321
DNC=1.930698165E-01
TM=70.
FS=0.623222222
FM=3.593913449E-01
VISCOSITY=256.6444444
APPROXIMATE DELTA H SETTING=

0.4292

COR.FACT.= 0.9940
CORRECTED CFM AT METER SHOULD=

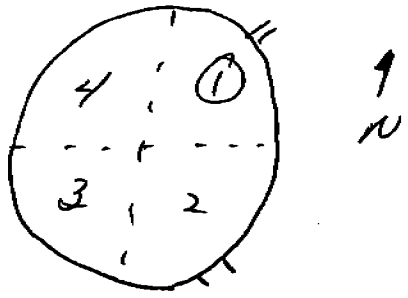
0.3615

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch Cement
DATE 11-16-81
SAMPLING LOCATION Outlet-Quad 1
SAMPLE TYPE Port Sig.
RUN NUMBER ~~0-2-1~~ & 0-1-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.9
SITE TO BARO. ELEVATION, ft. 100
CORRECTED B.P. 28.8
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 53

LEAK CK: Initial at ≥15" Hg, CFM 0.0
Final at 1 " Hg, CFM 0.002
Pitot at ≥3" H_2O Pre - OK Post - OK



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) .3615
PROBE TIP DIAMETER .195
CO_2 17
O_2 12
CO 0
N_2 61
% H_2O 5 assumed
METER CORRECTION (ΔY) .994
TEMP. METER NO. 9518
METER BOX NO. 6

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 140.634 Desired	Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	2217											
Quad 1	10	2227	144.25	144.01	.43	.43	.43	412	74	72	1	N/A	N/A
	20	2237	147.86	147.55	.44		.43	414	82	74	1		
	30	2247	151.48	151.12	.44		.43	414	90	78	1		
	~~40~~		~~155.09~~										

COMMENTS: @ meth 17 finished at 30 min.

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-16-81
Sampling Location Outlet - Quad 1 Name Cobb
Run Number ~~2-2-1~~ 0-1-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.43  0.43  4.2
74   72
0.44  0.43  414
82   74
0.44  0.43  414
90   78

I. VOL=140.654
F. VOL=151.12
M FACTOR=0.994
LK CK=0.002
B. P=28.8
STATIC P=-0.5
%02=12.
%C02=17.
MLS H20=5.4
% H20=   2.51
CP=   0.84
TIME=  30.00
NOZZLE D=0.185
NET VOL=10.422638
4
DS VOL=   9.747
STACK P=  28.765
AVE M T=  78.333
FIP=   0.860
DH=   0.430
ST T= 413.333
DRY MW=  31.000
WET MW=  30.467
% ISO=  98.945
STACK V= 2823
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch Cement
Sample Location Outlet - Quads
Sample Box No. N/A
Sample Type Part. Sig.

Run No. 0-2 + 0-1-2
Sample Date 11-16-81
Recovery Date
Cleanup Person

Filter No. 53
Sample No.
Sample Material Description OK

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	M			
Impinger Solution	H_2O	Dry			
Final Volume (wt)[b]	105	1			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	0.5	1			
Sample No.(s)	N/A	N/A			

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A
Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 5.4

SILICA GEL

706.6	
707.2	
+.6	

Silica Gel Color Spent

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Car (MRT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Seal(s) broken by
Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-263

Source Identification Outlet-Baghouse

Test Run Number ~~0-2-4~~ 0-1-2

Pollutant(s) in Sample Part. Size

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	2217-2247		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		2300-2400	Cobb	
Train Disassembly	11-17-81	1000,	Cobb/Beall	moisture on stack
Train Cleanout		1045	Beall	
Packing and Storage			Beall	
Shipment to Analysis Site			Hull/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN 0-2-2

MRI Project Number 4882-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet - Quad 2
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Beall
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch Cement
Sampling Location Outlet - Quad 2
Test No. 0-2-2

Date 11-16-81
Initial CAK

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

RUN I.D. 0-2-2
DATE 11-16-8
^PS=0.43
TS=412.
B.P.=28.79
PS=28.753
%H2O=5.
MF=0.95
MD=31.2
MS=30.54
VS=2815.214052
DNC=2.014661373E-01
TM=70.
FS=0.623222222
FM=3.593911843E-01
VISCOSITY=256.64
44444
APPROXIMATE
DELTA H SETTING=

0.3702

COR.FACT.= 1.069
0
CORRECTED CFM
AT METER SHOULD=

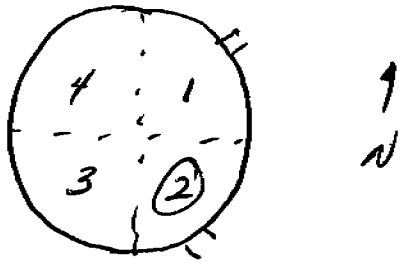
0.3361

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch Cement
DATE 11-16-81
SAMPLING LOCATION Outlet - Quad 2
SAMPLE TYPE Part. 5.2
RUN NUMBER 0-2-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.89
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.79
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 51

LEAK CK: Initial at ≥15" Hg, CFM 0.002
Final at ____ " Hg, CFM 0.000
Pilot at ≥3" H_2O Pre-OK Post-OK



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) .3361
PROBE TIP DIAMETER .185
CO_2 17
O_2 12
CO 0
N_2 69 at 61 ge a
% H_2O 5 assumed
METER CORRECTION (ΔY) 1.069
TEMP. METER NO. 9516
METER BOX NO. 9

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 760.6 Desired	GAS METER READING (V_m), ft^3 760.6 Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Quad 2	0 / 1810											
	10 / 1820	763.96	764.07	.42	.37	.39	413	72	70	1	N/A	N/A
	20 / 1830	767.32	—	.43		.37	413	76	70	1		
	30 / 1840	770.68	770.76	.43		.37	411	76	71	1		
b)	~~40~~	~~774.04~~										

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COMMENTS:
a) 61
b) Meth 17 done after 30 min

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-16-81
Sampling Location Outlet - Quad 2 Name Cobb
Run Number 1-2-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.42  0.39 413
72  70
0.43  0.37 413
76  70
0.43  0.37 411
76  71

I. VOL=760.6
F. VOL=770.76
M FACTOR=1.069
LK CK=0.
B. P=28.79
STATIC P=-0.5
%O2=12.
%CO2=17.
MLS H2O=6.1
% H2O=   2.69
CP=   0.84
TIME=  30.00
NOZZLE D=0.195
NET VOL=10.85104
DS VOL=  10.368
STACK P=  28.753
AVE M T=  72.500
DP=   0.653
DH=   0.376
ST T= 412.333
DRY MW=  31.300
WET MW=  30.844
% ISO= 105.500
STACK V= 2790
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT E in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Monarch Cement
Sample Location Outlet - Quad 2
Sample Box No. NA
Sample Type Part 5.2.

Run No. 0-2-2
Sample Date 11-16-81
Recovery Date
Cleanup Person

Filter No. 51
Sample No.
Sample Material Description OK

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	M			
Impinger Solution	H_2O	Dry			
Final Volume (wt)[b]	103	0			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	3	0			
Sample No.(s)	NA	NA			

Combined impinger contents, Sample No. NA
Liquid Level Marked NA
Container(s) Sealed NA
Description of Impinger Solution Clear
Total Moisture, gm 6.1

SILICA GEL

	707.2	
	704.1	
	3.1	

Silica Gel Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Car (MRT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Seal(s) broken by
Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163
Source Identification Outlet-Baghouse
Test Run Number 0-2-2
Pollutant(s) in Sample Part. Siz.

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1810-1840		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1900-1930	Cobb	
Train Disassembly		2000	Cobb / Beall	
Train Cleanout		2030	Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Cobb/Hall	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~0-2-2~~ 0-3-2

MRI Project Number 4892-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet-Aux 3
Sampling Date 11-16-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2 Buell
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch Cement
Sampling Location Outlet-Quad 3
Test No. ~~0-3-2~~ 0-3-2

Date 11-16-81
Initial Cobb

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	

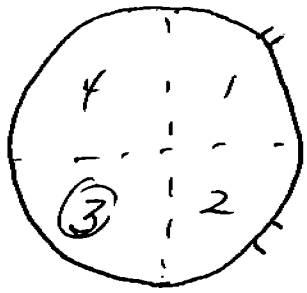
0-3-2
RUN I.D. ~~0-3-2~~
DATE 11-16-8
^PS=0.52
TS=408.
B.P.=28.82
PS=28.783
%H20=5.
MF=0.95
MD=31.2
MS=30.54
VS=3087.123752
DNC=1.917019[illegible]E-01
TM=80.
FS=0.6187777[illegible]
FM=3.6523671[illegible]E-01
VISCOSITY=25[illegible]
55556
APPROXIMATE
DELTA H SETTING=
0.4423
COR.FACT.= 0.994
0
CORRECTED CFM
AT METER SHOULD=
0.3674

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch Cement
DATE 4-15-81
SAMPLING LOCATION Outlet - Quad 3
SAMPLE TYPE Part. Sig
RUN NUMBER ~~2~~ 3 0-3-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.92
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.82
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 52

LEAK CK: Initial at ≥15" Hg, CFM 0.0
Final at 1 " Hg, CFM 0.0
Pitot at ≥3" H_2O Pre-ck Post-ck



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) 13674
PROBE TIP DIAMETER .195
CO_2 17
O_2 12
CO 0
N_2 61
% H_2O 5 assumed
METER CORRECTION (ΔY) .994
TEMP. METER NO. 7568
METER BOX NO. 6

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1135	103.109										
Quad 3	10 / 1145	106.78	106.72	.47	.44	.44	412	70	72	1	N/A	N/A
	20 / 1155	110.46	110.22	.47		.44	413	76	72	1		
	30 / 1205	114.13	113.78	.49		.44	412	82	76	1		
	40 / 1215	117.81	117.343	.48		.44	412	87	80	1		

COMMENTS:

H-260

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-15-81
Sampling Location Outlet Quad 3 Name cobb
Run Number ~~2-2-3~~ 0-3-2

ISOKINETIC EQUATION

$$\%I = \frac{1.039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.47  0.44 412
70  72
0.47  0.44 413
76  72
0.49  0.44 412
82  76
0.48  0.44 412
87  80

I. VOL=103.109
F. VOL=117.243
M FACTOR=0.994
LK CK=0.
B. P=28.82
STATIC P=-0.5
%O2=12.
%CO2=17.
MLS H2O=10.9
% H2O=   3.71
CP=   0.84
TIME=  40.00
NOZZLE D=0.195
NET VOL=14.04919
6
DS VOL=  13.318
STACK P=  28.783
AVE M T=  76.875
√DP=   0.690
DH=   0.440
ST T= 412.250
DRY MW=  31.200
WET MW=  30.710
% ISO=  96.826
STACK V= 2957
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-3-2

Plant Monarch Cement
Sample Location Outlet - Quad 3
Sample Box No. N/A
Sample Type Part Sig

Run No. 1-2-3
Sample Date 11-18-81
Recovery Date
Cleanup Person

Filter No. 52
Sample No.
Sample Material Description yK

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	M			
Impinger Solution	H2O	Dry			
Final Volume (wt)[b]	106	1			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	6	1			
Sample No.(s)	N/A	N/A			

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A
Container(s) Sealed N/A
Description of Impinger Solution Clear
Total Moisture, gm 10.9

SILICA GEL

741.2	
736.3	
4.9	

Silica Gel
Color

a/ S = Greenburg-Smith standard, M = Modified, O = Other
b/ Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Ron (mkt) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Seal(s) broken by
Date broken
Remarks:

SAMPLE HANDLING LOG

Project Number 4892-163

Source Identification Outlet - Baghouse

Test Run Number ~~0-2-3~~ 0-3-2

Pollutant(s) in Sample Part. Sig.

Task	Date	Time	Personnel	Remarks
Sampling	11-16-81	1135-1215		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1230-1300	Cobb	
Train Disassembly		1300	Cobb/Gabriel/Beall	
Train Cleanout		1400	Gabriel/Beall	
Packing and Storage	11-17-81		Beall	
Shipment to Analysis Site			Hall/Cobb	
Lab Analysis				
Write Up				

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~A-2-4~~ 0-4-2

MRI Project Number 4892-L63
Field Dates
Plant Monarch Cement
Sampling Location Outlet-Duct
Sampling Date 11-14-81

FIELD CREW

Crew Chief Hansen

Testing Engineer 1 Cobb
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Monarch Cement
Sampling Location Outlet - Quad 4
Test No. ~~0-2-4~~ 0-4-2

Date 11-14-81
Initial Cobb

Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	

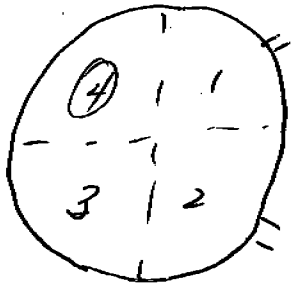
0-4-2
RUN I.D. ~~0-2-4~~
DATE 11-14-8
^PS=0.52
TS=409.
B.P.=28.78
PS=28.743
%H20=5.
MF=0.95
MD=31.568
MS=30.8896
VS=3073.508512
DNC=1.922985552E-01
TM=65.
FS=0.619888889
FM=3.553188842E-01
VISCOSITY=255.9777778
APPROXIMATE DELTA H SETTING=
0.3619
COR.FACT.= 1.0690
CORRECTED CFM AT METER SHOULD=
0.3823

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Monarch Cement
DATE 11-14-81
SAMPLING LOCATION Outlet · Quad 4
SAMPLE TYPE Part 5-2
RUN NUMBER Quad 4 0-4-2
OPERATOR Cobb
BAROMETRIC PRESSURE 28.88
SITE TO BARO. ELEVATION, ft. 100'
CORRECTED B.P. 28.78
STATIC PRESSURE (P_s) -.5
FILTER NUMBER(s) 50

LEAK CK: Initial at ≈15" Hg, CFM .003
Final at 1 " Hg, CFM 0.0
Pitot at ≈3" H_2O Pre-OK Post-OK



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) 3,323
PROBE TIP DIAMETER .195
CO_2 18.8
O_2 14
CO 0
N_2 67.2
% H_2O 5 assumed
METER CORRECTION (ΔY) 1.069
TEMP. METER NO. 9516
METER BOX NO. 9

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 717.1 Desired	Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLER TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Quad 4	0 1820											
	10 1830	720.42	720.37	.52 ck	.36	.36	407	60	60	1	N/A	N/A
	20 1840	723.75	—	.51		.36	403	64	60	1		
	30 1850	727.07	726.85	.52		.36	409	65	61	1		
	40 1900	730.39	730.133	.53		.36	409	67	62	1		

COMMENTS: ck .52

H-266

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Monarch Cement Date 11-14-81
Sampling Location Outlet Duct 4 Name Cobb
Run Number ~~0-2-4~~ 0-4-2

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(\text{ST T.}+460)(\text{DS VOL.})}{(\text{STACK V.})(\text{TIME})(\text{STACK P})(\text{Mf})(\text{NOZZLE D.})^2}$$

ST T.= Avg. stack temperature (^{o}F)
DS VOL= Dry standard cubic feet
STACK V= Velocity in stack (FPM)
TIME= Duration of test (minutes)
STACK P= Pressure in stack, absolute (in. Hg)
Mf= Mole fraction dry gas ((100-%H_2O)/100)
NOZZLE D= Nozzle diameter (in.)

```
0.52  0.36 407
60  60
0.51  0.36 403
64  60
0.52  0.36 409
65  61
0.53  0.36 409
67  62

I. VOL=717.1
F. VOL=730.133
M FACTOR=1.069
LK CK=0.
B. P=28.78
STATIC P=-0.5
%O2=14.
%CO2=18.8
MLS H2O=10.
% H2O=   3.35
CP=   0.84
TIME=  40.00
NOZZLE D=0.195
NET VOL=13.93227
7
DS VOL=  13.552
STACK P=  28.743
AVE M T=  62.375
VDP=   0.721
DH=   0.360
ST T= 407.009
DRY MW=  31.568
WET MW=  31.112
% ISO=  94.465
STACK V= 3058
```

Execution of program:
Computer must be in DEF (define) mode. If a mistake is made when entering traverse data there are two correction modes.
One: Press SHIFT F in order to correct a mistake before entering all the data on a line. The entire line must be reentered.
Two: Press SHIFT C in order to correct a mistake after the data has been entered and printed. You may choose the entry to be corrected.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

0-4-2

Plant Monarch Cement
Sample Location Outlet - Quad 4
Sample Box No. WH
Sample Type Part. 5-7

Run No. 0-2-4
Sample Date 11-14-81
Recovery Date
Cleanup Person

Filter No. 50
Sample No.
Sample Material Description OK

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	M			
Impinger Solution	H2O	Dry			
Final Volume (wt)[b]	105	D			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	5	D			
Sample No.(s)	N/A	N/A			

Combined impinger contents, Sample No. N/A
Liquid Level Marked N/A Container(s) Sealed
Description of Impinger Solution Clear
Total Moisture, gm 10

SILICA GEL

699.6	
694.6	
5	

Silica Gel
Color
N/A

[a] S = Greenburg-Smith standard, M = Modified, O = Other
[b] Indicate value in units, ml or gm

RECOVERED SAMPLE

Probe Rinse: Sample No.
Liquid Level Marked
Sealed

Impinger Rinse: Sample No.
Liquid Level Marked
Sealed

Water Blank: Sample No.
Liquid Level Marked

Dry Catch: Sample No.
Description
Sealed

Acetone Blank: Sample No.
Liquid Level Marked
Sealed

Filter Blank: Sample No.
Sealed

Sample Disposition
Carrier Car (MKT) Date Shipped: 11-17-81
Remarks:

Date of laboratory custody
Personnel accepting custody
Remarks:

Seal(s) broken by
Date broken

SAMPLE HANDLING LOG

Project Number 4892-263

Source Identification Outlet-Boghouse

Test Run Number ~~0-2-4~~ 0-4-2

Pollutant(s) in Sample Part. Size

Task	Date	Time	Personnel	Remarks
Sampling	11-14-81	1820-1900		
Probe Technician				
Meter Technician			Cobb	
Other				
Transport of Train to Cleanup Site		1900-2000	Cobb	
Train Disassembly		2000	Cobb/Hubbard	moisture down on stack
Train Cleanout		2100	Hubbard	
Packing and Storage	11-17-81		Bissell	
Shipment to Analysis Site			Cobb/Bissell	
Lab Analysis				
Write Up				

APPENDIX I

SAMPLING LOGS

TABLE I-1. GENERAL SUMMARY LOG FOR SAMPLING

11-10-81	p.m.	Truck and crew leaves for Monarch Cement Company, Humboldt, Kansas
	p.m.	Truck and crew arrives - begin setup
11-11-81	a.m.	Finish setup
	p.m.	Preliminary data collected - No. 5 kiln inlet to 10-cell baghouse and common outlet stack
11-12-81	a.m.	Preliminary data collected - No. 5 kiln bypass to 3-cell baghouse
	p.m.	Begin testing - No. 5 kiln inlet to 10-cell baghouse and common outlet stack
11-14-81	p.m.	No. 5 kiln upset - resumed testing after process stabilized
11-15-81		No. 5 kiln down due to broken screw conveyor feed shaft - no testing
11-16-81	a.m.	Testing resumed
	p.m.	Testing completed
11-17-81	a.m.	Tear down
	p.m.	Truck and crew return to MRI

TABLE I-2. SAMPLING LOG

Date	24-Hr clock time	Inlet to No. 5 kiln 10-cell baghouse: Total mass (EPA Method 5)	Inlet to No. 5 kiln 10-cell baghouse: Particle size (Andersen HCSS with 15-μm preseparator)	No. 5 kiln common outlet stack from 10- and 3-cell baghouses: Total mass (EPA Method 17)	No. 5 kiln common outlet stack from 10- and 3-cell baghouses: Particle size (Andersen Mark III with 15-μm preseparator)
11/12/81	1433			Begin 0-1-1	
	1438			↓	Begin 0-1-1
	1450	Begin I-2-1			↓
	1456	End I-2-1			
	1523			End 0-1-1	End 0-1-1
	1528				
	1805		Begin I-2-1		
	1814		End I-2-1		
	1917		Begin I-2-2		
	1926		End I-2-2		
11/13/81	1024	Begin I-4-1			
	1026	↓		Begin 0-2-1	
	1031			↓	Begin 0-3-1
	1033	End I-4-1			↓
	1046			End 0-2-1	
	1051				End 0-3-1
	1252		Begin I-4-1		
	1301		End I-4-1		
	1502		Begin I-4-2		
	1511		End I-4-2		
	1656	Begin I-3-1			
	1705	End I-3-1			
	1830			Begin 0-3-1	
	1835			↓	Begin 0-2-1
	1838		Begin I-3-1		↓
	1847		End I-3-1		
	1900			End 0-3-1	
	1905				End 0-2-1
	2006		Begin I-3-2		
	2015		End I-3-2		
11/14/81	0956	Begin I-1-1			
	1002	End I-1-1			
	1038			Begin 0-4-1	
	1045			↓	Begin 0-1-1
	1118			End 0-4-1	↓
	1123		Begin I-1-1		
	1125		↓		End 0-1-1
	1132		End I-1-1		
	1237		Begin I-1-2		
	1246		End I-1-2		
	1500	Begin I-1-2			
	1506	End I-1-2			
	1557		Begin I-1-3		
	1606		End I-1-3		
	1610	No. 5 kiln upset. Temperature and pressure fluctuations noted. Stopped testing.			
	1810	No. 5 kiln stabilized for about 1 hr. Testing resumed.			
	1815			Begin 0-1-2	
	1820			↓	Begin 0-4-2
	1848		Begin I-1-4		↓
	1855		↓	End 0-1-2	
	1857		End I-1-4		
	1900				End 0-4-2
11/15/81	0725	No. 5 kiln down. Screw conveyor feed shaft broke and had to be replaced. No testing this date.			

(continued)

TABLE I-2. (concluded)

Date	24-Hr clock time	Inlet to No. 5 kiln 10-cell baghouse: Total mass (EPA Method 5)	Inlet to No. 5 kiln 10-cell baghouse: Particle size (Andersen HCSS with 15-μm preseparator)	No. 5 kiln common outlet stack from 10- and 3-cell baghouses: Total mass (EPA Method 17)	No. 5 kiln common outlet stack from 10- and 3-cell baghouses: Particle size (Andersen Mark III with 15-μm preseparator)
11/16/81	0535	No. 5 kiln has been back on-line since 1700 on 11/15/81. Minor fluctuations in temperature and pressure. Testing postponed until kiln stabilized.			
	1115	Begin I-3-2			
	1121	End I-3-2			
	1130			Begin 0-2-2	
	1135			↓	Begin 0-3-2
	1210			End 0-2-2	↓
	1215				End 0-3-2
	1247		Begin I-3-3		
	1259		End I-3-3		
	1500		Begin I-3-4		
	1509		End I-3-4		
	1652	Begin I-4-2			
	1658	End I-4-2			
	1805			Begin 0-3-2	
	1810				Begin 0-2-2
	1817		Begin I-4-3		↓
	1826		End I-4-3		
	1835			End 0-3-2	
	1840				End 0-2-2
	1946		Begin I-4-4		
	1955		End I-4-4		
	2114	Begin I-2-2			
	2120	End I-2-2			
	2159		Begin I-2-3		
	2208		End I-2-3		
	2212			Begin 0-4-2	
	2217			↓	Begin 0-1-2
	2242			End 0-4-2	↓
	2247				End 0-1-2
	2330		Begin I-2-4		
	2339		End I-2-4		

APPENDIX J

PROJECT PARTICIPANTS

PROJECT PARTICIPANTS

Midwest Research Institute

Dr. H. K. Wilcox, Head, Field Programs Section
Fred Bergman, Senior Chemist, Project Leader
Mark D. Hansen, Associate Environmental Scientist, Field Team Leader
George R. Cobb, Associate Chemist, Field Team Member
Marilyn Gabriel, Junior Environmental Scientist, Field Team Lab Supervisor
Ed Whited, Associate Environmental Scientist, Field Team Mebmer
Kent Hall, Technican, Field Team Member
Robert C. Stultz, Associate Engineer
Diane Lacy, Junior Environmental Scientist
Cecily Beall, Assistant Environmental Scientist, Field Team Member
Ed Olson, Assistant Environmental Scientist, Field Team Member
John Kinsey, Associate Environmental Scientist
Frank Pendleton, Junior Environmental Scientist
David Griffin, Junior Environmental Scientist

The Monarch Cement Company, Humboldt, Kansas Cement Plant

Ken Howard, Vice President
Ken Miller, Plant Manager
Russ Runnels, Chief Chemist and Environmental Coordinator

U.S. EPA INDUSTRIAL ENVIRONMENTAL RESEARCH LABORATORY

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