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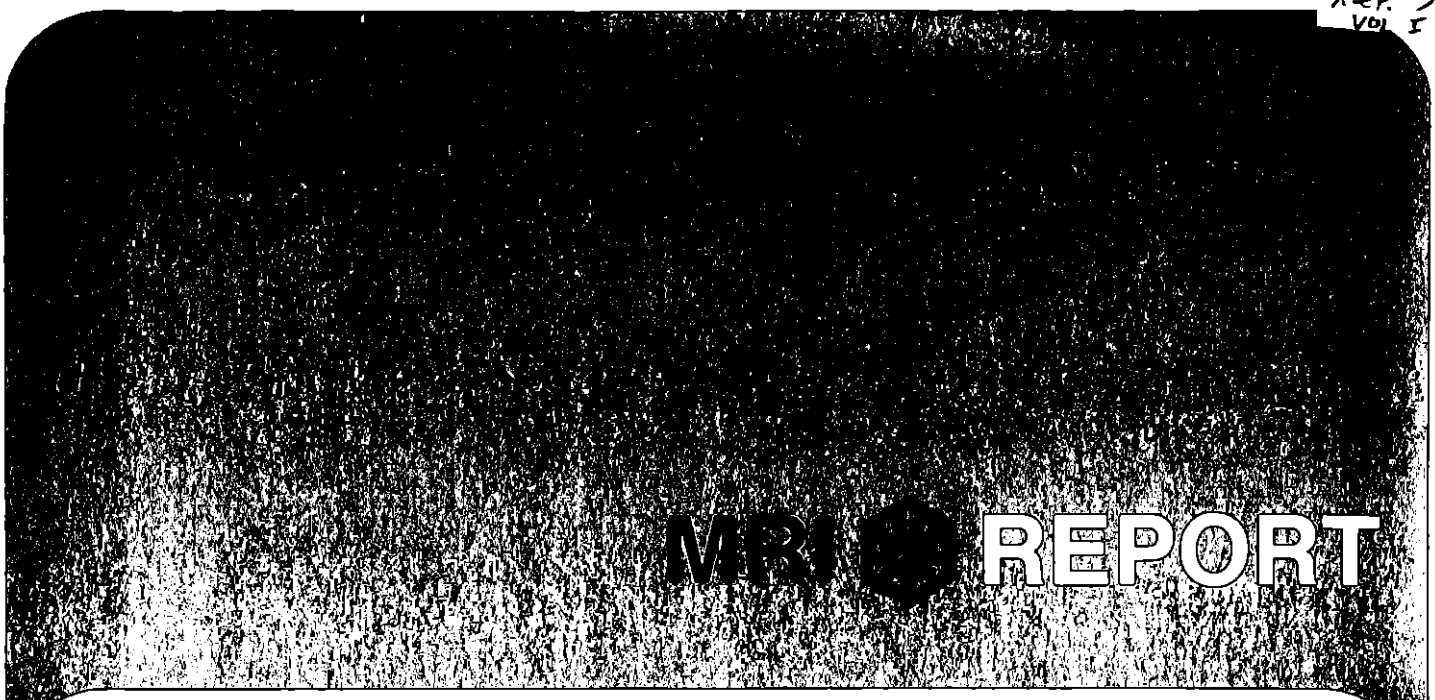
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CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRUM-MIX ASPHALT PLANT

VOLUME I

FINAL REPORT

Contract No. 68-02-3158, Technical Directive No. 8
MRI Project No. 4891-L(84)

February 16, 1983

For:

Industrial Environmental Research Laboratory
Environmental Protection Agency
Cincinnati, Ohio 45268

Attn: Mark Stuteman

MIDWEST RESEARCH INSTITUTE 425 VOLKER BOULEVARD, KANSAS CITY, MISSOURI 64110 • 816 753-7600

CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRUM-MIX ASPHALT PLANT

by

Thomas M. Walker
George R. Cobb
Mark D. Hansen
John S. Kinsey

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PREFACE

This report was prepared for the Environmental Protection Agency, Industrial Environmental Research Laboratory, under Contract No. 68-02-3158, Technical Directive No. 8. It describes the results of emission testing conducted by Midwest Research Institute (MRI) for the study, "Characterization of Inhalable Particulate Matter Emissions from a Drum-Mix Asphalt Plant." The field testing was conducted at the Bowen Construction Company, 2501 Manchester Trafficway, Kansas City, Missouri, during the period October 19 through November 6, 1981. Condensables testing was performed by Southern Research Institute during the period October 7 through October 9, 1981.

The study was conducted by the Field Programs Section of MRI's Environmental Systems Department under the general supervision of Ken Wilcox, Head, Field Programs Section. John Kinsey was the task leader; Tom Walker served as crew chief and was assisted in the field by Bob Stultz, George Cobb, Mark Hansen, Ed Whited, Marilyn Gabriel, Diane Lacy, and Kent Hall of MRI. The sampling conducted by Southern Research Institute was performed under the direction of Ashley Williamson.

We would like to express our appreciation to personnel of the Bowen Construction Company asphalt plant who gave their assistance and cooperation. We especially want to thank Matt Bowen and Ken Whisler.

ABSTRACT

This report presents data for the characterization of inhalable particulate emissions from the asphalt industry. Only ducted sources were tested at this site. The plant selected for this study was the drum-mix asphalt plant owned by the Bowen Construction Company located at 2501 Manchester Trafficway in Kansas City, Missouri. One drum-mixer equipped with a baghouse dust collector was tested for both total mass and particle size. The inlet and outlet of the control device were tested concurrently. Size-specific emission factors were calculated for 15, 10, and 2.5 μm based on the total mass emission rate and particle size data for the source tested in this program.

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SECTION 1.0

INTRODUCTION

This report presents the results of tests conducted by Midwest Research Institute (MRI) during the period of October 19 through November 6, 1981. The data collected in this project will be used to establish baseline conditions for future regulations governing inhalable particulate matter from the asphalt concrete industry.

The tests were conducted at the Bowen Construction Company asphalt plant located in Kansas City, Missouri. A general schematic of the plant layout is shown in Figure 1.1. Samples were collected at both the inlet and the outlet of the baghouse. Fugitive emission testing was not conducted.

A sampling log is presented in Appendix A with the sampling runs arranged in chronological order. All raw data, including field data sheets, computer printouts, sampling calculations and nomenclature, calibration data, dry molecular weight determinations, and laboratory and analytical data are provided in the appendices to this report. The process Bowen employs to produce asphalt paving and the plant operation are described in detail in Section 2.0. Section 3.0 contains information pertaining to the sampling locations, types of equipment, and procedures used to conduct the tests with the results summarized in Section 4.0. The condensables testing conducted by Southern Research Institute is presented in Section 5.0.

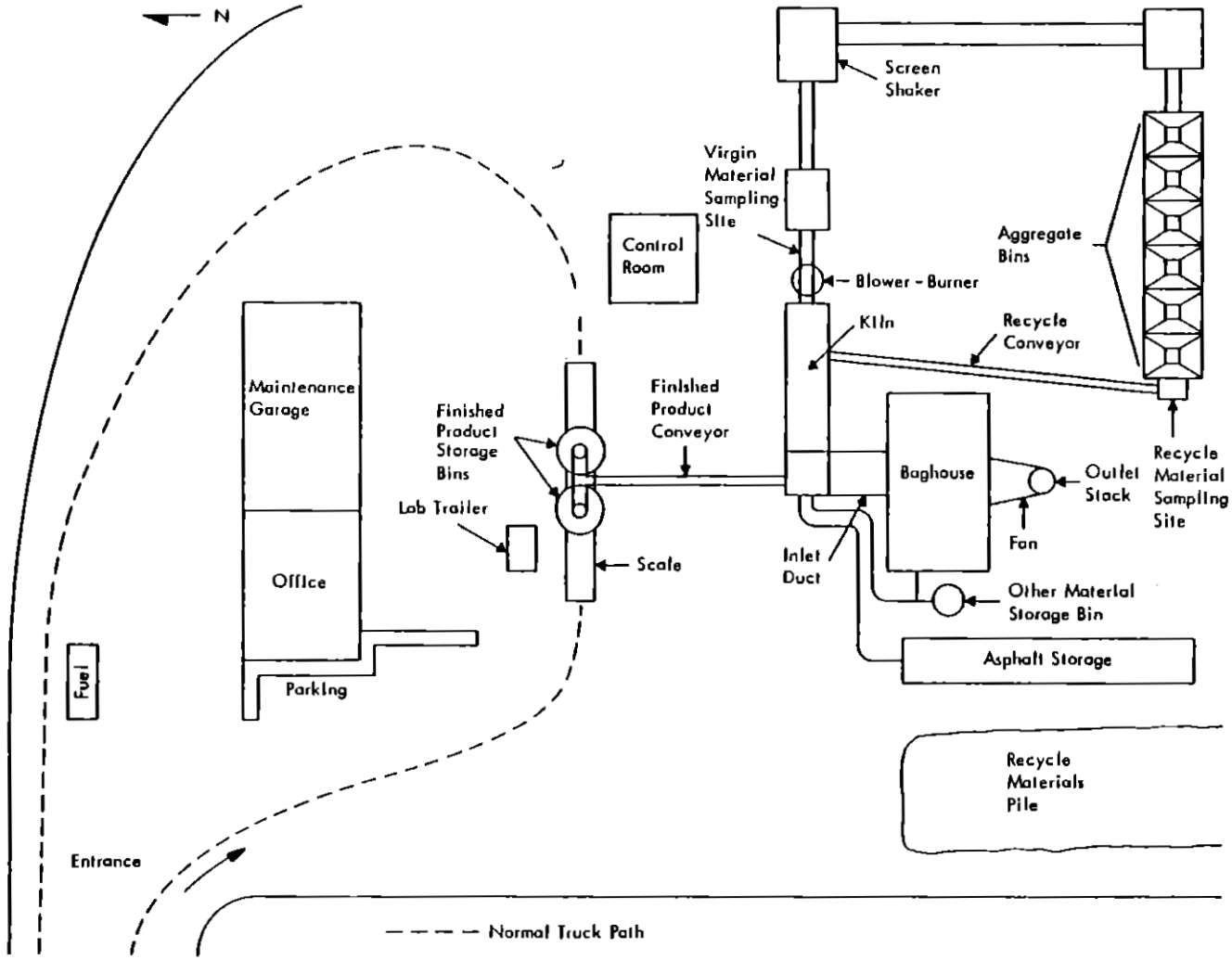


Figure 1.1. Schematic of the Bowen Construction Company asphalt plant.

SECTION 2.0

PROCESS DESCRIPTION AND OPERATION

2.1 PROCESS DESCRIPTION

The Bowen plant is a Standard Havens drum mix asphalt plant rated at a maximum production capacity of 325 tons/h. The plant also has incorporated into its design provisions for introducing recycled asphalt concrete into the drum mixer through a split-feed arrangement. Emissions to the atmosphere are controlled by a Standard Havens Alpha Mark III baghouse collector with reverse pulse cleaning. The baghouse contains 420 bags with 9,660 ft^2 of cloth area for an overall air-to-cloth ratio of 5.4:1. The bags are made of Beta/Mex (Nomex) fabric with a maximum rated operating temperature of 375°F. Standard specifications of both the plant and the baghouse collector are provided in Table 2.1.

During normal operation, proportioned aggregate from four cold feed bins is transported by belt conveyor to a set of vibrating screens where the larger material is rejected. The aggregate is sized according to the type of mix being produced. From the screens the aggregate is introduced into the uphill end of the drum mixer where it passes through the burner flame and is heated to a temperature of 300 to 500°F to remove moisture. Asphalt cement from a heated storage tank is introduced from the opposite end of the drum where it is mixed with the superheated aggregate to produce hot mix asphalt paving. The hot mix is discharged from the drum mixer and transported by inclined belt conveyor to storage silos for eventual loading into trucks and transport to the job site.

TABLE 2.1. ENGINEERING SPECIFICATIONS OF ASPHALT PLANT AND BAGHOUSE DUST COLLECTOR

Asphalt plant

Type: Drum mix with recycling system

Maximum production capacity: 325 tons/h (using 5% moisture aggregate and producing 300°F asphalt paving)

Drum size: 8 ft 2 in. diameter x 38 ft long

Recycling system: Center entry feed

Burner: Genco Model AF-75 rated at $129(10)^6$ Btu/h

Fuel: LP or natural gas

Burner blower: 7,500 scfm with 75 hp motor

Baghouse dust collector

Model: Alpha Mark III, size 30

Effective cloth area: 9,660 ft^2

Maximum operating temperature: 375°F

Air-to-cloth ratio: 5.4:1

Airflow rate: 52,000 acfm (at 375°F)

Reverse airflow rate: 117 scfm at 110 psig

No. of bags: 420

Type of bag material: Beta/Mex (maximum operating temperature 375°F)

Induced draft fan: New York Blower Model PLR44, Class IV

Fines reclaiming system: 9 in. screw conveyor, rotary air lock feeder, 40-hp pneumatic blower

In addition to utilizing virgin aggregate as a raw material, the plant is also designed to use recycled asphalt concrete, which reduces the amount of new rock and asphalt cement necessary to produce the required job mix. Old asphalt pavement is broken up at the job site, removed from the road base, crushed, and screened to the appropriate size. This recycled paving material is then transported to the asphalt plant and fed to the process by belt conveyor from a separate recycle feed bin. The recycled material is introduced at about midpoint along the drum mixer in a split-feed arrangement where it is heated by high temperature exhaust gases and by heat transfer from the hot virgin aggregate. The appropriate amount of additional asphalt cement is then injected into the drum downstream of the point where the recycle is introduced and is mixed with the virgin/recycled aggregate to produce hot mix paving. A complete process flow diagram for the plant is shown in Figure 2.1.

The emissions from the drum mixer consist of a gas stream containing a substantial amount of particulate matter and lesser amounts of gaseous organic compounds of various species. The particulate generally consists of fine aggregate particles entrained in the flowing gas stream during the drying process. The organic compounds, on the other hand, are a result of the heating and mixing of the asphalt cement inside the drum, which volatilizes certain components of the asphalt. Once the volatile organic compounds have sufficiently cooled, they can condense to produce the fine liquid aerosol or "blue smoke" typical of drum mix asphalt plants. At the Bowen facility, it was determined visually that some blue smoke was present at the stack exit, but it was not considered a significant problem due to opacity observation of less than 5%.

As stated previously, the particulate emissions from the plant are controlled by a baghouse dust collector. Gases from the drum mixer are pulled into the baghouse where the gas stream strikes a deflector plate that changes its direction of flow. The gas then passes through the Nomex bags where the particulate matter is removed. The cleaned gas then exits the collector through an induced draft fan to a stack and finally to the atmosphere. The dust cake is removed from the bags by a pulse jet of air

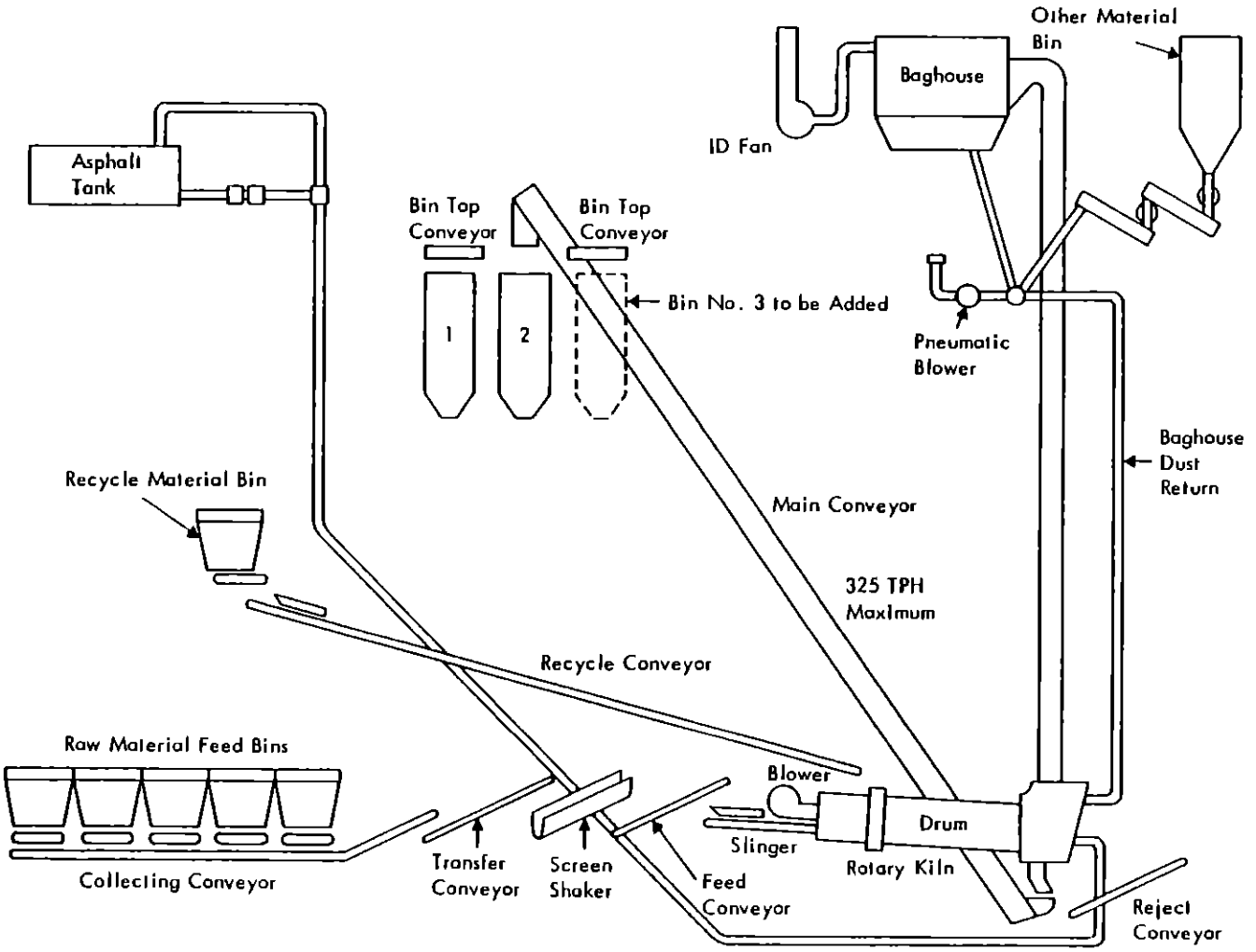


Figure 2.1. Process flow diagram of the Bowen Construction Company asphalt plant.

and is deposited in a hopper located beneath the collector. The collected dust is returned to the drum from the hopper using a positive flow pneumatic system.

2.2 PROCESS OPERATION

As an integral part of the field sampling program, data on the operation of the plant were obtained which characterized the various parameters affecting the generation of emissions. Such data included the plant production rate, the raw material throughput, the asphalt content of the mix, the ratio of recycle material to total aggregate, and the temperature of the hot mix and the effluent gas from the drum mixer. This information was collected in the form of hard copy printouts from the computerized system controlling plant operation. The printouts were obtained approximately every 30 min throughout each sampling period. A summary of the process operating data collected during the program is presented in Table 2.2, and photocopies of the original printouts are provided in Appendix B.

During the period when testing was being conducted at the Bowen plant, a number of different types of asphalt paving were produced depending on individual customer requirements. Each type of mix is designated according to its job mix number, as shown in Table 2.2. The job mix number specifies the type and quantity of aggregate and asphalt cement required to produce a particular grade of asphalt paving. In the process, the proper amount of material from each of the cold feed bins (including the recycle feed bin) is provided to supply aggregate of the appropriate gradation. Hot asphalt cement is also metered to the process according to the job mix specifications. Allowances have been made in the job mix formula to account for the asphalt content of the old asphalt concrete when recycled material is used.

Table 2.3 provides a summary of the job mix specifications available for each type of paving produced by the Bowen plant as a function of the aggregate gradation and asphalt content.

TABLE 2.2. SUMMARY OF PROCESS OPERATING DATA AT BOWEN CONSTRUCTION COMPANY

Date	Time (h)	Raw material throughput (tons/h)[d] Total aggregate[a]	Asphalt cement	Production rate (tons/h)[d]	Asphalt content of mix (wt. %)	Job mix No.	Recycle material/total aggregate (%)	Hot mix exit temp. (°F)	Dryer gas exit temp. (°F)[b]
10/7/81	13:30	362	10.3	372	4.56	8	28.2	320	338
	14:00	316	11.1	327	4.64	8	30.4	293	330
	14:32	314	11.2	325	4.64	8	29.0	292	334
	15:00	322	10.9	333	4.61	8	30.7	305	342
10/8/81[c]	-	-	-	290	-	8	-	-	345
10/9/81	08:50	309	10.9	320	4.83	8	30.4	304	359
	09:15	309	10.8	320	4.75	8	29.4	307	356
	10:00	321	8.8	330	3.58	9	29.9	287	363
	10:30	316	8.8	325	3.94	8	29.4	308	361
	11:00	304	9.1	313	-	8	29.3	305	359
	11:30	312	8.8	321	3.93	8	30.8	307	362
	12:00	306	9.1	315	4.10	9	30.4	301	356
	12:30	300	8.0	308	3.78	9	28.3	306	359
	13:00	322	10.4	332	3.77	8	29.8	296	354
	13:30	274	11.4	285	5.05	8	36.1	298	340
	14:00	249	9.2	258	5.40	8	30.5	297	363
	14:30	245	8.8	254	5.01	8	29.8	291	351
	15:00	235	8.8	244	4.97	8	28.1	311	356
	15:30	-	7.2	-	3.77	8	-	288	337
10/16/81	10:30	257	13.7	271	5.05	5	0	301	335
	11:05	262	8.9	271	4.45	8	30.9	299	379
10/19/81	08:00	265	8.7	274	4.41	8	31.3	293	359
	08:30	-	-	-	-	8	-	-	-
	09:00	274	8.7	283	4.37	8	32.1	298	358
	09:30	275	8.6	284	4.49	8	32.7	297	363
	10:00	253	8.4	261	4.53	8	31.2	298	362
	10:30	245	8.6	254	4.57	8	27.8	260	379
	11:00	256	8.6	265	4.53	8	30.9	318	364
	12:00	213	9.4	222	4.20	5	0	318	348
	12:30	253	8.3	261	4.65	8	31.2	305	342
	13:00	260	8.2	268	4.53	8	31.5	307	352
	13:30	171	8.8	180	4.54	5	2.3	299	357
	14:00	228	7.6	236	5.17	8	35.1	302	361
	14:30	218	11.7	230	4.95	5	0	311	341
10/20/81	08:00	223	7.9	231	4.53	8	30.0	312	361
	08:30	222	7.7	230	4.61	8	29.7	317	368
	09:00	216	11.4	227	4.95	5	0	307	346
	10:00	212	7.1	219	4.45	8	31.1	307	344
	10:30	214	6.6	221	4.66	5	29.0	316	358
	11:00	263	8.6	272	4.57	8	31.6	306	349
	11:30	278	9.5	288	4.61	8	30.2	316	365
	12:00	298	10.2	308	4.53	8	30.5	295	352
	12:30	304	10.0	314	4.61	8	31.6	293	351
	13:00	245	8.1	253	4.57	8	29.8	314	367
	13:25	211	8.7	220	4.53	8	17.5	307	351
10/21/81	08:30	230	7.9	238	4.61	8	29.1	296	343
	09:15	245	12.5	258	4.97	6	0	297	321
	09:45	239	12.4	251	4.89	6	0	296	331
	10:15	190	9.5	200	4.73	6	0	302	345
	11:15	195	9.8	205	4.81	6	0	313	343
	12:00	185	10.3	195	4.98	4	0	314	338
	12:30	185	10.1	195	5.14	4	0	314	335

(continued)

TABLE 2.2. (concluded)

Date	Time (h)	Raw material throughput (tons/h)[d] Total aggregate[a]	Asphalt cement	Production rate (tons/h)[b]	Asphalt content of mix (wt. %)	Job mix No.	Recycle material/total aggregate (%)	Hot mix exit temp. (°F)	Dryer gas exit temp. (°F)[b]
10/22/81	07:45	146	7.9	154	5.18	4	0	325	340
	08:30	161	9.0	170	5.14	4	0	326	345
	09:00	160	8.8	169	5.14	4	0	318	334
	09:30	147	8.1	155	5.14	4	0	333	345
	10:00	160	8.8	169	5.14	4	0	331	348
	10:30	163	8.8	172	5.10	4	0	325	338
	11:00	189	10.3	199	4.94	4	0	315	333
	11:30	180	9.9	190	5.14	4	0	324	357
	12:30	190	10.3	200	5.10	4	0	320	329
	13:30	194	10.4	204	5.10	4	0	325	333
10/26/81	09:30	157	8.1	165	5.03	5	0	327	353
	10:00	152	7.9	160	5.03	5	0	318	336
	10:30	154	8.1	162	4.95	5	0	315	348
	11:00	163	8.4	171	4.99	5	0	317	336
	11:30	156	8.0	164	4.99	5	0	322	343
	12:00	191	10.0	201	5.07	5	0	309	330
	12:30	180	9.8	190	5.03	5	0	334	352
	13:00	212	11.0	223	4.99	5	0	324	353
	13:30	215	11.7	227	4.99	5	0	332	363
	14:00	234	12.2	246	4.99	5	0	307	337
	14:30	238	12.9	251	5.03	5	0	325	357
	15:00	192	12.4	204	5.19	5	0	329	374
10/27/81	08:00	206	10.9	217	4.99	5	0	339	375
	08:30	207	11.1	218	5.03	5	0	340	362
	09:00	199	11.0	210	4.99	5	0	335	366
	09:30	209	10.8	220	4.95	5	0	329	363
	10:30	185	9.6	195	5.19	5	0	341	371
	11:00	203	10.7	214	4.83	5	0	332	338
	14:00	134	7.0	141	4.95	5	0	327	339
	14:30	131	6.9	138	4.93	5	0	344	346
10/30/81	08:00	193	10.0	203	5.01	5	0	337	341
	08:30	186	9.9	196	4.98	5	0	330	348
	09:00	189	9.8	199	5.01	5	0	316	351
	10:00	188	9.9	198	4.98	5	0	333	348
	10:30	186	9.9	196	4.93	5	0	323	335
	11:00	186	10.0	196	4.85	5	0	315	361
	11:30	188	9.9	198	4.85	5	0	333	359
	12:00	167	8.7	176	4.85	5	0	342	331
	12:30	163	8.7	172	5.01	5	0	330	347
	13:00	160	8.7	169	4.98	5	0	328	333
	13:30	143	7.8	151	5.06	5	0	332	342
11/6/81	10:00	264	8.4	272	4.21	10	29.9	308	367
	10:30	268	8.8	277	4.45	10	30.2	303	372
	11:00	265	8.8	274	4.45	10	29.8	309	378
	11:30	261	8.7	270	4.42	10	29.9	310	360
	12:00	248	8.0	256	4.45	10	30.6	312	354

[a] Total aggregate = virgin material + recycled asphalt pavement.

[b] Measured at inlet to baghouse.

[c] All process data for this date are daily averages reconstructed from plant historical records.

[d] Short tons/hour; 1 short ton = 2,000 lb.

TABLE 2.3. JOB MIX SPECIFICATIONS

Job mix No.	Aggregate gradation			Asphalt content of mix (% weight)[b]
	Coarse aggregate (% > 8 mesh)[a]	Fine aggregate (% < 8 mesh)[a]	Mineral filler (% < 200 mesh)[a]	
4	36.5	63.5	3.6	5.2
5	47.8	52.2	3.4	5.0
6	47.8	52.2	4.0	4.9
8[c]	45.8	54.2	5.9	4.9
9	Not Available			
10[c]	54.6	45.4	5.7	5.1

[a] Percent of total aggregate.

[b] Percent of total mix.

[c] Includes recycled asphalt paving.

It should be noted that the mineral filler content shown in Table 2.4 is that percent of the total aggregate (or recycle) below 200 mesh which is indigenous to the material itself and should not be misinterpreted as supplementary mineral filler added to the aggregate.

In addition to collecting process data, samples of both the virgin aggregate and the recycled asphalt concrete being used as raw material were collected. These samples were taken from the appropriate belt conveyor just prior to being transferred into the drum mixer. The samples were stored in polyethylene bottles in the field for transport back to the laboratory for analysis. These samples were then analyzed gravimetrically for surface moisture. The virgin material dried in a laboratory oven at 110°C for 24 h; and the recycle material at 110°C for 1.5 h. The raw data sheets of the moisture analyses are contained in Appendix C. The aggregate and recycle samples were then graded according to size by dry sieving using standard AASHTO test methods. Since MRI's nest of sieves does not contain a No. 8 screen, which is the cutoff between coarse and fine aggregate, the percent in each of these ranges was obtained through a linear regression analysis of the entire aggregate size distribution. Again, it should be noted that the mineral filler content is that which is indigenous to the material itself and not added to the mix. The results of the raw material analyses are provided in Table 2.4. The raw data of the dry sieve and moisture analyses are provided in Appendix D. Also contained in this appendix are the graphs plotted to determine the cut point between coarse and fine aggregate.

Included in the data collected during the sampling program was an analysis of the asphalt cement used by Bowen in their process. This cement was a standard 60-70 paving asphalt manufactured by the Amoco Oil Company at their refinery in Sugar Creek, Missouri. An analysis of the asphalt cement is contained in Table 2.5. This information was supplied by Amoco Oil Company.

TABLE 2.4. SUMMARY OF RAW MATERIAL ANALYSES

Date collected	Time (h)	Type of raw material: Virgin aggregate	Type of raw material: Recycled paving	Coarse fraction[a] (% > 8 mesh)	Fine fraction[a] (% < 8 mesh)	Mineral filler[a] (% < 200 mesh)	Surface moisture (wt. %)
10/7/81	SoRI Run #1	X		44.3	55.7	5.4	2.1
			X	72.7	27.3	0.1	0.9
10/9/81	SoRI Run #3	X		77.6	22.4	1.4	1.4
			X	87.3	12.7	0.1	0.9
	15:30	X		69.0	31.0	2.2	1.3
			X	61.1	38.9	0.8	0.8
10/19/81	13:30	X		61.5	38.5	4.2	2.5
			X	74.7	25.3	0.2	1.5
10/20/81	08:15	X		65.2	34.8	2.7	2.5
			X	75.2	24.8	0.2	1.7
	13:30	X		57.7	42.3	3.5	2.4
			X	79.1	20.9	0.7	1.5
10/21/81	09:00	X		49.5	50.5	3.1	2.5
10/22/81	08:30	X		24.4	75.6	2.3	4.0
	12:00	X		28.3	71.7	2.9	5.4
10/26/81	11:00	X		41.0	59.0	4.5	4.9
	13:15	X		49.1	50.9	3.9	3.1
10/27/81	08:40	X		53.3	46.7	2.5	3.1
	14:20	X		57.3	42.7	2.2	3.1
10/30/81	08:50	X		59.8	40.2	1.5	2.3
11/6/81	10:15	X		72.1	27.9	4.1	2.0
			X	66.8	33.2	0.7	3.2

[a] Percent of total material.

TABLE 2.5. ANALYSIS OF ASPHALT CEMENT

Parameter	Specification	Test results
Penetration (at 77°F)	0.6-0.7 mm	0.62 mm
Flash point	450°F	615°F
Ductility (at 77°F)	100 cm	150+ cm
Solubility	99%	99.96%
Specific gravity	-	1.035

Source: Amoco Oil Company.

SECTION 3.0

SAMPLING LOCATIONS, EQUIPMENT, AND PROCEDURES

This section describes the sampling locations, equipment, and procedures used for the sampling of ducted emissions at the Bowen Construction Company asphalt plant.

3.1 SAMPLING LOCATIONS

3.1.1 Baghouse Inlet and Outlet

The Bowen Construction Company's asphalt plant uses one drum for the production of hot mix asphalt paving. Emissions from the process are controlled by a single baghouse. As can be seen on Figure 3.1, there is only one straight piece of duct work in the inlet system. Because of this configuration, this was the only possible location to acquire uncontrolled emission samples. These samples were collected through two 6 in. sampling ports located on the side of the horizontal duct. Figure 3.2 shows the duct dimensions, sampling ports, quadrants, and sample point locations.

Samples of the processes' controlled emissions were collected from a circular stack with a diameter of 4 ft. These samples were acquired through two 6 in. ports located 7.25 stack diameters downstream from the fan and 1 stack diameter upstream from the exit. Figure 3.2 shows the sample point locations at the outlet.

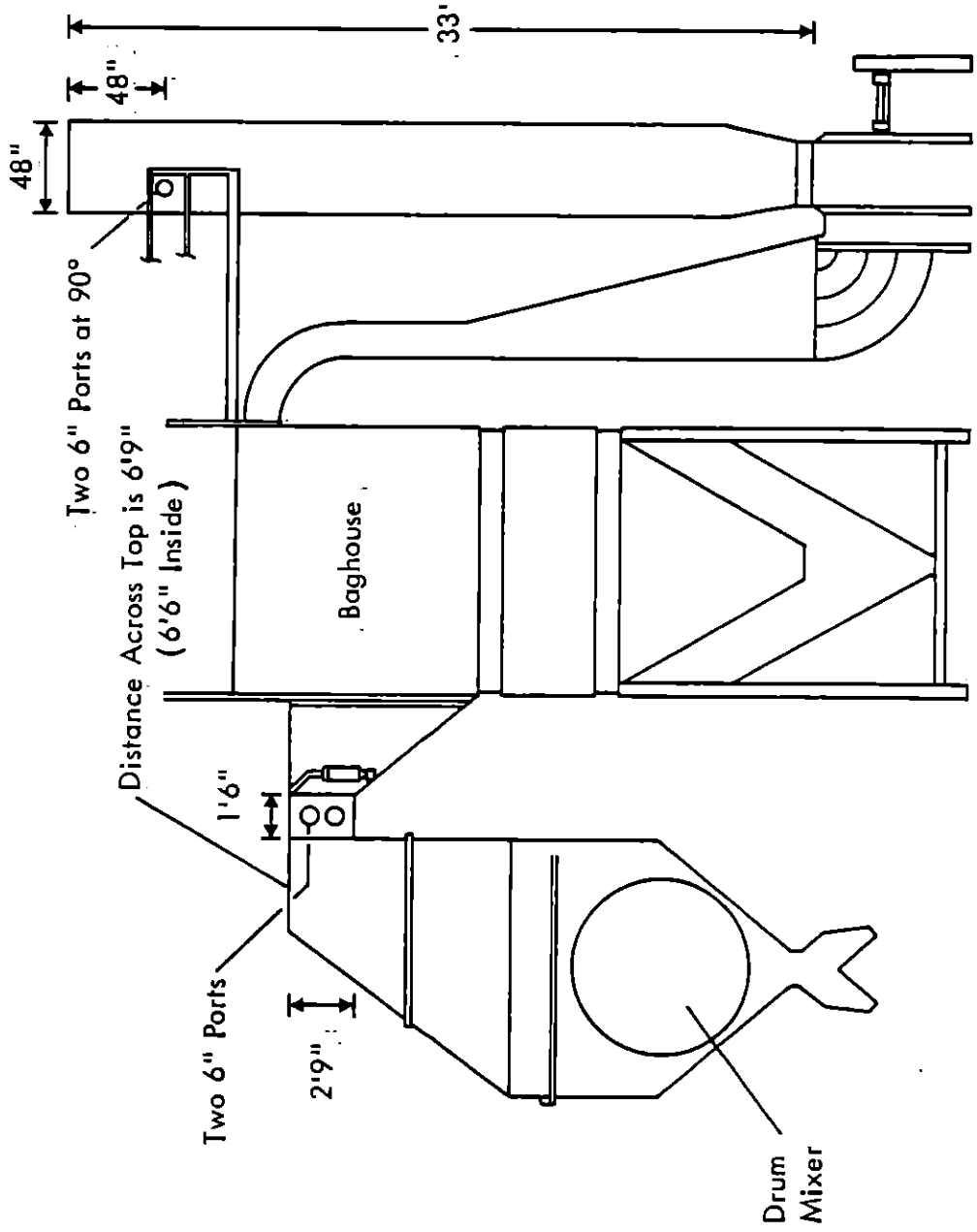
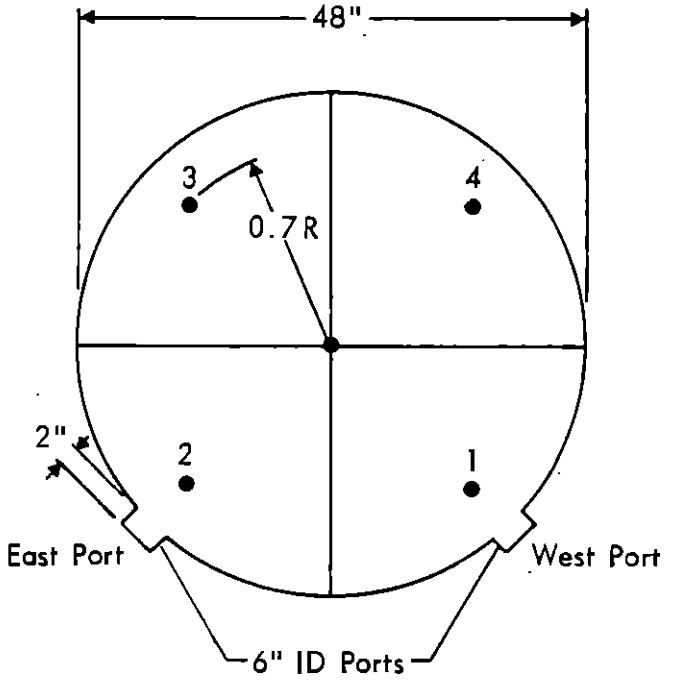
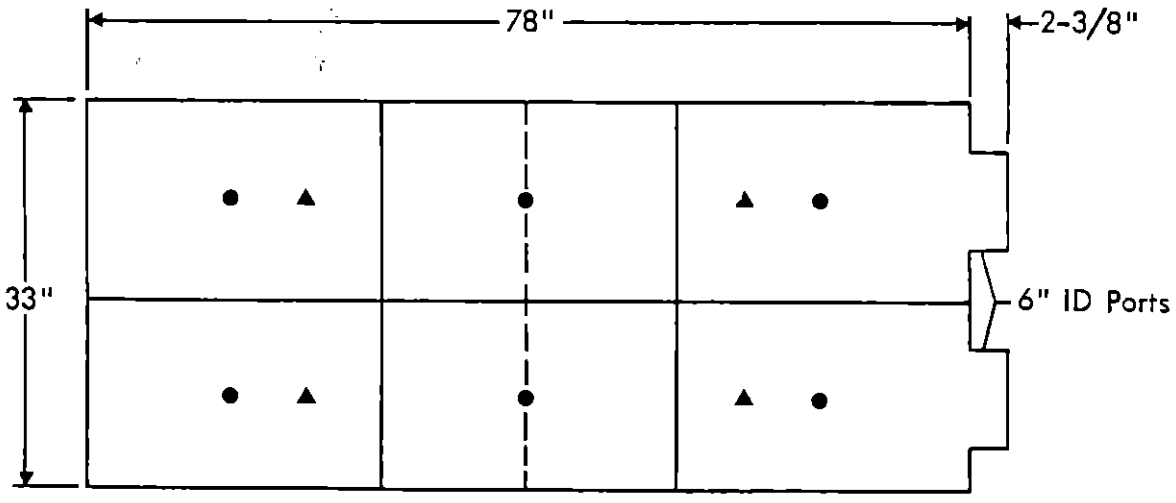


Figure 3.1. Location of sampling ports.



Outlet Cross Section



● Mass Train Traverse Sampling Points
▲ IP Train Quadrant Sampling Points

Inlet Cross Section

Figure 3.2. Baghouse inlet duct and outlet stack dimensions and quadrant identification.

3.1.2 Raw Material Samples

Grab samples of virgin and recycled material were taken at different intervals throughout the test. The virgin material was collected from the belt conveyor just before it entered the drum-mixer. The recycled material was collected just after being screened and deposited from the feed bin (refer to Figure 1.1).

3.2 SAMPLING EQUIPMENT

3.2.1 Particulate Mass

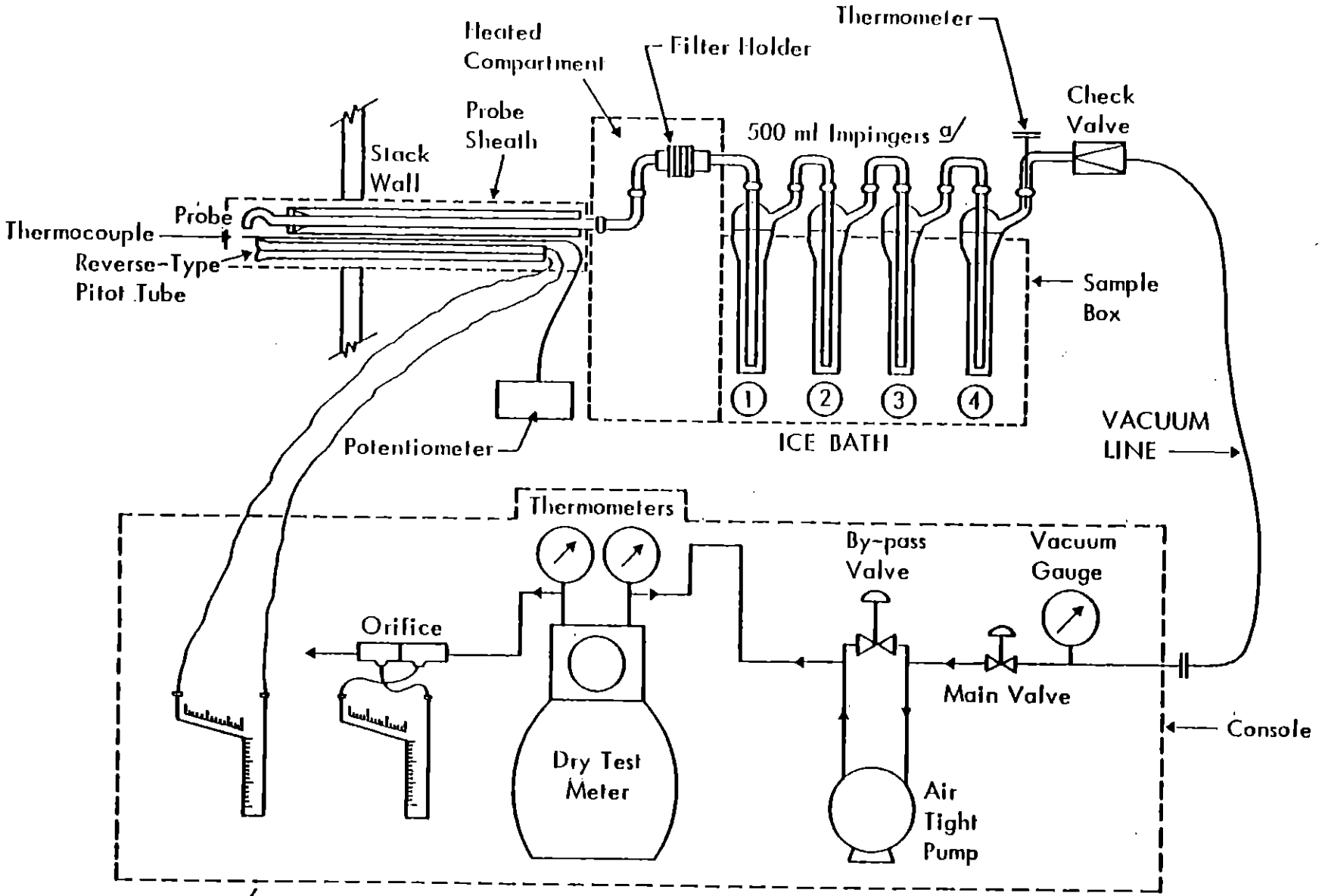
3.2.1.1 EPA Method 5 Train--

The EPA Method 5 train used for mass sampling at the inlet to the baghouse is shown schematically in Figure 3.3. The sampling train consisted of an MRI modified Research Appliance Company (RAC) console and sample box. The probe nozzle and liner were made of 316 stainless steel, and the remainder of the train was made of borosilicate glass. Particulate matter was collected on 4-in. diameter, preweighed glass fiber filters. The sampling system employed here was in accordance with EPA Reference Test Method 5 as prescribed in the Federal Register, Vol. 42, No. 160, Thursday, August 18, 1977.

3.2.1.2 EPA Method 17 Train--

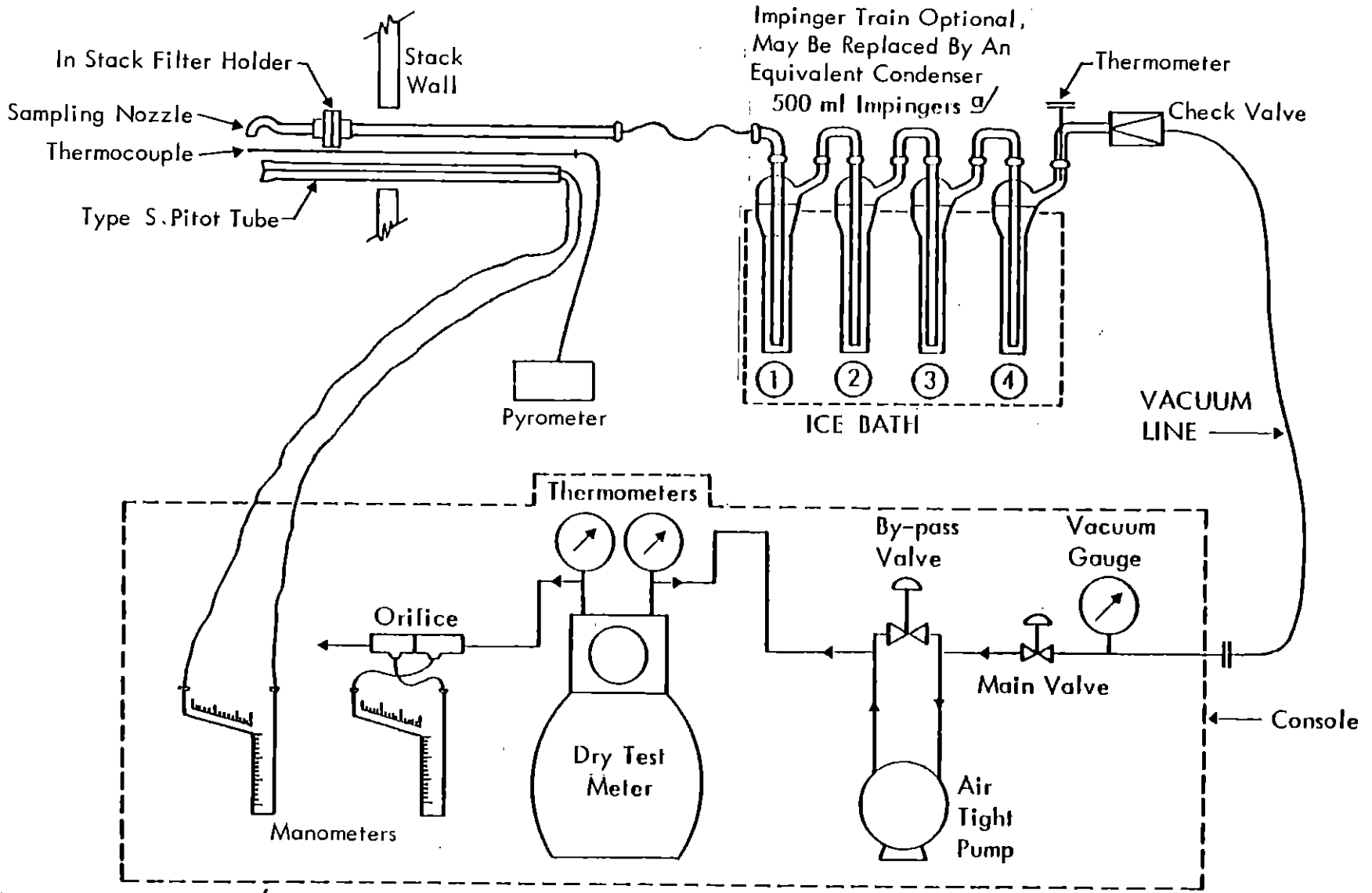
The EPA Method 17 train used for mass sampling at the outlet from the baghouse is shown schematically in Figure 3.4. The in-stack filtration sampling system used is in accordance with the configuration prescribed in the Federal Register, Vol. 43, No. 37, Thursday, February 23, 1978.

The metering and flow control system for this train consisted of an MRI modified RAC console. The filtration system consisted of an in-stack filter holder (Sierra Instruments, Inc., Model 273) coupled to a 3/8-in. schedule 40 stainless steel pipe. The nozzle and filter holder were constructed of 316 stainless steel. Particulate matter was collected on 47-mm preweighed, glass fiber filters. The condenser consisted of a typical EPA Method 5 impinger train. The impinger train did not include a thermometer or a check valve after the silica gel.



a/ Impingers 1, 3 and 4 are of the Modified Greenburg-Smith Type
Impinger 2 is of the Greenburg-Smith Design
Impinger 1 and 2 Contain 100 ml Water
Impinger 3 Empty
Impinger 4 Contains 200-300 Grams Silica Gel

Figure 3.3. EPA Method 5 sampling train.



g/ Impingers 1, 3 and 4 are of the Modified Greenburg-Smith Type
Impinger 2 is of the Greenburg-Smith Design
Impinger 1 and 2 Contain 100 ml Water
Impinger 3 Empty
Impinger 4 Contains 200-300 Grams Silica Gel

Figure 3.4. EPA Method 17 sampling train.

3.2.2 Particle Size

3.2.2.1 Andersen High Capacity Stack Sampler (HCSS)--

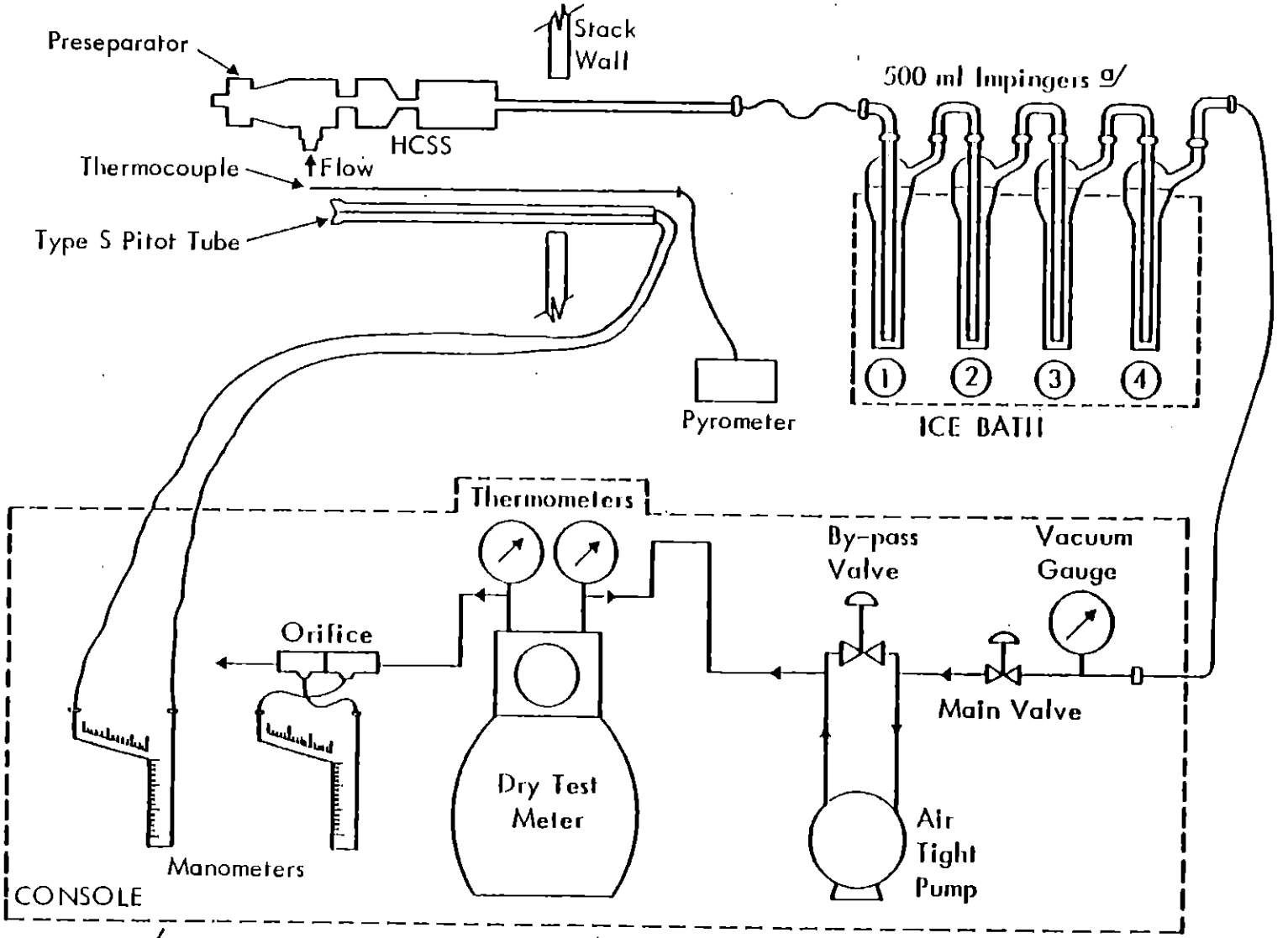
An Andersen HCSS (Andersen 2000) cascade impactor with a Sierra Instruments 15-μm preseparator was used for particle size distribution measurements of emissions at the inlet to the baghouse. This system was used for heavy loading situations encountered at the baghouse inlet sampling site. Figure 3.5 shows the Andersen HCSS impactor with 15-μm preseparator in the sampling mode.

The Andersen HCSS cascade impactor consists of two single-jet impaction chambers followed by a third stage cyclone and a backup thimble filter. An MRI modified RAC console was used for the control and metering of flows. A typical EPA Method 5 impinger train without thermometer or check valve was used for determining moisture content. Particulate matter was collected inside the Stage 1 and 2 impactor chambers and the Stage 3 cyclone. All particles remaining in the gas stream downstream of the Stage 3 cyclone were collected in a preweighed, high efficiency glass fiber filter.

3.2.2.2 Andersen Mark III--

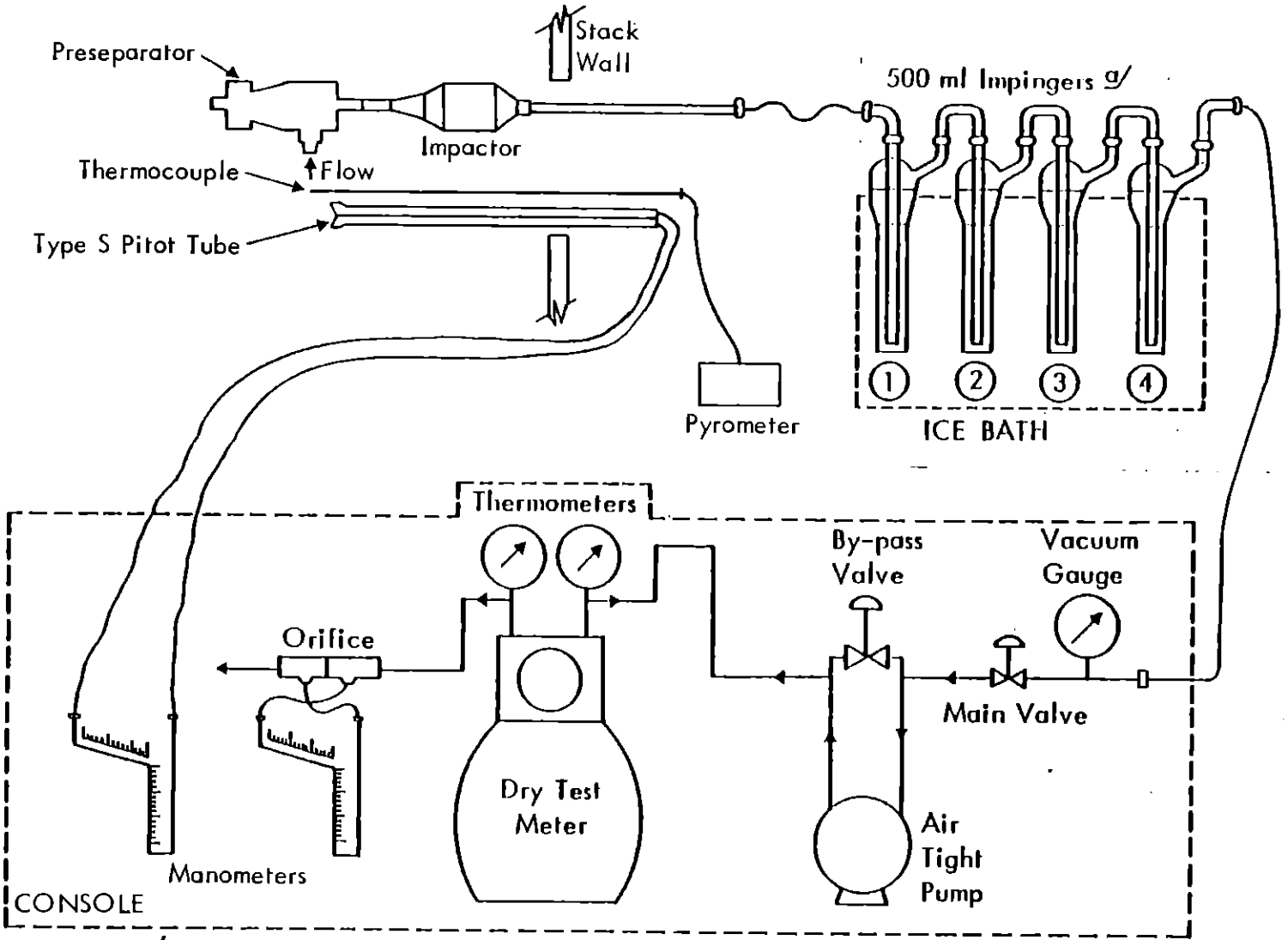
An Andersen Mark III (Andersen 2000) cascade impactor with a Sierra Instruments 15-μm preseparator was used for particle size distribution measurements of emissions at the outlet from the baghouse. This system was used for light loading situations encountered at the baghouse outlet sampling site. Figure 3.6 shows the Andersen Mark III impactor with 15-μm preseparator in the sampling mode.

The Andersen Mark III is a multistage, multijet cascade impactor. An MRI modified RAC console was used for control and metering of flows. A typical Method 5 impinger train without thermometer or check valve was used for determining moisture content. Particulate matter was collected on 2.5-in. diameter preweighed glass fiber filters.



a/ Impingers 1, 3 and 4 are of the Modified Greenburg-Smith Type
Impinger 2 is of the Greenburg-Smith Design
Impinger 1 and 2 Contain 100 ml Water
Impinger 3 Empty
Impinger 4 Contains 200-300 Grams Silica Gel

Figure 3.5. Andersen high capacity stack sampler with preseparator sampling train.



a/ Impingers 1, 3 and 4 are of the Modified Greenburg-Smith Type
Impinger 2 is of the Greenburg-Smith Design
Impinger 1 and 2 Contain 100 ml Water
Impinger 3 Empty
Impinger 4 Contains 200-300 Grams Silica Gel

Figure 3.6. Andersen Mark III impactor with preseparator sampling train.

3.2.3 Equipment Calibration

All emission sampling equipment described above were calibrated according to EPA requirements as prescribed by the Federal Register, Vol. 42, No. 160, August 18, 1977. Appendix E contains the calibration data for the equipment used during this field test.

3.3 SAMPLING PROCEDURES

The preliminary inlet and outlet test data taken prior to performing the actual emission tests at the asphalt plant are contained in Appendix F. The preliminary inlet data contain an attempted Method 17 run using 48 sampling points (traversing 24 points per port). However, only two points were sampled because of the high loading. The testing strategy decided upon is discussed in more detail in Section 3.3.2. Also contained in Appendix F are the dry molecular weight determinations used in the final calculations. The dry molecular weight of the stack gas was determined daily at the inlet and outlet of the baghouse.

3.3.1 Pretest Preparations

3.3.1.1 Particulate Mass--

3.3.1.1.1 EPA Method 5 train--Four-inch diameter Type A/E (Gelman Sciences, Inc.) glass fiber filters were used for particulate collection substrates in the EPA Method 5 train used at the baghouse inlet. The filters were placed in numbered 4-3/4 in. diameter by 3/16 in. deep aluminum weighing pans. The filters and weighing pans were then placed in a constant humidity and temperature room for 24 h, after which each filter and its corresponding numbered weighing pan were weighed on a Mettler Model AK 160 electronic balance to the nearest 0.1 mg. The filters and weighing pans were again equilibrated for 6 h and weighed. This procedure was repeated until two consecutive weighings agreed within 1.0 mg. The Method 5 filter tare weights are found in Appendix G. After completion of weighings, the filters were placed in plastic petri dishes for transport to the test site.

Two-hundred and fifty milliliter capacity glass beakers were used for recovery of mass train samples. The beakers were first washed in Alconox detergent and the rinsed with tap water. After the beakers were numbered with a lead pencil on the etched surface of the beaker, they were rinsed with distilled water. The beakers were then heated in an oven to 500°F for 1 h to burn off any organic material present. The beakers were transferred using beaker tongs to an equilibration room and equilibrated for 24 h. The beakers were then weighed on a Mettler Model AK 160 electronic balance to the nearest 0.1 mg. The beakers were equilibrated for 6 h and then re-weighed. This procedure was repeated until two consecutive weighings agreed within 1.0 mg. Tare weights for 250 ml beakers are presented in Appendix G. After completion of weighing, the beakers were placed in sterile plastic Whirl-Pak containers and put into their original box for shipping.

3.3.1.1.2 EPA Method 17 train--Gelman type A/E 47-mm diameter glass fiber filters were used for particulate collection substrates in the EPA Method 17 train used at the baghouse outlet location. The filters were placed in numbered 57-mm diameter aluminum weighing pans. The equilibration and weighing procedures used on these filters were identical to the procedures used for the EPA Method 5 filters. Method 17 filter tare weights are presented in Appendix G. Plastic petri dishes were used as shipping containers.

One-hundred and fifty milliliter capacity glass beakers were used for recovery of EPA Method 17 samples. The beakers were cleaned, equilibrated, and weighed according to the procedures described above for the EPA Method 5 beakers. Tare weights for the 150-ml beakers are presented in Appendix G. These beakers were transported in sterile plastic Whirl-Pak containers.

3.3.1.2 Particle Size--

3.3.1.2.1 Andersen high capacity stack sampler with 15-μm preseparator--The entire Andersen HCSS impactor and 15-μm preseparator system and nozzles were washed in detergent and rinsed with tap water, distilled water, and acetone. The acceleration and vent tubes were cleaned with a high pressure air stream.

A 1-1/2 in. diameter by 4-3/4 in. long aluminum tube was used as a container for each glass fiber thimble filter. The aluminum tube also served as a weighing container. The thimble filter and aluminum tube were prepared for field use as follows:

- Aluminum tubes were numbered with an engraver.
- Aluminum tubes and lids were washed in Alconox detergent.
- Aluminum tubes and lids were first rinsed with tap water, then with deionized, distilled water.
- Aluminum tubes and lids were heated in an oven to 500°F for 1 h to remove any potential organic contaminants. After heating, the aluminum tubes were handled only with beaker tongs. The aluminum lids were handled with latex surgical gloves since they were not weighed.
- The aluminum tubes and lids were removed from the oven and allowed to cool.
- A thimble filter was placed in each container.
- The thimble filter and aluminum tube were placed in a constant humidity room for 24 h at ambient temperature and pressure.
- The aluminum tube and thimble filter were weighed to the nearest 0.1 mg on a Mettler Model AK 160 electronic balance. The aluminum tube lid was not desiccated or weighed.
- The aluminum tube and thimble filter were desiccated for 6 h.
- The aluminum tube and thimble filter were weighed a second time.

- Weighings were repeated until two consecutive weighings agreed within 1.0 mg.

- The lid was placed on the aluminum tube.

- Aluminum tubes were wrapped in aluminum foil and placed in plastic Whirl-Paks for shipment.

Aluminum weighing pans 57 mm in diameter and 20 mm deep were used in recovering samples from the first four impactor stages. Each weighing pan was numbered with a metal engraver. The aluminum weighing pans were then desiccated and weighed according to the procedures used for the aluminum tubes and thimble filters. The aluminum weighing pans were placed in 100 mm diameter by 20 mm deep plastic petri dishes used as shipping containers. Thimble filter and aluminum weighing pan tare weights can be found in Appendix G.

3.3.1.2.2 Andersen Mark III impactor with 15-μm preseparator--Ten 3-in. aluminum foil squares were cut to serve as holders for each filter set. The aluminum foil squares were folded in half, labeled, and the appropriate glass fiber filter substrate (Andersen 2000) placed inside. The equilibration and weighing procedures used were as follows:

- The filter sets were equilibrated in a constant humidity room for 24 h.

- The filter and its aluminum foil holder were weighed on a Cahn Instruments Model 27 electrobalance to the nearest 0.01 mg.

- The filter sets were equilibrated for another 6 h.

- The filters were weighed a second time.

- The equilibration and weighing procedures were repeated until two consecutive weighings agreed within 0.05 mg.

- Each complete filter set was placed in a glassine envelope for shipping.

Andersen Mark III impactor substrate tare weights are found in Appendix G.

3.3.2 Testing Strategy

The Southern Research Institute "Procedure Manual for Inhalable Particulate Sampler Operation," November 30, 1979, prepared for EPA (SoRI-EAS-79-761, 4181-37), was used to determine most of the sampling criteria for both the particle sizing and mass tests. Four individual sampling points were used rather than a standard traverse of the duct, except for the inlet. Also, the criterion for isokinetic sampling was expanded to ± 20% rather than the standard ± 10%.

3.3.2.1 Baghouse Inlet--

According to the procedures manual cited above, the recommended sampling points for circular and square or rectangular ducts can be determined using Figure 3.7. However, due to the duct configuration and the extremely high loading at the inlet, it was decided to deviate from the recommended sampling points for the total mass tests. Instead of sampling at one point during a run, it was decided to traverse six points. A traverse of the duct was necessary to obtain total mass data that would be unbiased by stratification. Six points were chosen because of the short sampling time dictated by the high loading of the inlet. The particle sizing tests were conducted using normal inhalable particulate testing procedures. (Refer to Figure 3.2.)

3.3.2.2 Baghouse Outlet--

The testing strategy used in testing the outlet employed normal inhalable particulate testing procedures for both particle sizing and total mass tests.

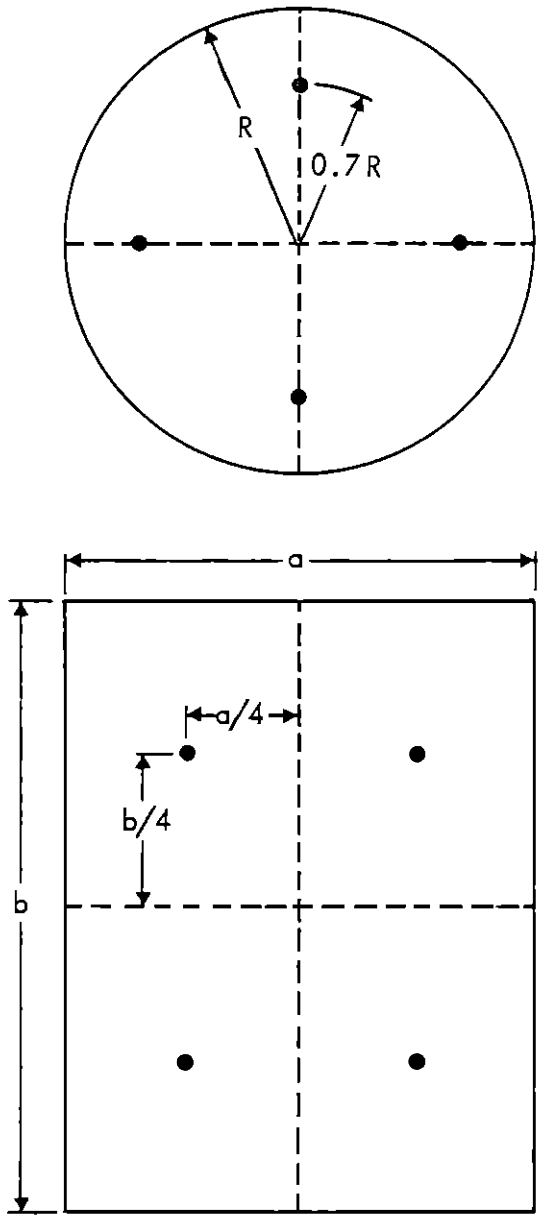


Figure 3.7. Recommended sampling points.

Source: Southern Research Institute, "Procedure Manual for Inhalable Particulate Sampler Operation," prepared for EPA, November 30, 1979. (SoRI-EAS-79-761, 4181-37).

3.3.3 Testing, Recovery, and Analysis

3.3.3.1 Particulate Mass Tests at the Inlet to the Baghouse--

3.3.3.1.1 EPA Method 5 train--Methods 1 through 4 of the Federal Register were followed in obtaining preliminary test data. The same six-point traverse as mentioned previously was used for Method 1.

An EPA Method 5 sampling train was used for total particulate mass sampling at the inlet duct to the baghouse. This sampling train allows the gases to condensate before they pass through a sample filter, which ensures their collection as a particulate. The sampling train was operated according to EPA Method 5 guidelines the following changes. Six traverse points were used rather than a standard traverse. A test consisted of one train traversing all six sampling points. There were a total of eight modified Method 5 tests conducted at the inlet test location. Due to the negative pressure of the inlet duct, the sample probe was withdrawn from the duct at the completion of each test with the sample pump running to prevent loss of the sample. The pump was turned off at the completion of the sampling period. This operation was regulated so that the pump was running only a few seconds after the probe had been removed from the duct. The isokinetic criterion for sampling was expanded to ± 20% rather than ± 10%. Sampling calculations are shown in Appendix H.

The EPA Method 5 mass train sample recovery was performed using EPA Method 5 guidelines. Equilibration and gravimetric analysis of the samples followed the same procedures discussed in Section 3.3.1.1 (Particulate Mass). Sample weights are presented in Appendix G.

3.3.3.2 Particulate Mass Tests at the Outlet to the Baghouse--

3.3.3.2.1 EPA Method 17 train--Methods 1 through 3 of the Federal Register were followed in obtaining preliminary test data. Four sampling points were used rather than a standard traverse.

An EPA Method 17 sampling train (in-stack filtration system) was used for total particulate mass sampling at the outlet duct from the baghouse. The EPA Method 17 train was used instead of the EPA Method 5 train because of the light loading expected. The sampling calculations are identical to the Method 5 sampling calculations found in Appendix H.

Prior to testing, the filter was loaded into the in-stack filter holder and the two halves screwed together. The filter was handled with nonserrated forceps and surgical gloves. After the proper size nozzle was attached, the filter holder body, excluding the nozzle, was wrapped in aluminum foil to keep it clean during sampling and to prevent filter contamination upon recovery.

The EPA Method 17 train was operated according to EPA Method 5 guidelines. Four individual sampling points were used, and a run was conducted at each sampling point. These four runs constituted a test. There were two tests for a total of eight runs conducted at the outlet test location. Duct pressures were negative at this location; therefore, the withdrawal of the sampler was accomplished according to the procedure outlined for the EPA Method 5 train. The isokinetic criterion was also the same as the EPA Method 5 train.

The recovery of the EPA Method 17 sampling train was accomplished as follows:

- The filter holder was removed from the probe and the protective aluminum foil wrapping discarded.

- The filter was removed from the filter holder and placed in its numbered weighing pan.

- The nozzle and front half of the filter holder assembly were rinsed with acetone directly into a preweighed, numbered 150-ml glass beaker.

- The volume of acetone rinse used was recorded to the nearest 10 ml using the graduations on the 150-ml glass beaker.

Equilibration and gravimetric analysis of the EPA Method 17 filters and 150-ml beakers were accomplished using the same procedures as the EPA Method 5 samples. These procedures are discussed in Section 3.3.1 (Pretest Preparations). Sample weights are presented in Appendix G.

3.3.3.3 Particle Size Tests at the Inlet to the Baghouse--

3.3.3.3.1 Andersen high capacity stack sampler with 15-μm preseparator--An Andersen HCSS impactor with a 15-μm preseparator was used for particle sizing at the inlet duct to the baghouse. This impactor was chosen for use at this location because it is designed for heavy grain loading--situations in which standard impactors cannot be used because of overloading or unacceptably short sampling times. The standard impactor provides four particle size cutpoints, and the addition of the 15-μm preseparator to the top of the impactor provided a fifth.

Preliminary test data for the particle sizing tests were obtained from previous EPA Method 5 train runs and from Federal Register Methods 1 through 3 determinations. The six sampling points used for the EPA Method 5 mass train were not used for the particle sizing runs. A run was conducted at each of four sampling points (one per quadrant), and these four runs constituted a test. There were four tests for a total of 16 particle sizing runs conducted at the inlet test location.

The Andersen HCSS impactor was operated according to the procedures described by the manufacturer. During sampling, a sample was drawn from the duct at a constant velocity through the nozzle. This flow rate allowed for a 15-μm cutoff in the preseparator while still remaining within the ± 20% isokinetic criterion range. Preliminary and isokinetic sampling calculations are shown in Appendix H. The calculations can also be found on the raw data sheet for any particular particle size run.

At the completion of each run, the impactor was withdrawn from the duct with the sample pump left running because of the negative pressure in the duct. This procedure is the same as that described for the EPA Method 5 mass train. The impactor was held at a 45-degree angle during transport to the laboratory recovery site. This precaution was necessary to minimize the possibility of sample relocation from one stage to another during transport.

Figure 3.8 shows a cutaway view of the five particulate recovery stages of the Andersen HCSS impactor with 15-μm preseparator. The procedure used for recovery of particulate samples from the impactor was as follows:

- While holding the impactor at a 45-degree angle with the inlet nozzle at the top, the 15-μm preseparator was removed and set aside.

- Keeping Stages 2 through 5 at a 45-degree angle, Stages 2 and 3 were removed and set aside in a horizontal position.

- Stages 4 and 5 were removed and set aside in a horizontal position.

- The recovery of each stage was carried out over a piece of glassine paper so that any particulate that was spilled could be recovered.

- While the 15-μm cyclone preseparator was held at a 45-degree angle with the exit tube pointing up, the sides of the cyclone were tapped lightly to free clinging particulate matter. The exit tube was removed, and the particulate on the outer sides of the tube was brushed into the collection cup. The inside of the inlet nozzle was also brushed into the collection cup. The particulate in the collection cup was transferred to container No. 1.

- The interior surfaces of the cyclone exit tube and the interior surfaces of Stage 2 were brushed into container No. 2.

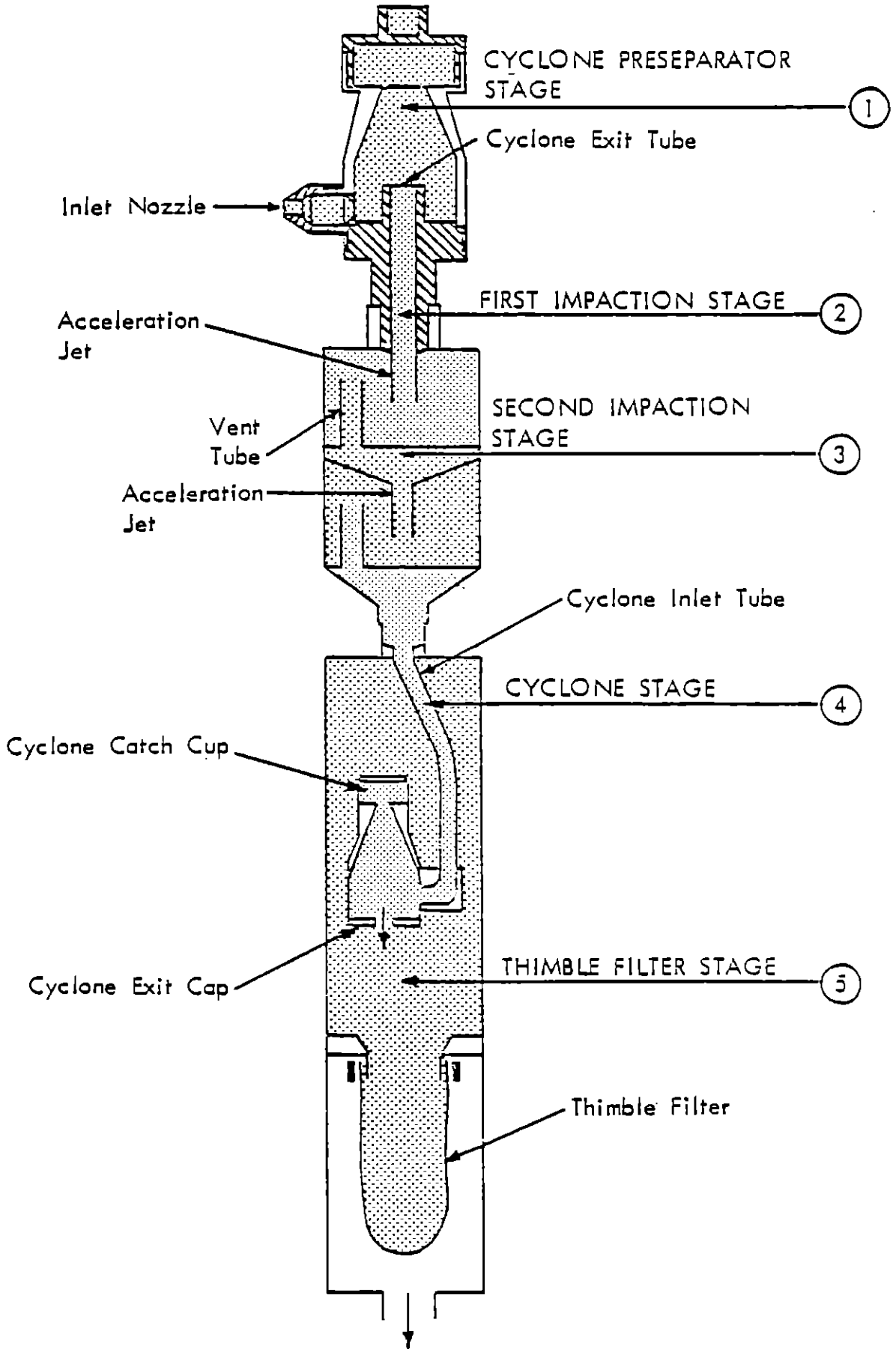


Figure 3.8. Andersen high capacity stack sampler with preseparator.

- The interior surfaces of the vent tubes from Stage 2, the acceleration jet going into Stage 3, and the interior surfaces of Stage 3 were brushed into container No. 3.

- While Stages 4 and 5 were held horizontally, the cyclone was removed from the body of Stage 5. The exterior surfaces of the cyclone were brushed into Stage 5. The material collected in the interior of the cyclone and its inlet tube were recovered in container No. 4.

- The interior surfaces of Stage 5 were brushed into the thimble filter. The thimble filter was removed and placed in container No. 5.

The samples were equilibrated and gravimetrically analyzed using the same procedures as discussed in Section 3.3.1.2.1. Sample weights are presented in Appendix G.

3.3.3.4 Particle Size Tests at the Outlet to the Baghouse--

3.3.3.4.1 Andersen Mark III impactor with 15-μm preseparator--An Andersen Mark III impactor with 15-μm preseparator was used for particle sizing at the outlet stack from the baghouse. This impactor was chosen for use at this location because it is designed for moderate grain loading situations. The standard impactor provides nine particle size cutpoints, and the addition of the 15-μm preseparator to the top of the impactor provided a 10th.

Preliminary test data for the particle sizing tests were obtained from previous EPA Method 17 train runs and from Federal Register Methods 1 through 3 determinations. The four sampling points used for the EPA Method 17 mass train were also used for the particle sizing runs. A run was conducted at each of the four sampling points, and these four runs constituted a test. There were two tests for a total of eight particle sizing runs conducted at the outlet test location.

The Andersen Mark III impactor was loaded and operated according to the procedures described by the manufacturer. During sampling, a sample was drawn from the duct at a constant velocity through the nozzle. This flow rate allowed for a 15-μm cutoff in the preseparator while still remaining within the ± 20% isokinetic range. Preliminary and isokinetic sampling calculations are shown in Appendix H. These calculations can also be found on any particle sizing raw data sheet.

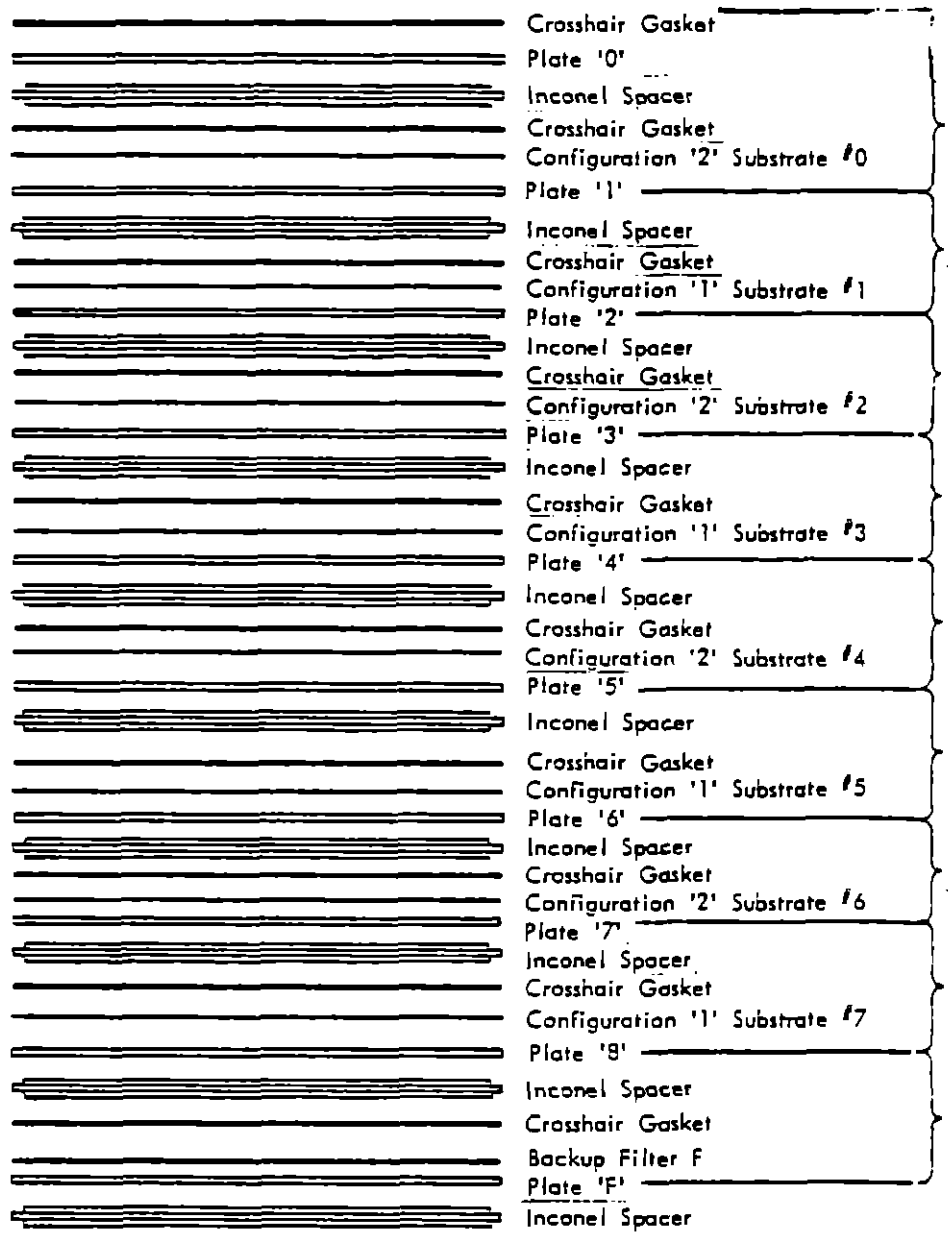
At the completion of each run, the impactor was withdrawn from the duct with the sample pump running because of the negative pressure in the duct. This procedure is the same as described for the EPA Method 5 mass train. The Andersen Mark III impactor was held at a 45-degree angle to prevent sample movement from one stage to another during transport to the field laboratory recovery site.

Figure 3.9 shows an exploded view of the impactor stages of the Andersen Mark III impactor. Figure 3.10 shows a cutaway view of the 15-μm preseparator mounted on top of the Andersen Mark III impactor. The procedures used for recovery of the particulate samples from the impactor were as follows:

- The sampler was held at a 45-degree angle while the exterior surface was brushed clean. This cleaning prevents contamination of the substrate collection surfaces inside the impactor during recovery.

- The sampler was held at a 45-degree angle while the preseparator was removed. The preseparator was set aside in a 45-degree angle position with the exit tube pointing up. The plate assembly housing was placed in a vertical position with the inlet pointing up.

- The foil liner labeled "X-Pres" was unfolded and placed on a sheet of glassine paper. If some of the sample spilled onto the glassine paper, it was recovered and placed in the liner. This was done with all stages during recovery.



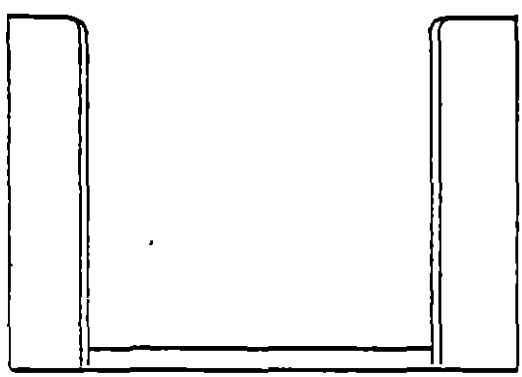


Plate Holder

Center Diameter

X - 0 = Small
X - 1 = Large
X - 2 = Small
X - 3 = Large
X - 4 = Small
X - 5 = Large
X - 6 = Small
X - 7 = Large
X - F = 2-1/2 in.

Back Up Filter

Figure 3.9. Andersen Mark III impactor stages.

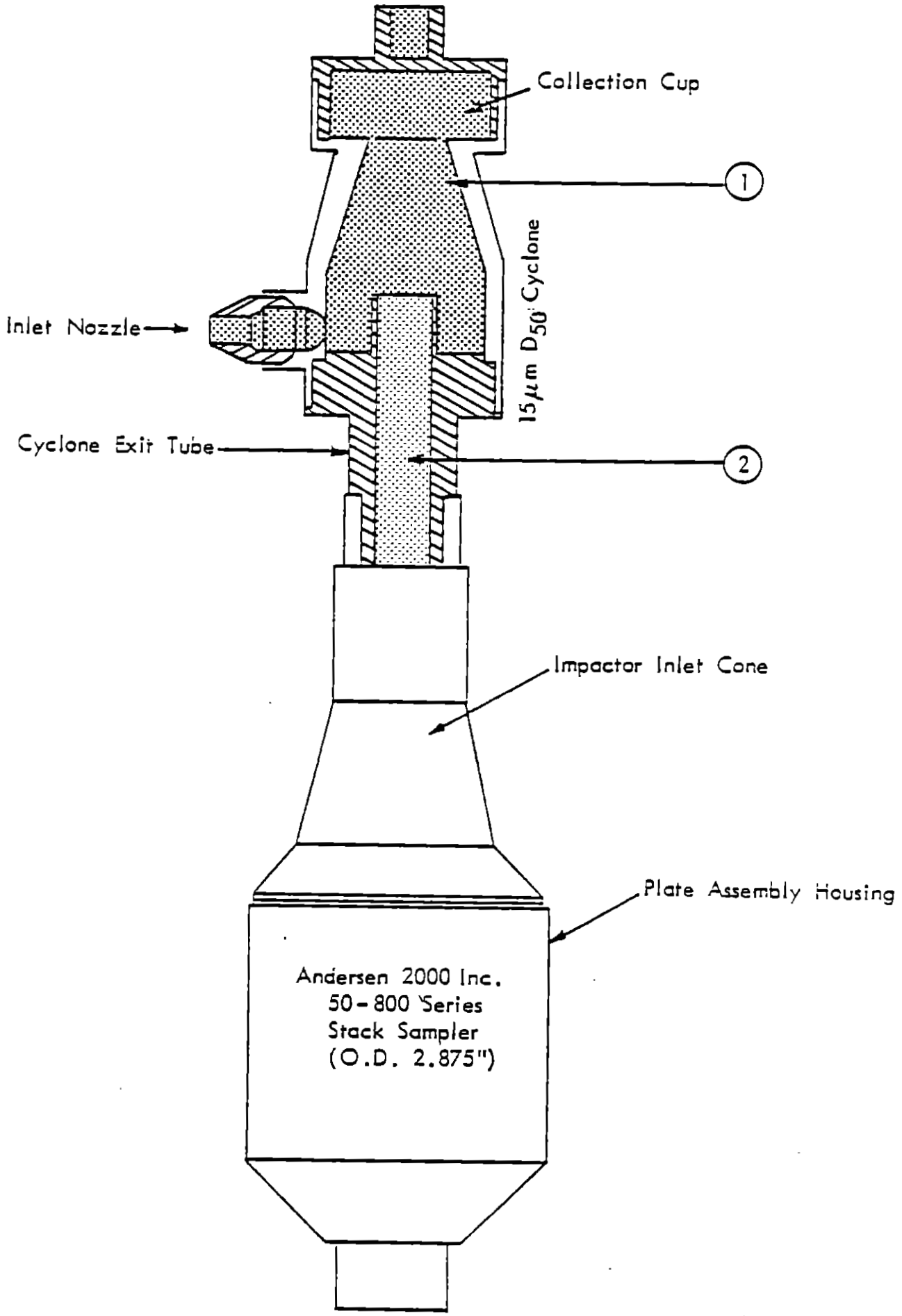


Figure 3.10. Andersen Mark III with preseparator.

- The cyclone exit tube, impactor inlet cone, crosshair gasket, plate "0," inconel spacer, and crosshair gasket were brushed into the foil liner labeled "X-0." Substrate No. 0 was placed in the foil liner. The top side of plate "1" was also brushed onto foil "X-0." The sides of the foil liner were folded, and it was returned to the filter holder.

- The bottom side of plate "1," the inconel space, and crosshair gasket were brushed onto foil liner "X-1." Substrate No. 1 was removed and placed in foil liner "X-1." The top side of plate "2" was also brushed onto foil liner "X-1." The foil liner was folded at the sides and returned to the filter holder.

- The above recovery procedures were repeated for the remaining stages.

Gravimetric analysis was done by the procedures discussed in Section 3.3.1 (Pretest Preparations). Sample weights are presented in Appendix G.

3.3.3.5 Sample Blanks--

3.3.3.5.1 Particulate mass--Extra 47-mm Method 17 filters and 4-in. diameter Method 5 filters were tare weighed and numbered. Three filters of each size were selected as sample blanks. These filters were not distinguished from other filters of the same type, nor were they treated in any way differently during the pretest equilibration and weighing. Three filters of each type were selected and weighed as blanks every day that actual sample filters from Method 17 and Method 5 runs were final weighed. The blank filters were handled and analyzed in the same manner as those containing actual particulate sample. One blank filter of each type was weighed before any actual samples were weighed. The second blank filter of each type was weighed during actual sample weighing. The third blank filter of each type was weighed at the completion of all actual sample weighing. A different filter of each type was used for each of the three blank weighings.

The three blank filter final weights of each type were totaled and then averaged at the end of each day. The average of each type was compared with the average initial tare weight of the same three filters. The difference between the average tare and average final weight of each filter type was then applied as a correction factor to all actual samples of that respective type that were final weighed on that day. A weight gain on the blank filters was subtracted from the sample final weights. A weight loss was added to the sample final weights performed that day. The blank filter weight analyses are presented in Appendix G.

Three acetone evaporations (per lot) were performed at MRI to determine the amount of residue in the acetone. The acetone containers used for this purpose were randomly selected. The glass beakers used were prepared and treated in the same manner as other beakers. There was a weight gain between the tare and final weighings of the beakers used for the acetone blanks, and this weight gain was applied as a correction factor to the sample weights of both Method 5 and Method 17 test results. The weight gained was divided by the amount of acetone used for each sample recovery; then this result was subtracted from the respective sample weight. The acetone blank analyses are presented in Appendix G.

3.3.3.5.2 Particle size--Three sets of Andersen filters for the Andersen Mark III impactor were assembled to be used as blanks. For the blank analyses, only two filters were used, rather than the nine normally loaded into the impactor. The blank filter sets consisted of the following filter configurations:

- One slotted impaction substrate (large or small center) and aluminum foil holder.

- One 2-1/2 in. diameter unslotted final filter and aluminum foil holder.

The blank sets were labeled as such, then desiccated, weighed, and handled in the same manner as the actual sets. Three blank sets were

selected and weighed in the lab on any day that final weighings were conducted on actual samples. One blank set was weighed prior to actual sample weighings, one set during, and one set after all samples had been weighed.

A correction factor for the Andersen Mark III particle size test results was derived by totaling and averaging the three blank set net weights performed each day sample sets were final weighed. A separate correction factor was applied for the slotted impactor substrates and the unslotted final filters. The average final weight of each substrate type was subtracted from its respective average tare weight. A weight gain on the blank filter substrate was subtracted from the sample net weights of that substrate type performed that day. A weight loss on the blank filter substrate was added to the sample net weights of that substrate type performed that day. The blank filter weight analyses for the Andersen Mark III impactor are presented in Appendix G.

Three Andersen HCSS thimble filters were used for blanks. No blank weight analyses were performed on the aluminum weighing pans used for sample recovery of the first four impactor stages. The blank thimble filters were equilibrated and weighed in the same manner as the thimble filters used for testing.

The three blank thimble filters were weighed in the lab on any day that final weighings were conducted on actual Andersen HCSS particle size test samples. A different thimble filter was weighed each time a blank final weight was obtained. One thimble filter was weighed prior to actual sample weighings, one during, and one after all samples had been weighed.

The three net weights were added together and divided by 3 to get a blank value for that day. The blank value for a specific day was applied to the thimble filter analysis performed on that day. The blank thimble filter weight analyses for the Andersen HCSS impactor are presented in Appendix G.

3.3.4 Test Identification System

A system of run identification numbers was assigned to the tests conducted at Bowen Construction Company. A typical run number is explained below.

I - 2 - 3 (B)

1 2 3 4

1 - The first letter denotes the source, inlet (I) or outlet (O).

2 - The second number is the test number.

3 - The third number is the quadrant number.

4 - The letter designation, shown in parentheses, indicates a repeat of the run in that particular quadrant.

In the above example, the "B" indicates that this was the second run of Test 2 in quadrant 3--run because the first did not meet established test criteria. The first run that did not meet the test criteria was then labeled "A." If a run met all criteria the first time, the letter "A" was not used. Only in the case of a repeated run was a letter designated. If a run was repeated the third time, then the letter "C" was designated, and so on.

The identification numbers for the Method 5 tests on the inlet consisted of a source letter (I or O) and a run number (1 through 8).

SECTION 4.0

SUMMARY OF RESULTS

Results of the testing program at the Bowen Construction Company asphalt plant are summarized in this section. The tabular and graphic presentations that follow were derived from reduction of the raw field data found in Appendix I and the laboratory and analytical data found in Appendix G. The raw data were combined and reduced by a computer program developed by MRI to produce the printouts found in Appendix J. The information contained in these computer printouts was used in the construction of the graphs and tables in this section.

Only data that have met specific acceptance criteria are summarized in this section. These criteria, as obtained from "Procedures Manual for Inhalable Particulate Sampler Operation," prepared by Southern Research Institute for EPA, are:

1. Each total mass and particle sizing run must be within ± 20% of isokinetic.

2. The particulate grain loading from the total mass train (EPA Method 5 or Method 17) and the corresponding particle size train (Andersen HCSS or Andersen Mark III with 15 μm preseparator) must be within ± 50%.

The data that has met this criteria is in Table 4.1. Two total mass and four particle sizing tests consisting of four runs per test (one run per quadrant on particle sizing) were conducted at the baghouse inlet test site. Two total mass and two particle sizing tests consisting of four runs each (one run per quadrant) were conducted at the baghouse outlet test site.

TABLE 4.1. SUMMARY OF BAGHOUSE INLET AND OUTLET ACCEPTANCE CRITERIA RESULTS

Test No.	Run No. source-run-quad	Test date	% Isokinetic	Particulate loading[a] gr/dscf	$\bar{x}$[b]	% from $\bar{x}$	Run No. Source-run	Test date	% Isokinetic	Particulate loading[a] gr/dscf	$\bar{x}$[b]	% from $\bar{x}$
	Inlet Particle Sizing Train						Inlet mass train					
1	I-1-1(B)	10/26/81	94.9	15.1								
	I-1-2	10/21/81	93.2	21.2			I-1(c)	10/21/81	102.0	28.9		
	I-1-3	10/22/81	95.1	17.5	21.9	22					27.6	25
	I-1-4	10/21/81	101.6	33.6			I-2	10/22/81	99.8	26.3		
2	I-2-1(C)	11/06/81	89.7	6.6								
	I-2-2(B)	10/22/81	96.0	18.6			I-3	10/20/81	100.9	19.3		
	I-2-3	10/26/81	99.1	12.7	16.0	11					16.0	27
	I-2-4	10/22/81	113.2	26.1			I-4	10/20/81	98.8	12.8		
3	I-3-1	10/27/81	90.9	16.9								
	I-3-2	10/26/81	95.4	18.9			I-5	10/22/81	106.1	24.7		
	I-3-3	10/27/81	89.9	10.4	19.7	9					22.4	2
	I-3-4	10/26/81	98.8	32.5			I-6(B)	10/27/81	106.0	20.1		
4	I-4-1	10/30/81	110.1	7.6								
	I-4-2	10/27/81	111.2	10.1			I-7	10/26/81	104.7	24.8		
	I-4-3	10/30/81	93.6	17.5	14.3	20					22.1	0.3
	I-4-4	10/30/81	109.5	22.1			I-8	10/27/81	104.2	18.8		
					$\bar{x}$ = 18.0						$\bar{x}$ = 22.0	
	Outlet Particle Sizing Train						Outlet mass train					
1	O-1-1(B)	10/21/81	120.1	0.0298								
	O-1-2	10/19/81	117.7	0.0310			O-1-1	10/22/81	95.6	0.0578		
	O-1-3	10/20/81	104.4	0.0188	0.0316	5	O-1-2	10/20/81	97.2	0.0505		
	O-1-4	10/22/81	114.3	0.0467			O-1-3(D)	10/19/81	103.0	0.0639	0.0537	0
							O-1-4	10/20/81	104.0	0.0426		
2	O-2-1	10/30/81	105.8	0.0232								
	O-2-2	10/22/81	101.2	0.0348			O-2-1	10/26/81	95.7	0.0539		
	O-2-3	10/27/81	100.8	0.0409	0.0352	5	O-2-2(B)	10/27/81	100.7	0.0293		
	O-2-4	10/26/81	92.5	0.0419			O-2-3	10/22/81	102.5	0.0861	0.0538	0
							O-2-4(C)	10/30/81	96.2	0.0458		
					$\bar{x}$ = 0.03338						$\bar{x}$ = 0.0538	

[a] Grains per dry standard cubic foot.

[b] Mean.

To further scrutinize the particle sizing data an average grain loading was determined for the 16 inlet runs and the 8 outlet runs. This average was compared to the average grain loading of each test. If the average varied by more than 50%, runs within that test would be compared to the grain loading found in the corresponding mass run. If these values disagreed by less than 50%, the deviation probably indicated a high degree of stratification and all data were retained.

4.1 INHALABLE PARTICULATE (IP) EMISSION FACTORS

The IP emission factors for a typical source were calculated for 15.0, 10.0, and 2.5 μm particles as follows:

A total mass emission factor, indicating the amount of particulate matter released into the atmosphere per unit of asphalt concrete produced, in pounds per ton was calculated for each run of each mass test. The total mass emission factor (lb/ton) was derived by dividing the total mass emission rate (lb/hr) calculated from the mass train data, by the production rate (tons/hr). Production data for the plant was provided by the Bowen Construction Company as described in Section 1. The calculation for a single run was based on the assumption that the average stack velocity during the run was the same as the velocity measured at the sampling point of the quadrant being sampled. In addition, the individual emission factors for each run were calculated based on the plant production rate during the period when the samples were collected with no adjustment being made for other variations in process operating conditions. The IP emission factors were calculated using the total mass emission factor derived from the Method 5 and Method 17 data rather than a factor which could have been calculated from the total mass collected by the particle sizing device.

The total mass collected during a run in the particle sizing device, and the mass collected on each individual stage was entered into a computer program along with the criteria to determine the actual D_{50} of each stage.

The D_{50} of a stage is the particle diameter at which the stage achieves 50% efficiency; one half of the particles of that diameter are captured and one half are not. The computer printouts of the particle sizing tests in Appendix J indicate cumulative percent greater than the stated D_{50}, whereas the graphs and tables indicate D_{50} as cumulative percent less than stated size. The cumulative percent less than stated size vs. the stated size (D_{50}) were then plotted for each of the four runs that constitute a test. Note: The cumulative percent less than stated size is determined by subtracting the numbers found in the row labeled "cum.% with filter" from 100.

To determine exactly what percentage of the total mass was less than 2.5, 10, and 15 microns, the cumulative percent greater than stated size and D_{50} from the abovementioned computer printouts were entered into a spline equation. A program for handling impactor data using a spline fit has been developed by J. E. Johnson et al. ("A Computer Based Cascade Impactor Data Reduction System," EPA-600/7-78-042, March 1978). An improvement to this program has recently been completed by MRI and was used in this study to determine emission factors. IP emission factors were calculated by multiplying the percentage of the total mass derived by the spline equation for the desired D_{50} by the total mass emission factor (lb/ton). The particle diameter upper limit was set at 50.0 μmA for the calculations using the spline fit.

4.2 CALCULATION PROCEDURES FOR THE INLET AND OUTLET OF THE BAGHOUSE

Due to the extremely high loading at the inlet, a deviation from normal IP protocol was used to calculate these emissions. The outlet emissions were calculated using the normal IP methods discussed earlier. The total mass runs were matched with the particle size runs as shown in Table 4.2 and 4.3.

All total mass samples taken at the inlet were collected using a six point traverse instead of being collected from one point at the center of a quadrant. Because of this, the mass and particle sizing runs could not be matched quadrant by quadrant. Total mass runs were matched with particle sizing runs according to time and day (see Appendix A). The last 2 days of

TABLE 4.2. BAGHOUSE OUTLET TOTAL MASS AND PARTICLE SIZING COORDINATION

Particle sizing run	Total mass run
O-1-1(B)	O-1-1
O-1-2 (recycle)	O-1-2 (recycle)
O-1-3 (recycle)	O-1-3(B) (recycle)
O-1-4	O-1-4 (recycle)
O-2-1 (recycle)	O-2-1
O-2-2	O-2-2(B)
O-2-3	O-2-3
O-2-4	O-2-4(C)

TABLE 4.3. BAGHOUSE INLET TOTAL MASS AND PARTICLE SIZING COORDINATION

Particle sizing run	Total mass run
None	I-3 (recycle)
None	I-4 (recycle)
I-1-4 I-1-2	I-1(C)
I-1-3 I-2-2(B)	I-2
I-2-4	I-5
I-2-3 I-3-2 I-1-1(B) I-3-4	I-7
I-3-1 I-3-3	I-8
I-4-2	I-6(B)
I-4-1 I-4-3 I-4-4 I-2-1(C) (recycle)	None

testing no total mass runs were conducted. The average total mass emission factor (lb/ton), calculated from all eight of the inlet mass runs (Table 4.3) was applied to the particle sizing runs conducted on that day.

4.3 DATA PRESENTATION FORMAT

Summary tables for both the baghouse inlet and outlet test locations are presented as follows:

Tables 4.4 and 4.5 present impactor particle size run sampling data including mass (mg), D_{50} values, and the cumulative percent less than stated size for each stage of the impactor.

Tables 4.6 and 4.7 present the total mass emission factors (lb/ton) and the IP emission factors for 2.5-, 10.0-, and 15-μm particles. An average ratio of the grain loading determined from the particle sizing train to the grain loading determined from the mass train, is presented in Table 4.7. This ratio was not included in the data for the inlet (Table 4.6) due to the six-point traverse (instead of quadrant sampling) used to obtain the sample.

The computer results of the modified EPA Method 5 and Method 17 train field data containing the calculated grain loading and the emission rate in pounds per hour, are presented in Appendix J. IP emission factors for both the inlet and the outlet are summarized in Table 4.8.

The data results are also presented in graphic form for both the baghouse inlet and outlet test locations. These graphs are presented as follows:

Figures 4.1, 4.2, 4.3, 4.4, 4.5, and 4.6 present the results of each individual test, which consisted of four separate runs (one per quadrant). The data presented include particle size (D_{50}) versus cumulative percent less than stated size and emission factors for 2.5, 10.0, and 15.0 μm.

TABLE 4.4. PARTICLE SIZE RUN TEST SAMPLING DATA, BAGHOUSE INLET

Test No.	Run No. source-run-quad	15-μm Cyclone			Stage 1			Stage 2			Cyclone			Filter	
		Mass (mg)	D_{50} size (μm)	Cum. % less than stated size	Mass (mg)	D_{50} size (μm)	Cum. % less than stated size	Mass (mg)	D_{50} size (μm)	Cum. % less than stated size	Mass (mg)	D_{50} size (μm)	Cum. % less than stated size	Mass (mg)	D_{50} size (μm)
1	I-1-1(B)	4,775.2	14.8	30.2	95.2	11.4	28.8	617.5	6.3	19.7	1,091.0	1.9	3.8	258.0	< 1.9
	I-1-2	6,088.7	15.5	25.0	125.0	11.8	23.5	566.6	6.7	16.5	1,143.3	1.9	2.4	198.0	< 1.9
	I-1-3	6,345.5	15.1	19.2	68.5	11.5	18.3	399.4	6.5	13.3	906.8	1.9	1.7	134.3	< 1.9
	I-1-4	10,607.6	15.2	17.6	179.5	11.6	16.2	750.9	6.5	10.4	977.9	1.9	2.8	356.5	< 1.9
2	I-2-1(C)	212.91	14.5	26.7	45.6	11.2	25.1	221.8	6.2	17.5	446.3	1.8	2.1	60.8	< 1.8
	I-2-2(B)	5,881.3	15.6	25.7	127.0	11.7	24.1	621.1	6.6	16.2	1,061.0	2.0	2.8	222.6	< 2.0
	I-2-3	4,157.7	15.4	22.9	60.4	11.7	21.7	362.7	6.6	15.0	746.8	1.9	1.2	62.4	< 1.9
	I-2-4	9,068.9	15.0	22.9	406.6	11.5	19.5	767.3	6.4	12.9	1,038.8	1.9	4.1	481.7	< 1.9
3	I-3-1	5,718.0	15.7	22.3	364.8	11.7	17.4	200.5	6.6	14.7	975.1	2.0	1.4	104.1	< 2.0
	I-3-2	6,113.0	15.5	23.5	81.0	11.7	22.5	505.7	6.6	16.2	997.5	2.0	3.7	294.8	< 2.0
	I-3-3	3,086.1	15.4	33.5	62.2	11.6	32.1	393.8	6.5	23.6	937.4	1.9	3.4	159.4	< 1.9
	I-3-4	10,346.7	15.2	19.8	170.5	11.6	18.5	888.7	6.5	11.6	1,062.2	1.9	3.4	435.3	< 1.9
4	I-4-1	2,149.4	15.5	35.8	48.4	11.7	34.4	301.8	6.61	25.4	671.9	2.0	5.3	177.1	< 2.0
	I-4-2	3,242.0	15.4	27.8	78.4	11.7	26.00	348.8	6.6	18.2	642.8	1.9	3.9	175.2	< 1.9
	I-4-3	7,794.4	15.4	20.2	89.3	11.6	19.3	550.6	6.6	13.6	874.2	1.9	4.7	456.6	< 1.9
	I-4-4	9,585.9	15.5	21.4	178.5	11.7	20.0	873.4	6.6	12.8	785.0	2.0	6.4	777.3	< 2.0

TABLE 4.5. PARTICLE SIZE TEST SAMPLING DATA, BAGHOUSE OUTLET

Test No.	Run No. source-run-quad	15-μm Cyclone Mass (mg)	15-μm Cyclone D_{50} size (μm)	15-μm Cyclone Cum. % less than stated size	Stage 0 Mass (mg)	Stage 0 D_{50} size (μm)	Stage 0 Cum. % less than stated size	Stage 1 Mass (mg)	Stage 1 D_{50} size (μm)	Stage 1 Cum. % less than stated size	Stage 2 Mass (mg)	Stage 2 D_{50} size (μg)	Stage 2 Cum. % less than stated size	Stage 3 Mass (mg)	Stage 3 D_{50} size (μg)	Stage 3 Cum. % less than stated size
1	O-1-1(B)	37.96	14.9	42.1	0.41	14.7	41.5	1.34	9.1	39.5	3.65	6.2	33.9	5.30	4.2	25.8
	O-1-2	84.91	14.7	21.0	0.51	14.4	20.5	0.89	9.0	19.7	3.94	6.1	16.0	4.44	4.1	11.9
	O-1-3	39.29	14.9	26.0	0.00	14.6	26.0	0.63	9.1	24.8	1.95	6.1	21.1	2.82	4.2	15.8
	O-1-4	72.37	14.8	31.6	0.61	14.7	31.1	0.73	9.2	30.4	2.36	6.2	28.1	16.29	4.2	12.7
2	O-2-1	21.93	15.2	56.7	1.60	14.9	53.1	1.88	9.3	49.8	4.33	6.3	41.2	4.56	4.3	32.2
	O-2-2	49.78	15.0	35.7	0.67	14.7	34.9	0.85	9.2	33.8	3.36	6.2	29.4	4.33	4.2	23.8
	O-2-3	61.54	14.6	32.8	3.52	14.3	28.9	1.98	8.9	26.8	4.77	6.0	21.6	4.58	4.1	16.6
	O-2-4	71.68	15.4	37.0	7.79	15.0	30.1	3.38	9.4	27.2	5.75	6.3	22.1	6.57	4.3	16.3

Test No.	Run No. source-run-quad	Stage 4 Mass (mg)	Stage 4 D_{50} size (μm)	Stage 4 Cum. % less than stated size	Stage 5 Mass (mg)	Stage 5 D_{50} size (μm)	Stage 5 Cum. % less than stated size	Stage 6 Mass (mg)	Stage 6 D_{50} size (μm)	Stage 6 Cum. % less than stated size	Stage 7 Mass (mg)	Stage 7 D_{50} size (μg)	Stage 7 Cum. % less than stated size	Filter Mass (mg)	Filter D_{50} size (μg)
1	O-1-1(B)	8.45	2.7	12.9	5.71	1.3	4.2	2.07	0.80	1.1	0.33	0.59	0.56	0.37	< 0.59
	O-1-2	5.43	2.6	6.8	4.74	1.3	2.4	1.71	0.78	0.82	0.57	0.58	0.29	0.31	< 0.58
	O-1-3	2.97	2.7	10.2	3.26	1.3	4.1	1.81	0.79	0.64	0.21	0.58	0.24	0.13	< 0.58
	O-1-4	0.00	2.7	12.7	12.4	1.3	1.0	0.00	0.81	1.0	0.88	0.59	0.20	0.21	< 0.59
2	O-2-1	5.68	2.7	21.0	5.09	1.3	11.0	2.60	0.81	5.8	1.54	0.60	2.8	1.40	< 0.60
	O-2-2	7.91	2.7	13.6	6.63	1.3	5.1	2.95	0.80	1.3	0.77	0.59	0.26	0.20	< 0.59
	O-2-3	7.04	2.6	8.9	5.09	1.3	3.3	2.45	0.78	0.64	0.46	0.57	0.14	0.13	< 0.57
	O-2-4	8.35	2.8	9.0	6.07	1.4	3.7	2.52	0.82	1.4	0.91	0.61	0.63	0.72	< 0.61

TABLE 4.6. BAGHOUSE INLET EMISSION FACTORS BASED ON TOTAL MASS AND IMPACTOR SIZE DISTRIBUTION

Test No.	Run No. source-run-quad	Matching mass run	Total mass emission rate lb/h	Production rate[b] ton/h	Total mass emission factor lb/ton	IP emission factors < 2.5 μm (lb/ton)	< 10 μm (lb/ton)	< 15 μm (lb/ton)
1	I-1-1(B)	I-7	7,480	225	33.3	2.1	9.1	10.2
	I-1-2	I-1(C)	8,190	217	37.7	1.6	8.3	9.4
	I-1-3	I-2	6,930	162	42.8	1.4	7.5	8.3
	I-1-4	I-1(C)	8,190	217	37.7	1.5	5.6	6.7
					Avg. 37.9	Avg. 1.65	Avg. 7.6	Avg. 8.7
2	I-2-1(B)[a]	None	-	-	(30.9)	1.3	7.4	8.5
	I-2-2(B)	I-2	6,930	162	42.8	1.9	9.5	10.9
	I-2-3	I-7	7,480	225	33.3	0.8	6.8	7.6
	I-2-4	I-5	7,180	195	36.8	2.0	6.6	8.5
					Avg. 40.0	Avg. 1.5	Avg. 7.6	Avg. 8.9
3	I-3-1	I-8	5,840	215	27.2	0.75	4.5	5.8
	I-3-2	I-7	7,480	225	33.3	1.8	7.1	7.8
	I-3-3	I-8	5,840	215	27.2	1.6	8.3	9.1
	I-3-4	I-7	7,480	225	33.3	1.5	5.7	6.6
					Avg. 30.3	Avg. 1.4	Avg. 6.4	Avg. 7.3
4	I-4-1[a]	None	-	-	(30.9)	2.5	10.0	11.0
	I-4-2	I-6(B)	5,720	205	27.9	1.6	6.8	7.7
	I-4-3[a]	None	-	-	(30.9)	1.9	5.6	6.3
	I-4-4[a]	None	-	-	(30.9)	2.2	5.6	6.6
					Avg. 30.2	Avg. 2.1	Avg. 7.0	Avg. 7.9
		Non-matching mass runs						
		I-3	5,620	223	25.2			
		I-4	3,850	237	16.3			
	Total average		6,350	210	(30.9)[c]	1.7	7.2	8.2

Note: A column labeled "Ratio of total mass conc. to particle sizing conc." is not included on this table due due to the traversing of the mass runs rather than quadrant sampling.

[a] No paired mass run for this particle sizing run. Used the average total mass emission factor of all eight mass runs (30.9 lb/ton) to calculate IP emission factors.

[b] Average plant production rate during mass test run.

[c] This average was derived from the eight mass runs in Table 4.3.

TABLE 4.7. BAGHOUSE OUTLET EMISSION FACTORS BASED ON TOTAL MASS AND IMPACTOR SIZE DISTRIBUTION

Test No.	Run No. source-run-quad	Total mass emission rate (lb/h)	Production rate (ton/h)	Total mass emission factor (lb/ton)[a]	Ratio of particle size train to total mass train conc.	IP emission factors		
						< 2.5 μm (lb/ton)	< 10 μm (lb/ton)	< 15 μm (lb/ton)
1	O-1-1(B)	11.5	164	0.07		0.008	0.028	0.03
	O-1-2	12.7	226	0.056		0.004	0.011	0.012
	O-1-3	16.6	216	0.077		0.007	0.019	0.021
	O-1-4	9.6	237	0.041		0.004	0.013	0.013
	Average	12.6	211	0.061	0.59	0.006	0.018	0.019
2	O-2-1	9.6	174	0.055		0.011	0.028	0.031
	O-2-2	7.3	216	0.034		0.004	0.012	0.012
	O-2-3	24.7	195	0.127		0.011	0.035	0.044
	O-2-4	10.0	178	0.056		0.004	0.016	0.021
	Average	12.9	191	0.068	0.65	0.008	0.023	0.027
	Total average	12.8	201	0.065		0.007	0.021	0.023

[a] Average plant production rate during test run.

TABLE 4.8. SUMMARY OF INHALABLE PARTICULATE EMISSION FACTORS

	Test No.	Emission factors (lb/ton)[a]			
		Total	< 2.5 μm[b]	< 10 μm[b]	< 15 μm[b]
Baghouse inlet	1	37.9	1.6	7.6	8.6
	2	37.6	1.5	7.6	8.9
	3	30.2	2.0	7.0	7.9
	4	27.9	1.4	6.5	7.4
	Average	33.4	1.6	7.2	8.2
Baghouse outlet	1	0.06	0.01	0.02	0.02
	2	0.07	0.01	0.02	0.03
	Average	0.07	0.01	0.02	0.02

[a] Pounds of particulate matter per short ton of paving produced.

[b] Aerodynamic diameter.

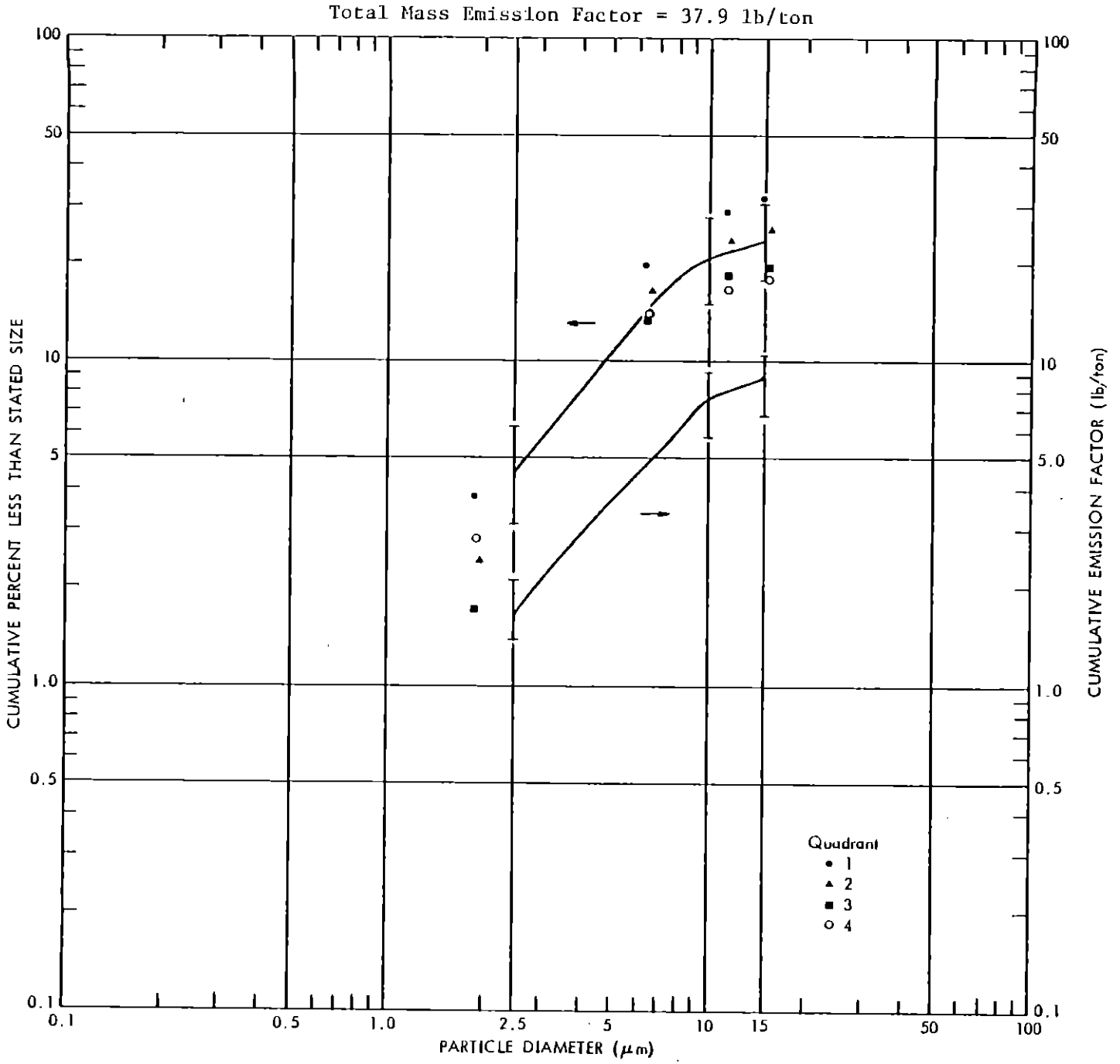


Figure 4.1. Inlet Test One.

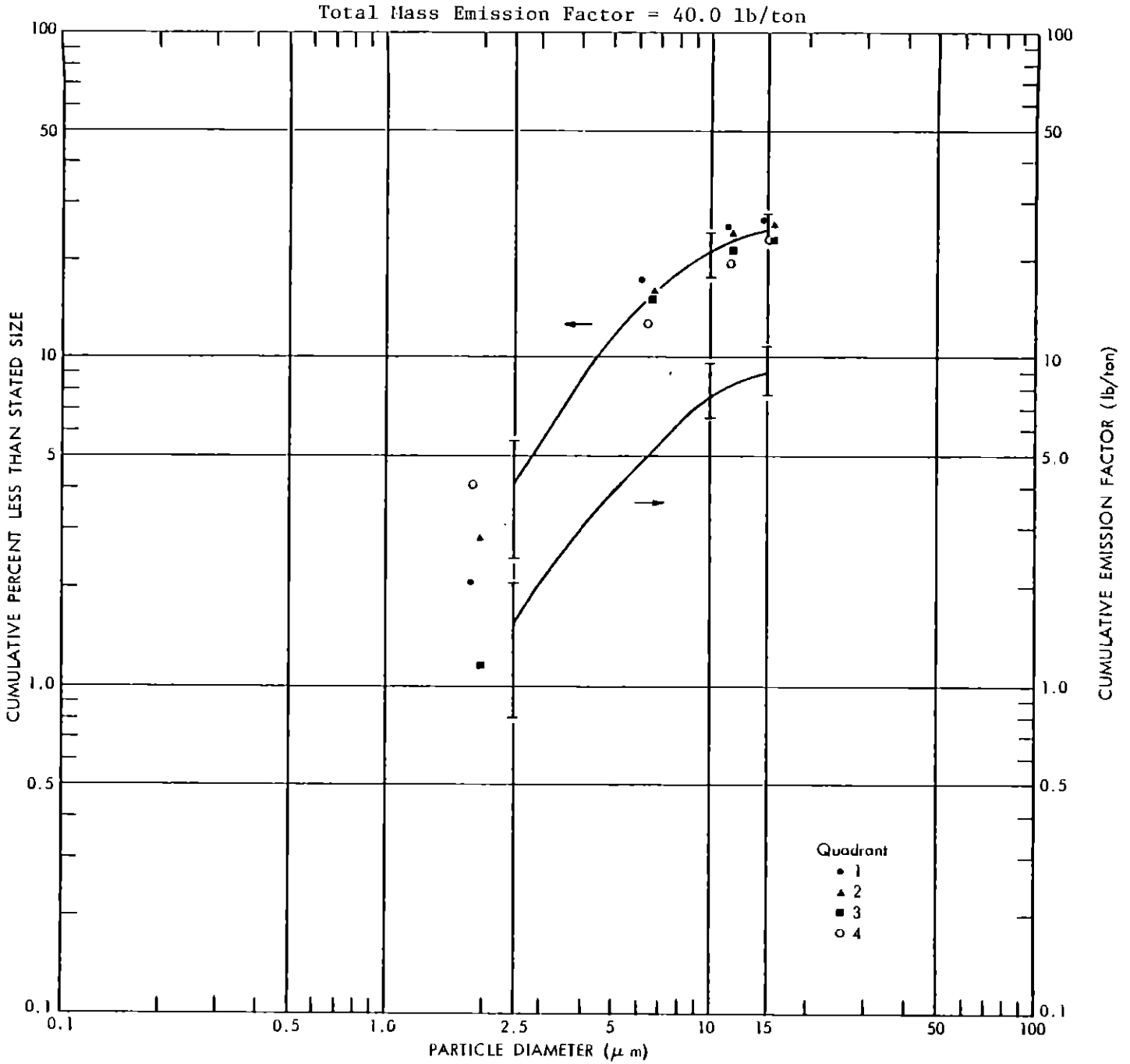


Figure 4.2. Inlet Test Two.

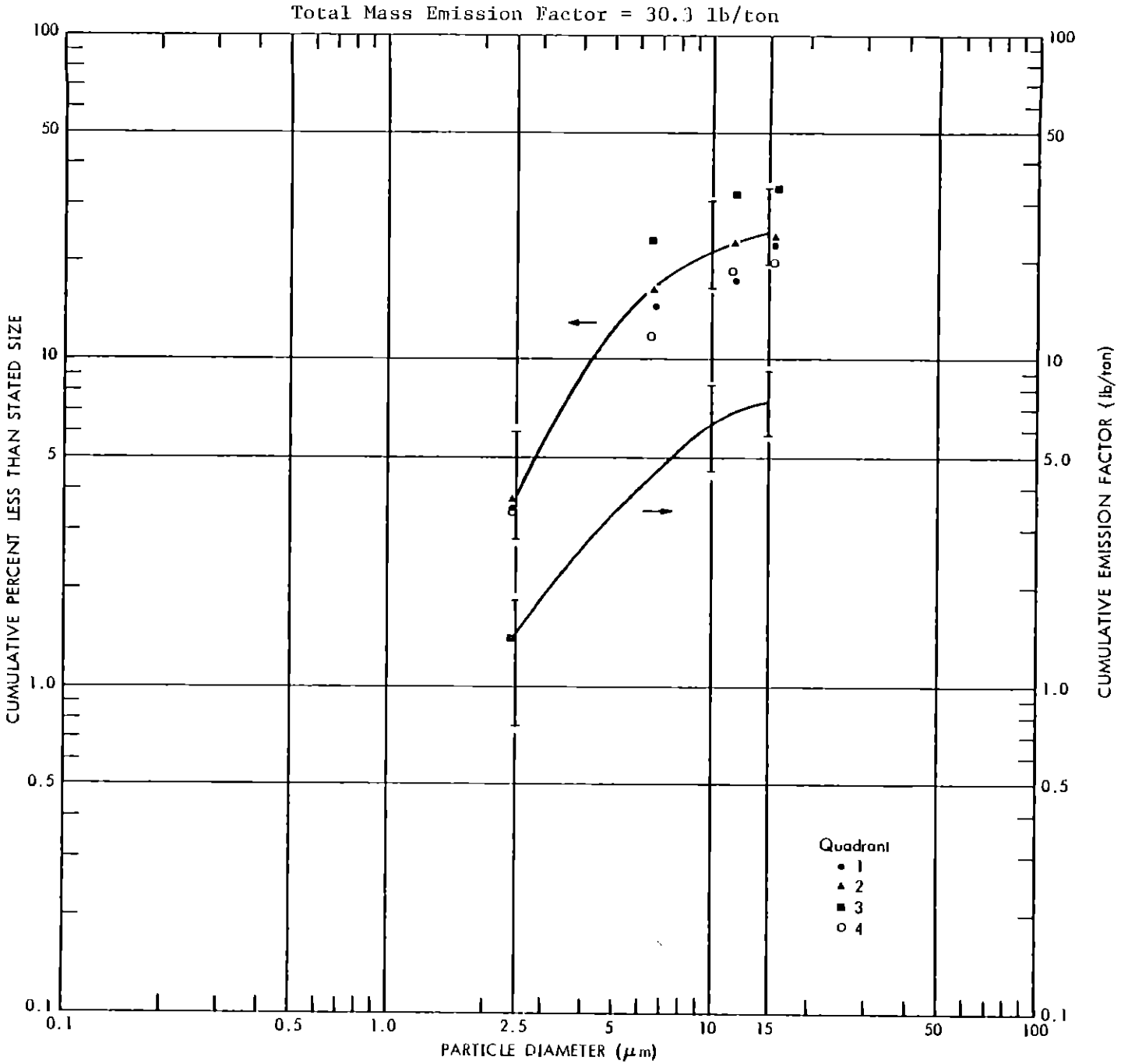


Figure 4.3. Inlet Test Three.

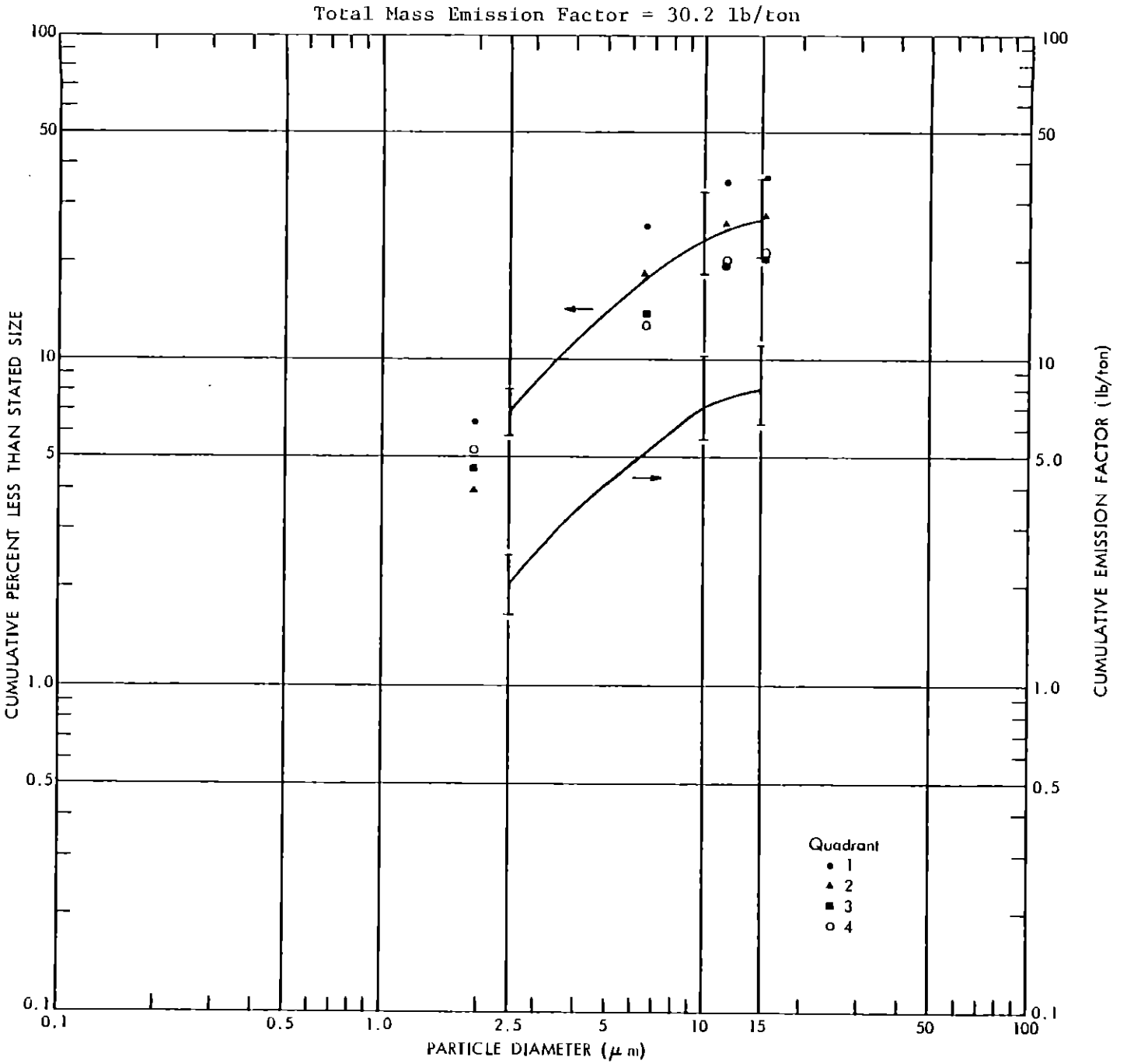


Figure 4.4. Inlet Test Four.

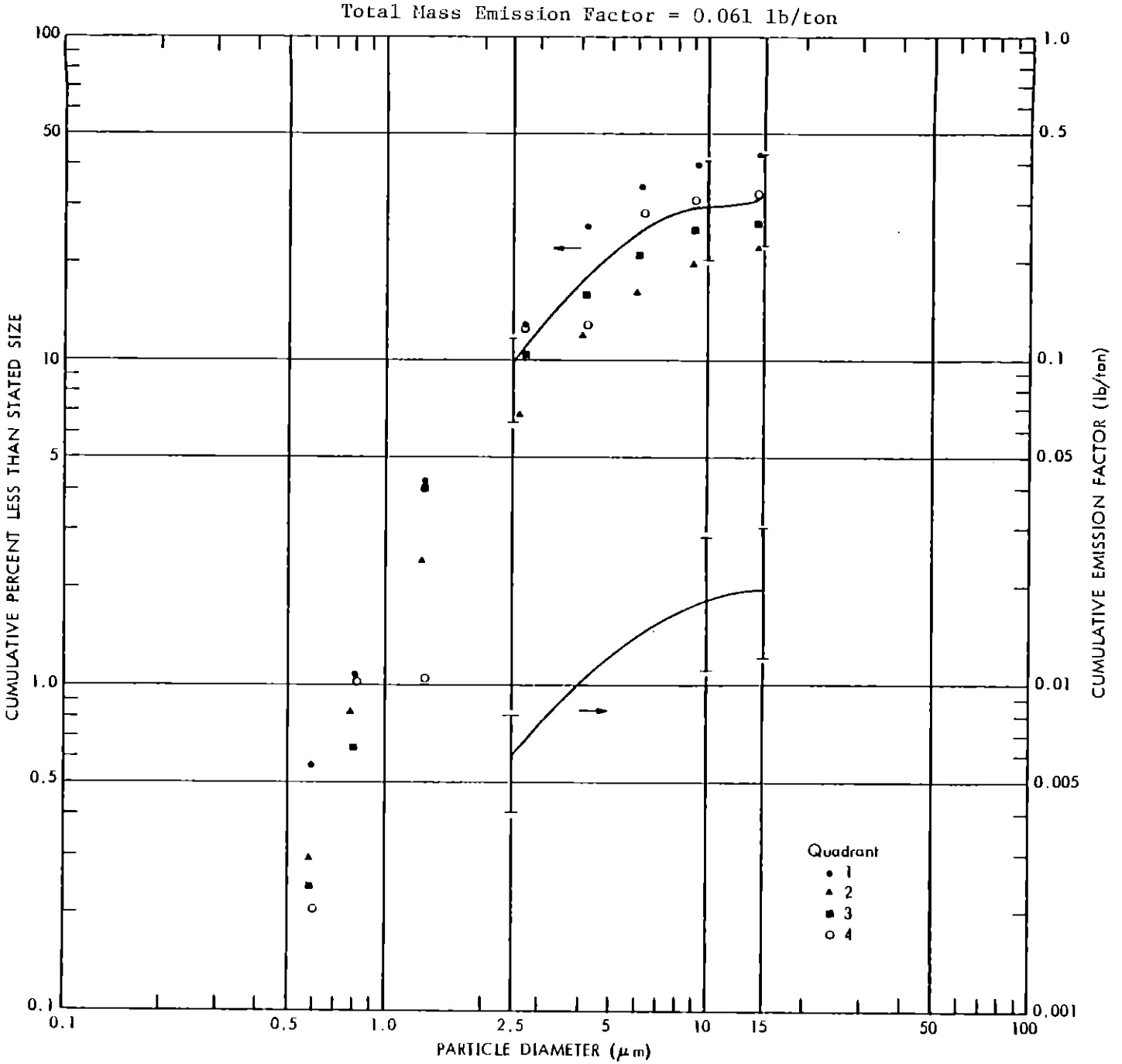


Figure 4.5. Outlet Test One.

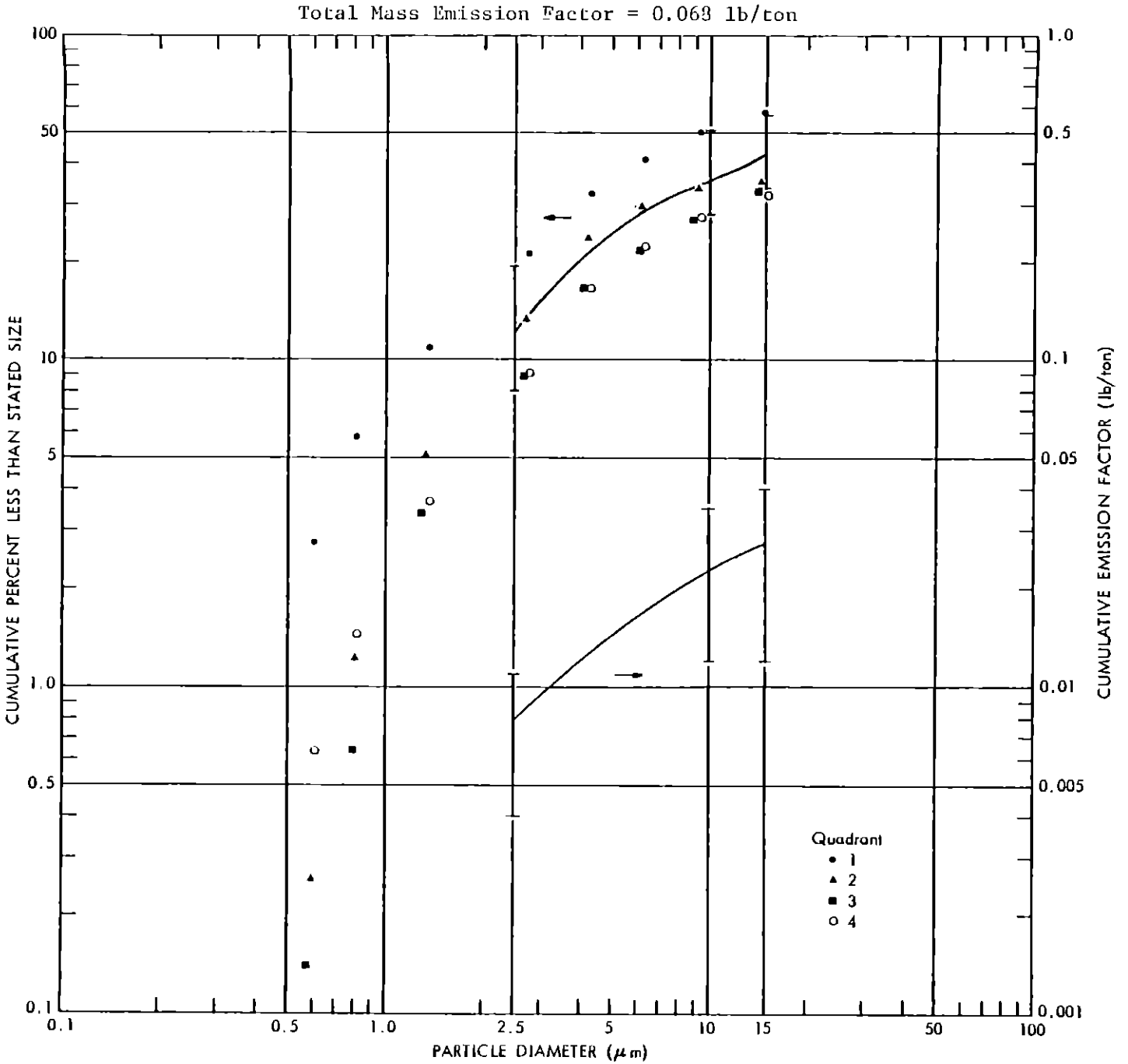


Figure 4.6. Outlet Test Two.

The data for particle size (D_{50}) versus cumulative percent less than stated size data have been plotted for each of the four separate runs. The average of the results from the four runs have also been presented as a line. This line was generated from the results of the spline fit of the selected particle diameters (2.5, 10.0, and 15.0 μm).

The calculated emission factors for 2.5, 10.0, and 15.0 μm are presented both as an average of the four runs and as a range of values for the four runs. The average of the four runs is presented as a line, whereas the range of values is presented as a vertical line at the selected diameters.

Figures 4.7 and 4.8 present the average of the results of all tests conducted at each testing location. There were four particle sizing tests of four runs per test conducted at the inlet location and two particle sizing tests of four runs per test conducted at the outlet location.

The average particle size (D_{50}) versus cumulative percent less than stated size for all tests is presented graphically. The plot was constructed by averaging all test data generated by the spline fit for the selected diameters of 2.5, 10.0, and 15.0 μm. The ranges of the individual test averages are also presented at the selected diameters.

The average emission factor for all tests is also represented by a line. The line was constructed by averaging the average of individual test results at the selected diameters of 2.5, 10.0, and 15.0 μm. The ranges of the individual test averages are presented at the selected diameters.

4.4 COMPARISON OF VIRGIN MATERIAL EMISSIONS WITH RECYCLE MATERIAL EMISSIONS

4.4.1 Inlet

The comparison data presented for the baghouse inlet were derived from one run that was conducted during recycle material feeding and the average of 12 runs during virgin material feeding. The single recycle run was further compared with the virgin runs in that quadrant.

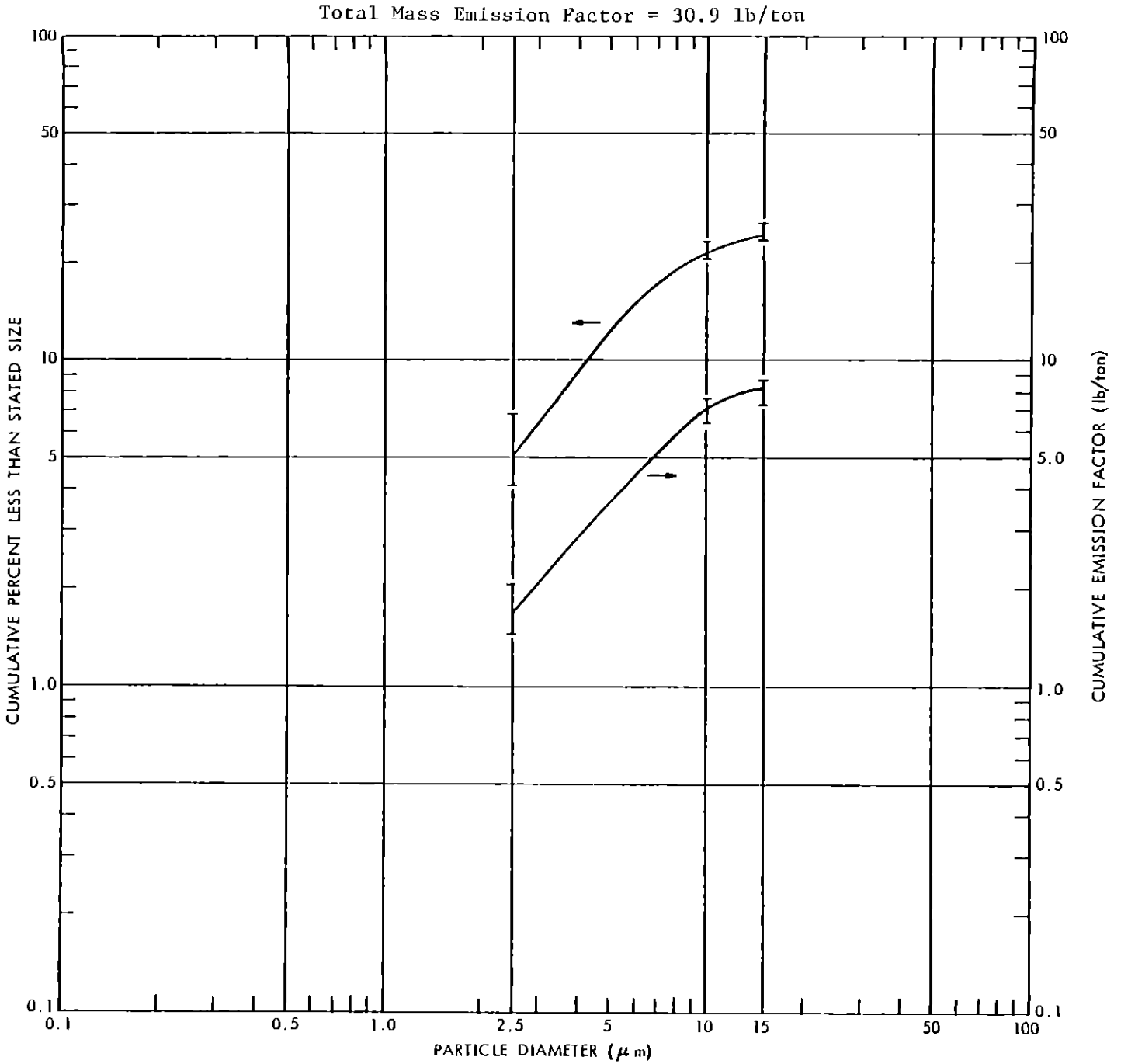


Figure 4.7. Inlet Average Test Results.

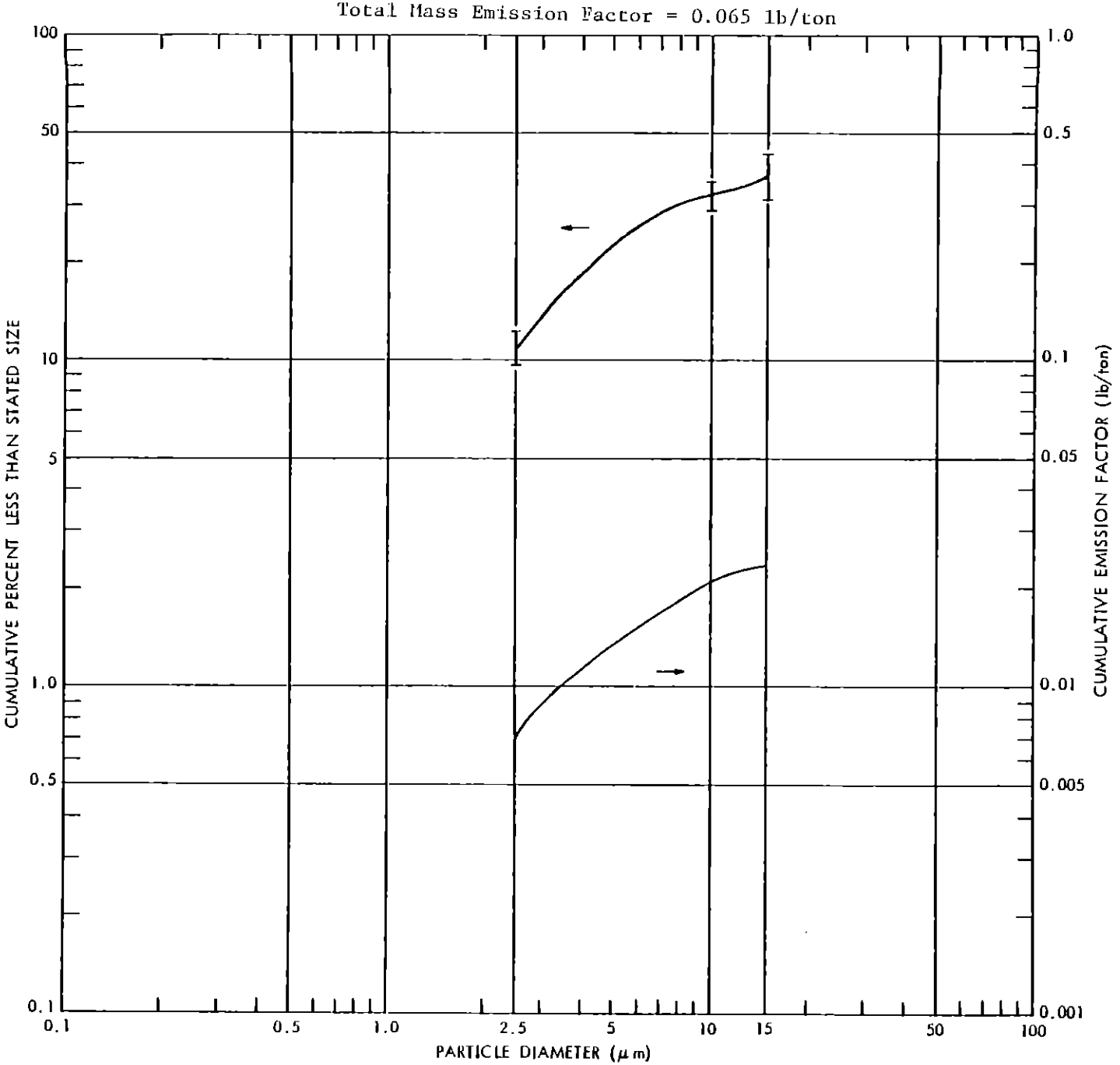


Figure 4.8. Outlet Average Test Results.

Figure 4.9 contains five lines representing comparisons of the effects of virgin and recycle material on emissions at the inlet.

Line one indicates the cumulative percent less than stated size of Run I-2-1c, which was the only particle sizing run conducted during a period when recycle material was being fed.

Line two represents the average cumulative percent less than stated size of Tests 1, 3, and 4, which were conducted while virgin material was being fed. Test 2 was not used because Run I-2-1c was a part of that test.

Line three is the average IP emission factor for quadrant one (Test 1, 3, and 4) during virgin material feeding. Test 2 was not used because Run I-2-1c was a part of that test.

Line four indicates the average IP emission factor for all quadrants during virgin material feed (Tests 1, 3, and 4).

Line five represents the IP emission factors for Run I-2-1c conducted during recycle material feed. The factors were derived from mass Runs I-3 and I-4, and particle sizing Run I-2-1c.

The fact that only one particle sizing run was conducted during a time when recycle material was being introduced into the process should be taken into consideration when interpreting the inlet data (Figure 4.9). The amount of data is inadequate for drawing solid conclusions as to the effect of recycle material on emissions. However, the existing data indicate that there may be fewer emissions when recycle material is being introduced.

4.4.2 Outlet

Figure 4.10 contains four lines comparing the effects of virgin and recycle material on emissions at the outlet of the baghouse.

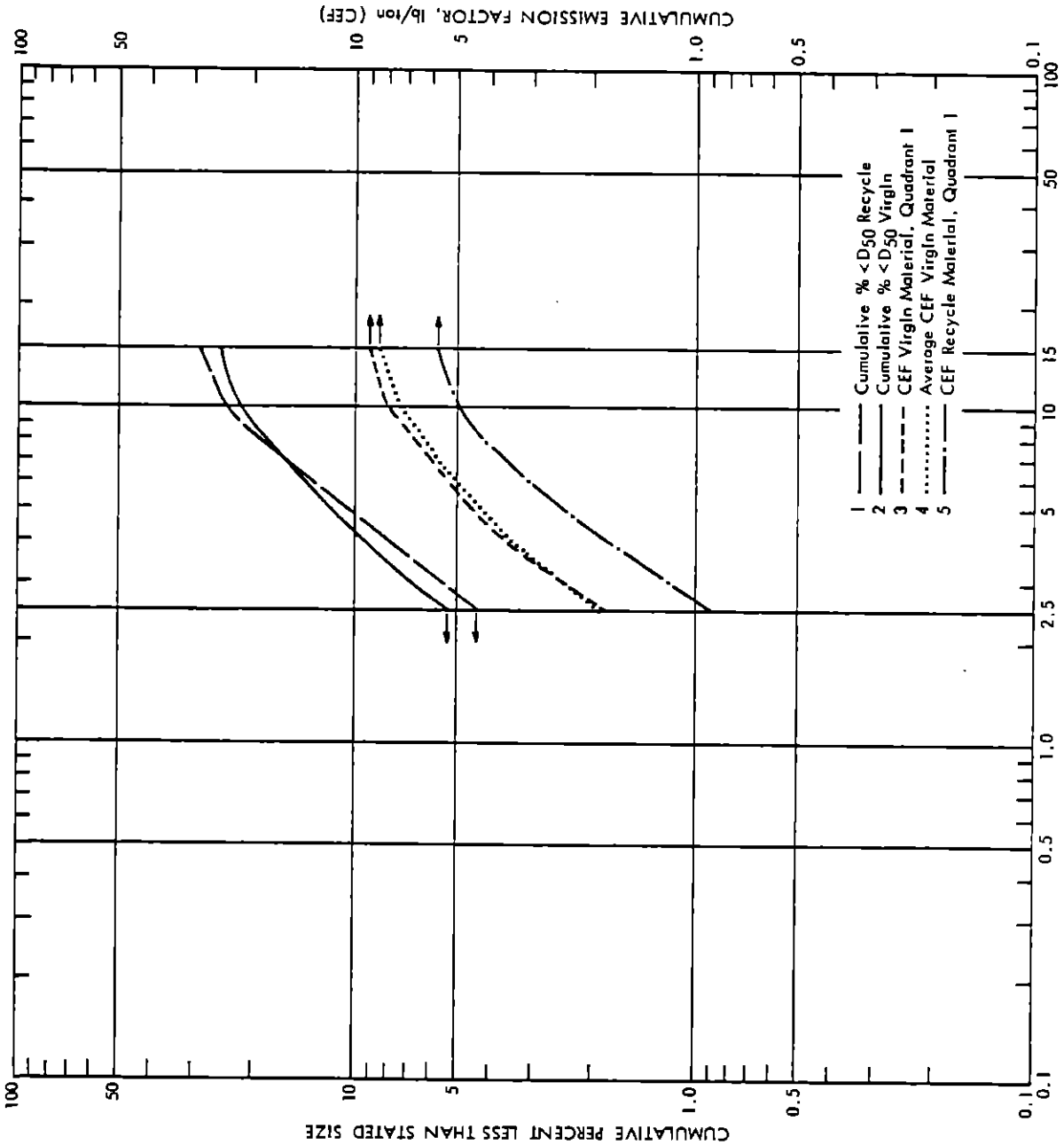


Figure 4.9. Comparison of the effects of virgin and recycle material on emissions at the inlet.

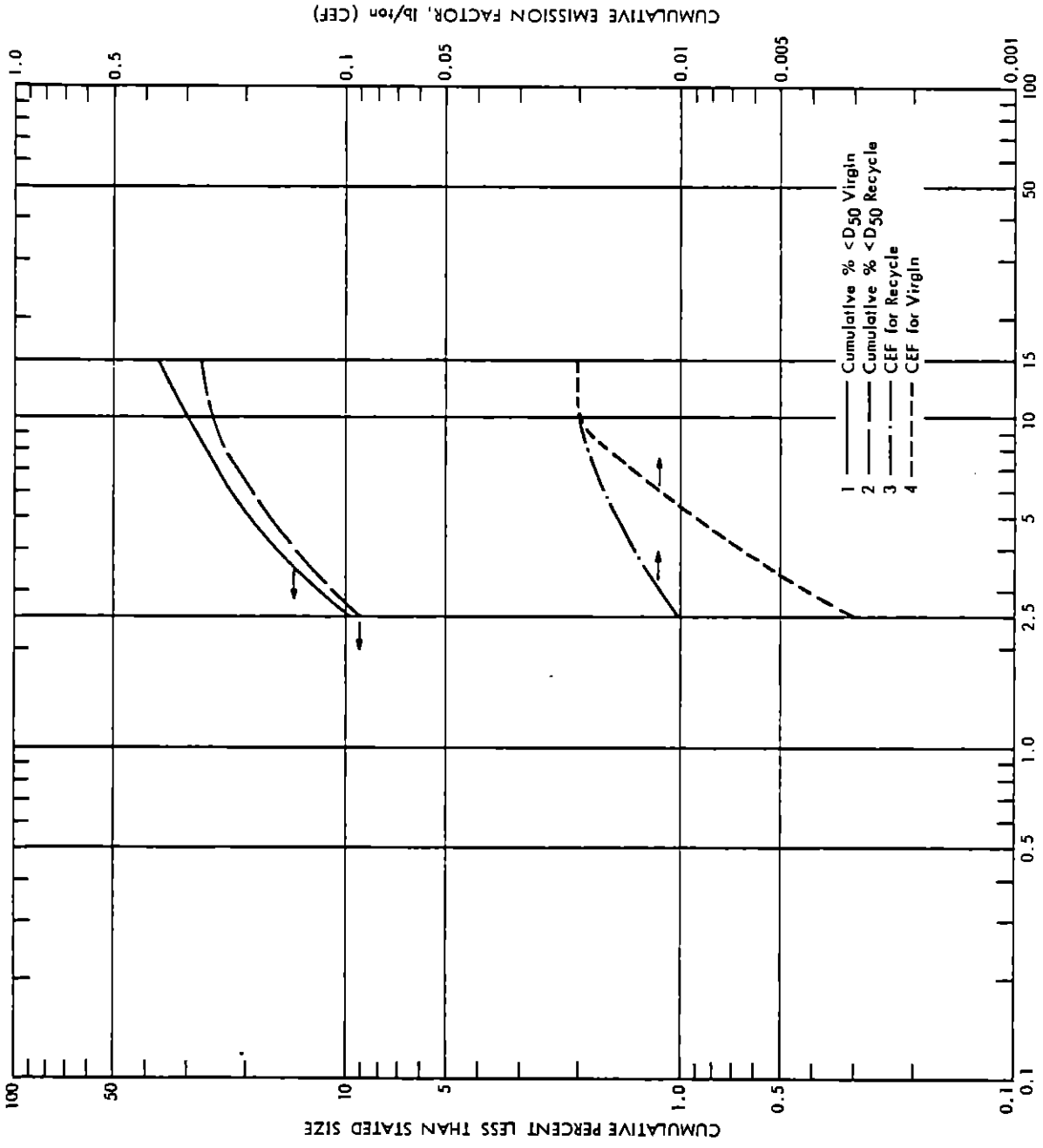


Figure 4.10. Comparison of the effects of virgin and recycle material on emissions at the outlet.

Line one represents the average cumulative percent less than stated size of quadrants 2, 3, and 4 of Test 2. These tests were conducted when virgin material was being fed.

Line two indicates the average cumulative percent less than stated size of quadrants 2, 3, and 4 of Test 1, run during the feeding of recycle material.

Line three shows the average IP emission factor for quadrants 2, 3, and 4 of Test 1 during the feeding of recycle material. The total emission factor used in the calculations was obtained from the average of the total mass runs conducted under recycle feeding conditions.

Line four indicates the average IP emission factor for quadrants 2, 3, and 4 of Test 2 during the feeding of virgin material.

The data collected at the outlet (Figure 4.10) seem to indicate that there may be an increase in the emissions of smaller particles during recycle material feeding, but the shortage of data nullifies solid conclusions.

SECTION 5.0

CONDENSABLES TESTING RESULTS

This section summarizes tests for condensable emissions conducted by Southern Research Institute (SoRI) at Bowen Construction Company. The tests were conducted during the week of October 5 to 10, 1981. The IP condensable testing was performed using the EPA Stack Dilution Sampling System (SDSS) according to IP protocol. Both the sampling equipment and the protocol used are described in this section, followed by a presentation of test data and a brief discussion of the test results.

5.1 DESCRIPTION OF INSTRUMENT AND TEST PROCEDURES

5.1.1 Design of Stack Dilution Sampling System (SDSS)

A diagram of the major components of the SDSS is shown in Figure 5.1. In operation, gases from the process stream are drawn through the IP Dual Cyclone Sampler in which particles with an aerodynamic diameter greater than 15 μm and those in the range 2.5 to 15 μm are removed in two stages. The stack gas containing the fine particle fraction (< 2.5 μm) and condensable vapors passes through the heated probe and flexible sample line and is introduced axially into the bottom of the cylindrical dilution chamber. At this point the stack gases are mixed with cool, dry dilution air to form a simulated plume which flows upward through the dilution chamber. A standard 20 x 25 cm hi-vol filter is installed at the discharge end of the chamber which collects the fine particulate including any new particulate formed by condensation. The diluted stream is exhausted by a 1-hp blower or optionally by a standard hi-vol blower. Stack gas flow rate is measured by an orifice

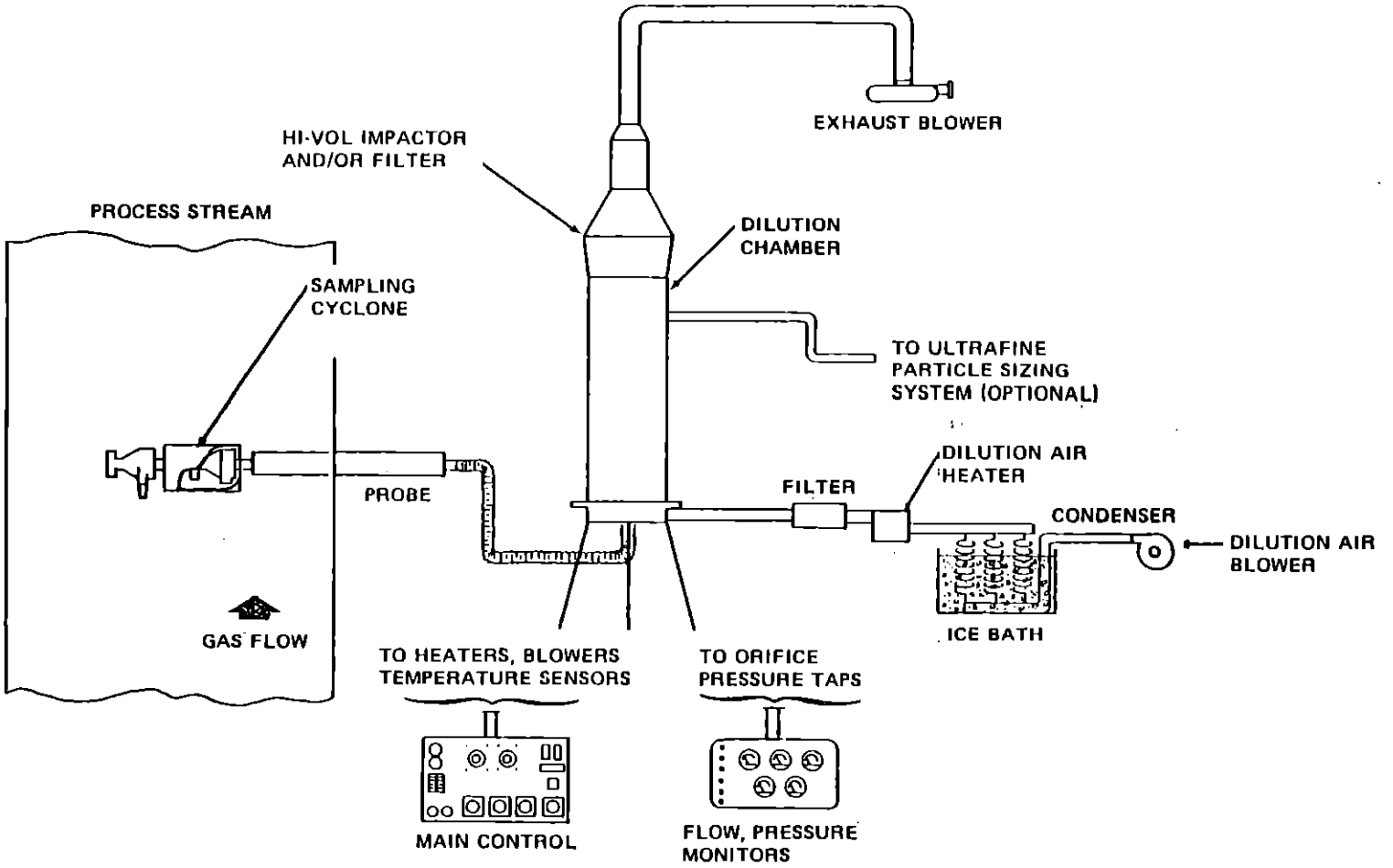


Figure 5.1. Diagram of stack dilution sampling system.

at the base of the dilution chamber. Dilution and exhaust flow are measured by orifices in the inlet and outlet lines, respectively.

Ambient dilution air is drawn through a blower and forced through an ice bath condenser. In this condenser the air is cooled to 5 to 8°C (41 to 46°F), depending on the flow and ambient temperature. More significantly, the dilution air humidity is reduced to about 0.57% by volume, corresponding to saturated air at the ice point. After the condenser, the air is reheated as required to reach 21.1°C (70°F) at the dilution chamber inlet, filtered through a HEPA-type absolute filter, and introduced into the dilution chamber. The dilution air enters a single tangential inlet at the base of the dilution chamber and passes through a set of flow straightening screens into the annular region surrounding the sample gas inlet. The ratio of the areas of the two inlets is such that for sample gas at room temperature the velocities of the sample and dilution streams are equal. Sample gas at stack temperature will be injected at a higher velocity proportional to the thermal expansion of the heated gas stream. This was judged the best simulation of a buoyant plume injected into stagnant air.

5.2 SPECIFICATIONS

The geometric and flow specifications were set by several constraints. The sample flow rate was set by the flow requirements of the IP cyclone sampler. Ideally, to approximate the conditions found in actual plumes, the dilution ratio should be high (approaching 10^3 to 10^4) and the mixing times long (tens of seconds). The actual dilution conditions represent a compromise dictated by limitations on the size of a portable field instrument. Geometric and flow specifications are given in Table 5.1.

Since the effect of varying dilution air temperature and humidity cannot be easily predicted for all typical process streams, standard conditions of 0.57% moisture by volume at 21.1°C (corresponding to about 24% relative humidity at 70°F) were chosen. This relatively dry dilution air should not be subject to water condensation for normal stack samples, yet is more realistic than totally dry air.

TABLE 5.1. SPECIFICATIONS FOR DILUTION SAMPLING SYSTEM

Geometric	
• Active length of dilution chamber:	48 in. (122 cm)
• Diameter of dilution chamber:	8.4 in. (21.3 cm)
• Diameter of sample inlet tube:	1.68 in. (4.27 cm)
• Active dilution volume:	1,54 ft^3 (43,600 cm^3)
Flow	
• Sample flow (determined by inhalable particulate cyclone train):	0.6 ft^3/min (~ 17 liters/min)
• Sample velocity:	0.86 ft/sec (~ 27 cm/sec) at 302°F (150°C)
• Dilution airflow:	15 ft^3/min (425 liters/min)
• Dilution air velocity:	0.66 ft/sec (20 cm/sec)
• Dilution ratio:	~ 25:1 (up to 40:1 possible)
• Residence time:	6.2 sec
Gas conditions	
• Sample gas: T < 250°C; particles > 2.5 μm removed by cyclones	
• Dilution air: T = 21.1°C; relative humidity 24%, filtered ambient air	
Sample collection	
• Particulate collected on glass fiber filter	
• Optional impactor gives cuts at 0.5, 1.0, 2.0, and 4.0 μm	
• Optional extraction of diluted stream for sizing by optical counter, electrical mobility analyzer, condensation nuclei counter, etc.	

5.3 OPERATING PROCEDURE

The in-stack IP dual cyclone train is the intended precutter for the SDSS. This device is fully described in the "Procedures Manual for Inhalable Particulate Sampler Operation" cited earlier. The flow rate of stack gas entering the dilution system is determined by the necessity to obtain a D_{50} of 15 μm (50% collection efficiency at 15 μm) for the initial IP cyclone (SRI-X). This flow rate, which varies with temperature, can be determined from the experimental calibration data for the cyclone train. Nominally, 23 L/min (0.8 ft^3/min) is required for standard air at 150°C (300°F). Over the entire operating temperature range of the sampler, Cyclone SRI-III obtains 50% collection efficiency at 2.5 $\pm$ 0.5 μm for the flow rate determined by cyclone SRI-X. Particulate with aerodynamic diameter smaller than 2.5 μm (the fine particulate fraction) passes into the SDSS and provides the nuclei for the accumulation of condensable material in the dilution/cooling process.

Since the fine fraction of the in-stack particulate is collected along with the condensable emissions, a second dual cyclone IP train with a standard in-stack filter is used to measure simultaneously the in-stack particulate without condensation effects. The setup and operating procedures for both cyclone trains are essentially identical and are described in full in the SoRI procedures manual. In brief, the stack gas temperature, velocity, and composition are measured, and the gas viscosity calculated. Using calibration data for Cyclone X of the dual cyclone IP sampler, a flow rate is selected to obtain a D_{50} of 15 μm for this device. Nozzles are selected for isokinetic sampling, and the sampling trains, after warmup, are inserted at different points in the stack that are demonstrated not to have dramatically different loadings due to stratification of emissions. The protocol for the SDSS calls for sampling at a minimum of two points in a duct rather than a minimum of four as specified for the dual cyclone train. In either case, sampling points are chosen at the centroids of quadrants of the duct. When the minimum two-point measurements are taken, as they were in this test, the dual cyclone train is used to sample at one point while the SDSS is used at the other. In alternate runs, the sampling trains are switched, especially if stratification is noted.

After sampling, the cyclones are unloaded and the cyclone catches are collected according to the procedures manual for the dual cyclone train. The probe, heated hose, and sample gas inlet assembly of the SDSS are washed with a suitable solvent, usually acetone. The rinses are evaporated to dryness and the residue weighed as in EPA Reference Method 5. The probe wash weights are included with the SDSS filter in calculating the fine particulate plus condensable emissions fraction.

5.4 TEST CONDITIONS

The sampling crew from SoRI arrived on-site with the SDSS on Monday, October 5, and began setup. Due to delays in obtaining electrical power, the first run could not be made until Wednesday, October 7. A second run was performed on Thursday, October 8; in order to make up for the lost run on Tuesday, two runs were made on Friday, October 9.

All samples were taken from the outlet of the baghouse with the plant utilizing recycled paving material. A cross-section of the stack is shown in Figure 5.2. Samples were taken at points 2 and 4 of Figure 5.2. These points lie 105 cm (41.0 in.) from the entrance of each port along the diameter of the stack; in other words, at the centroids of the quadrants of the stack cross section which lie away from the baghouse. Stack velocities were measured at quadrant centroid points 1 to 4 and averaged to select sampling nozzle sizes. Gas composition (dry basis) was measured by Orsat and determined to be 15% O_2, 3% CO_2, and 82% N_2, respectively. Stack moisture as determined at the end of all IP runs varied from 14 to 19% by volume. Obviously, this figure will vary with production rate and the moisture content of the aggregate, but it was roughly constant except for Run 4. Other relevant variables are presented in Table 5.2.

To provide a "clean" substrate for any future chemical analysis, Zefluor Teflon membrane filters (GHIA, Inc.), 2-μm pore size, were used for all SDSS runs. For the in-stack backup filters on the conventional IP train, preweighed 47-mm glass fiber filters were employed. No pressure

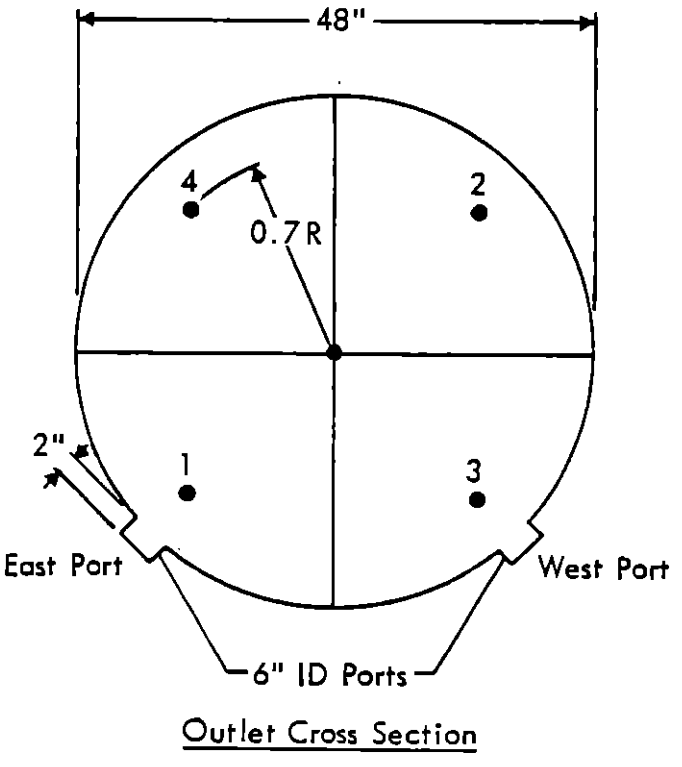


Figure 5.2. Cross section of baghouse outlet stack. Quadrants numbered as for condensables testing.

TABLE 5.2. RUN CONDITIONS FOR INHALABLE PARTICULATE AND STACK DILUTION SAMPLING SYSTEM TESTS AT BOWEN CONSTRUCTION COMPANY

Run No.	Start time	Date	Run time (min)	Stack temperature (°C)	Stack moisture volume (%)	Sample flow rate		Sample volume		Average stack velocity		Estimated total stack flow	
						alm[a]	(acfm)[b]	dscm[c]	(dscf)[d]	m/sec[e]	(ft/sec)[f]	m^3/min[g]	(acfm)[h]
1 IP	12:40 p.m.	10/7/81	155	154	18.3	20.72	(0.732)	1.765	(62.3)	18.4	(60.2)	1,290	45,400
1 SDSS			158			17.97	(0.635)	1.559	(55.0)				
2 IP	1:10 p.m.	10/8/81	146	154	19.9	21.39	(0.755)	1.681	(59.4)	21.5	(70.5)	1,500	53,100
2 SDSS			145			17.61	(0.622)	1.375	(48.6)				
3 IP	8:30 a.m.	10.9.81	180	152	18.7	21.38	(0.755)	2.104	(74.3)	21.7	(71.2)	1,520	53,700
3 SDSS			168			18.66	(0.659)	1.704	(60.2)				
4 IP	2:03 p.m.	10.9.81	106	149	14.0	18.73	(0.661)	1.155	(40.8)	21.4	(70.3)	1,500	53,000
4 SDSS			108			17.70	(0.625)	1.112	(39.3)				

[a] Actual liters per minute.

[b] Actual cubic feet per minute.

[c] Dry standard cubic meters.

[d] Dry standard cubic feet.

[e] Meters per second.

[f] Feet per second.

[g] Actual cubic meters per minute.

[h] Actual cubic feet per minute.

drop problems were noted with either filter. The SDSS filter from Run 1 was dropped after the run and was contaminated thus voiding the results. All other filters, including one blank filter of each type, were kept protected in covered containers.

5.5 RESULTS

The weights of the cyclone and filter catches are presented in Table 5.3. The cyclone catches were weighed after desiccation on a Cahn 27 balance at SoRI. All filter weights represent the results of replicate weighings in the controlled humidity weighing room at MRI. The variation of all replicate weighings was insignificant except for the loaded SDSS Teflon filters. The filters from Runs 2 to 4 showed a steady loss of weight with time, as shown in Figure 5.3. A blank SDSS filter which was taken to the test site and returned for weighing showed no such variation. For reasons discussed below, this loss was interpreted as evaporation of condensed organic compounds collected on the filter of the diluted stream. No similar weight loss was noted on the glass filters used for the in-stack cyclone train. The variations in the weights of these filters were within the 0.2-mg reliability of the Mettler AK160 balance used and were not monotonic with time. Over the 3- or 4-day weighing period, the glass filters were as likely to gain weight as to lose weight between reweighings. Thus, we concluded that the systematic weight loss was real and unique to the filter samples taken with the SDSS. Therefore, the weights reported for these filters in Table 5.3 are not averages, but rather the individual weights as measured 1 day after sampling. The rationale for this decision is discussed below.

Inspection of the data in Table 5.3 reveals that the two parallel cyclone trains collected roughly comparable amounts of dust for the runs in this test. For all pairs of cyclone catches except those in Run 1, the deviation from the mean is less than 30%. In Run 1, the SDSS cyclone X was significantly higher than the standard IP train with a deviation of 48% above the mean, but this is still within reasonable limits for simultaneous

TABLE 5.3. RAW WEIGHTS[a] FROM INHALABLE PARTCULATE STACK DILUTION SAMPLING SYSTEM TESTS AT BOWEN CONSTRUCTION COMPANY

Run No.	15 μm D_{50} cyclone SRI X	2.5 μm D_{50} cyclone SRI III	Uncorrected filter wt.	8% Corrected filter wt.	Wash	Total weight collected	Corrected total wt.
1 IP	10.21	2.77	2.8			15.78	
2 IP	31.53	1.58	2.5			35.61	
2 SDSS	20.51	2.77	14.69	15.87	5.4	43.37	44.55
3 IP	77.31	9.17	3.5			89.98	
3 SDSS	43.63	9.40	25.21	27.23	6.0	84.24	86.26
4 IP	11.20	2.47	2.8			16.47	
4 SDSS	16.09	2.37	24.64	26.61	4.0	47.1	49.07

[a] All weights in milligrams.

[b] Filter from SDSS Run 1 was contaminated.

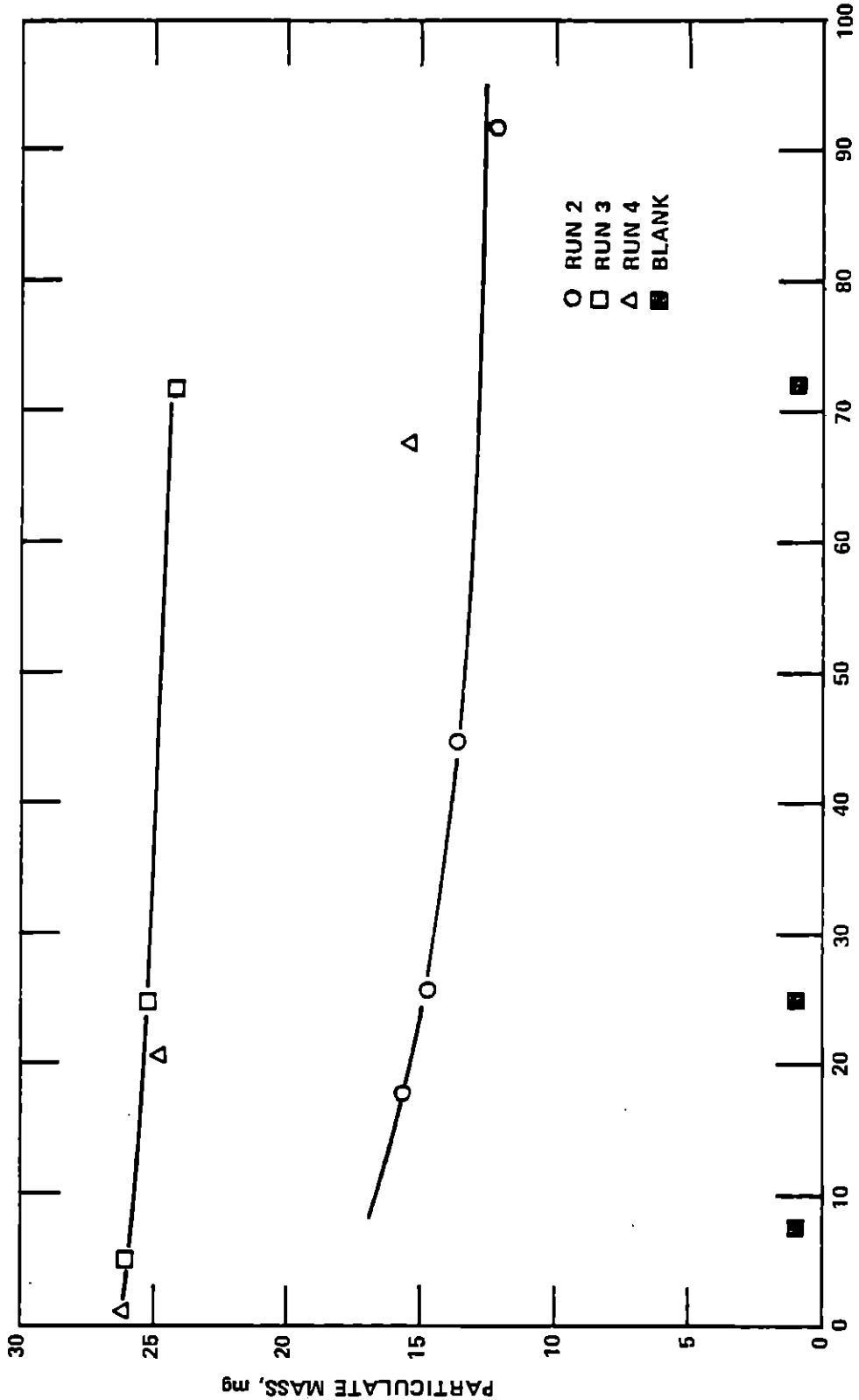


Figure 5.3. Variation of particulate mass on filter from stack dilution sampling system with time after sampling.

single-point samples. In contrast, the SDSS filter catches were factors of 6 to 9 higher than the in-stack filters even before the probe washes were included. This extra mass, coupled with the steady weight loss of the SDSS filters, indicates that the diluted flue gas contained a substantial amount of condensable material with enough volatility to reevaporate at room temperature. The most likely candidate species appear to be lower molecular weight aliphatic hydrocarbons from the asphalt mix, but analyses of the material would be necessary to confirm this speculation.

The evaporation of the SDSS filter samples results in some difficulty in assigning a unique loading to the filters. Obviously, the weights of the filters immediately after sampling would give best lower bounds to the samples, but there were technical problems in obtaining these data. First, it is not always desirable to take an appropriate balance to the field site. Second, it is customary to equilibrate filters for several hours in a constant humidity atmosphere or a desiccator before weighing to avoid artifacts due to adsorbed moisture. In this test, prompt weighings were available only for Run 4. However, for all three runs weighings were in the vicinity of 24 h after sampling. Since this was the earliest period after sampling for which accurate weights could be reported for all runs, and since the filters should have equilibrated with the weighing room atmosphere by the end of the day, these weights were chosen for Table 5.3.

To obtain a more realistic comparison of the weight losses of the three SDSS filters, all sample weights were normalized to the 1-day weights. These normalized data are presented in Figure 5.4. It is noteworthy that the relative weights of the three samples lie along the same curve. Extrapolating this curve, it is estimated that the filter catches immediately after sampling are 5 to 10% higher than the 24-h value and that up to 20% of this mass is lost after 4 days. To calculate mass concentrations at the time of emission, the 1-day weights given in Table 5.3 should be increased by approximately 8%.

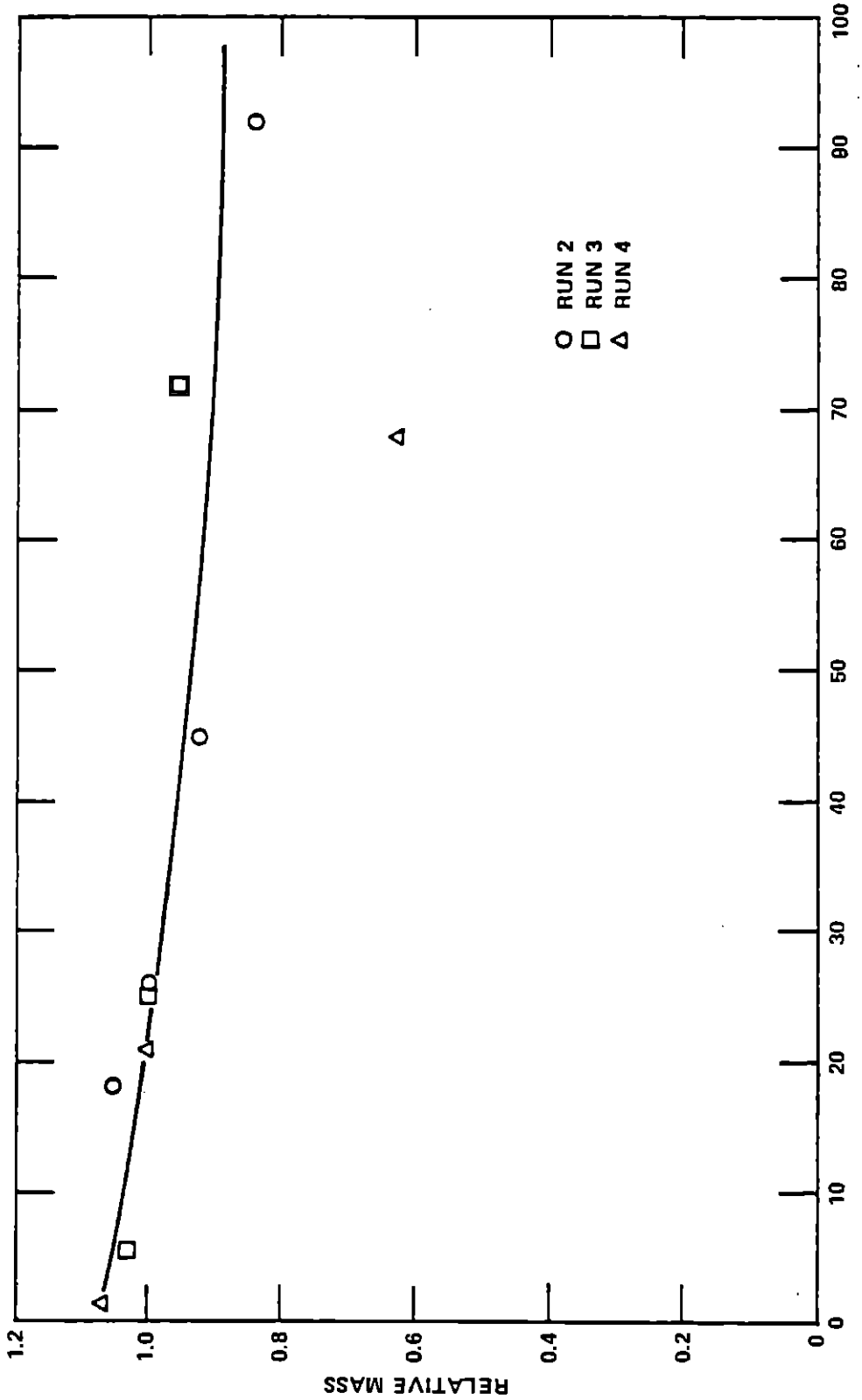


Figure 5.4. Relative variation of particulate mass on SDSS filter with time after sampling. All data for each run are normalized with respect to mass measured 1 day (21 to 26 h) after sampling.

The mass concentrations calculated from the test data are presented in Table 5.4. Concentrations have been calculated from the data in Tables 5.2 and 5.3. The fine particle plus condensable fraction has been corrected by the 8% fraction mentioned earlier, and the concentration of particles formed by condensation alone has been calculated by subtracting the fine particulate concentration measured by the standard IP train from the corresponding fraction from the SDSS data. This value, divided by the total emissions concentration measured in the SDSS, is tabulated as percent condensable. As can be seen, on the average 45% of the particulate measured in the SDSS at this source was formed by condensation.

The total mass concentrations in Table 5.4 are listed in metric and English units and have been converted to emissions factors in pounds per hour using the stack volume flow listed in Table 5.2. This number is based on a four-point velocity average rather than a full pitot traverse.

Table 5.5 presents the IP emission factors that were calculated from the condensables testing data. The IP emission factors were determined by first calculating a total mass emission factor (pounds/ton). The total mass emission factor was calculated by multiplying the ratio of the stack flow rate to the sampler flow rate by the total weight collected in the sampler and converting to pounds per hour. Pounds of emissions per ton of product were calculated by multiplying the average production rate (tons per hour) during the test period by the total emissions (pounds per hour). In order to calculate emission factors for >15, 2.5 to 15, and <2.5 μm (pounds per ton), the ratio of the individual stage weight (Table 5.3) to the total weight collected was multiplied by the total mass emission factor (pounds per ton).

One final word of caution: The condensable emission factors measured in the SDSS must not be equated with volatile organic carbon measurements made with other sampling trains. It has been demonstrated that the SDSS does not retain all the more volatile hydrocarbons that fall in the volatility range corresponding to the TCO fraction Level 1 organic analysis. These more volatile hydrocarbons will not be retained by the SDSS filter,

TABLE 5.4. PARTICULATE MASS CONCENTRATIONS (CONDENSABLES TESTING)

Run No.	Cyclone X > 15 μ mg/dscm[a]	Cyclone X > 15 μ gr/dscf[b]	Cyclone III 2.5-15 μm mg/dscm	Cyclone III 2.5-15 μm gr/dscf	Filter < 2.5 μm mg/dscm	Filter < 2.5 μm gr/dscf	Filter plus wash < 2.5 μm condensables mg/dscm	Filter plus wash < 2.5 μm condensables gr/dscf	% Condensables	Total emissions mg/dscm	Total emissions gr/dscf
1 IP	5.78	0.00252	1.57	0.000686	1.59	0.000694				8.94	0.0039
1 SDSS	19.03	0.00831	2.80	0.00122			-		-	-	-
2 IP	18.76	0.00819	0.94	0.00041	1.49	0.000651				21.19	0.0093
2 SDSS	14.92	0.00652	2.01	0.000878			15.78	0.00689	43.7	32.71	0.0143
3 IP	36.74	0.16	4.36	0.0019	1.66	0.000725				42.76	0.0187
3 SDSS	25.61	0.112	5.52	0.00241			19.79	0.00864	35.6	50.92	0.0223
4 IP	9.70	0.00424	2.14	0.000935	2.42	0.00106				14.26	0.0062
4 SDSS	14.47	0.00632	2.13	0.00093			27.81	0.0121	57.2	44.41	0.0194
Average IP	17.75	0.00775	2.25	0.000983	1.79	0.000782				21.79	0.0095
Average SDSS	18.51	0.00808	3.11	0.00136			21.13	0.00923	45.3	42.68	0.0187

[a] Milligrams per dry standard cubic meter.

[b] Grains per dry standard cubic foot.

TABLE 5.5. EMISSION FACTORS (CONDENSABLES TESTING)

Run No.	Date	Ratio of total stack flow rate to sampler flow rate	Total emissions (lb/hr)	Average production rate[a] (tons/hr)	Total mass emission factor (lb/ton)	% Condensable	IP emission factor > 15 μm (lb/ton)	IP emission factor 2.5-15 μm (lb/ton)	IP emission factor < 2.5 μm (lb/ton)
1 IP	10/7/81	62,200	0.838	339	0.00247	-	0.0016	0.00043	0.00044
1 SDSS		71,500	-		-		-	-	-
2 IP	10/8/81	70,300	2.27	290	0.0078	43.7	0.0069	0.00035	0.00055
2 SDSS		85,400	3.47		0.012		0.0055	0.00075	0.0057
3 IP	10/9/81	71,100	4.70	322	0.0155	35.6	0.013	0.0016	0.00060
3 SDSS		81,500	5.54		0.0172		0.0087	0.0019	0.0066
4 IP	10/9/81	80,200	1.65	252	0.00655	57.2	0.0045	0.00098	0.0011
4 SDSS		84,800	5.10		0.0202		0.0066	0.00098	0.013
Avg IP				Avg IP	-0.0081	-45.5	-0.0065	-0.00004	-0.00067
Avg SDSS				Avg SDSS	-0.016		-0.0069	-0.0012	-0.0084

[a] Average production rate for test period except for Run 2 where the daily average was used to calculate the emission factor.

as they will not remain in the condensed particulate in the actual plume of a stack. To obtain values of total organic emission, a sampling train such as the Source Assessment Sampling System is recommended. The present results are representative of the particulate emissions as they would exist in the near-stack ambient environment after emission, including that fraction of the volatile emissions found in the condensed phase.

SECTION 6

SUMMARY AND CONCLUSIONS

During this program IP testing was conducted of both the controlled and uncontrolled emissions from a 325 ton/h drum-mix asphalt plant equipped with a fabric filter dust collector. From the data collected, emission factors were developed for the particulate matter generated by the plant based on total mass and for particles less than 15, 10, and 2.5 μmA in size. Testing was also conducted under the sampling program of the emissions of condensable organics resulting from the gas-to-particle conversion of a certain portion of the volatile organic compounds created during the manufacture of the hot asphalt paving.

From these tests, it was determined that the average uncontrolled emission factor for the process varied from 27.9 to 37.9 lb/ton of asphalt paving produced for total mass and from 7.4 to 8.9 lb/ton, 6.5 to 7.6 lb/ton, and 1.4 to 2.0 lb/ton for particles less than 15, 10, and 2.5 μm, respectively. These tests also showed the average controlled emission factor to be from 0.06 to 0.07 lb/ton of product for total mass and from 0.02 to 0.03 lb/ton, 0.02 lb/ton, and 0.01 lb/ton for particles less than 15, 10, and 2.5 μm, respectively. Testing of the condensable organic emissions from the plant resulted in a total average emission factor for the process which ranged from 0.005 to 0.010 lb/ton.

It is recognized that the grain loading (gr/dscf) reported for the outlet of this plant do not meet the NSPS requirements. However the testing protocols used varied from the standard EPA Method 5 and Method 17 requirements which may have influenced the results. Tests conducted earlier on the plant using standard Method 5 techniques gave results which easily met the NSPS requirements. Opacity during the MRI test was judged to be less than 5% and was not considered to be a problem.

Sec. 11.1
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Vol. II

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MRI REPORT

CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRUM-MIX ASPHALT PLANT

VOLUME II
APPENDICES

FINAL REPORT

Contract No. 68-02-3158, Technical Directive No. 8
MRI Project No. 4891-L(84)

February 16, 1983

For

Industrial Environmental Research Laboratory
Environmental Protection Agency
Cincinnati, Ohio 45268

Attn: Mark Stutsman

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

CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRUM-MIX ASPHALT PLANT

by

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Mark D. Hansen
John S. Kinsey

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APPENDIX A

SAMPLING TIME LOG

TABLE 1.0. SAMPLING TIME LOG

Date	Time	Inlet		Outlet	
		MASS[a]	HCSS[b]	MASS[c]	MKIII[d]
10/19/81	1032	Begin I-1(A)			
	1050	↓		Begin 0-1-3(A)	Begin 0-1-2
	1051	End I-1(A)		↓	↓
	1220			End 0-1-3(A)	
	1300			Begin 0-1-3(B)	
	1329		Begin I-1-1	↓	
	1345		End I-1-1		
	1400			End 0-1-3(B)	End 0-1-2
	1500	Begin I-1(B)			
	1514	End I-1(B)			
10/20/81	0808				Begin 0-1-3
	0819		Begin I-2-1		↓
	0830		↓	Begin 0-1-2	
	0839		End I-2-1	↓	
	0921	Begin I-3		End 0-1-2	
	0922	↓			
	0944	End I-3			End 0-1-3
	1038				
	1139		Begin I-2-2(A)		
	1200		End I-2-2(A)		
	1218				Begin 0-1-1(A)
	1300			Begin 0-1-4	↓
	1312	Begin I-4		↓	End 0-1-1(A)
	1325	↓			
	1327	End I-4			
	1328			End 0-1-4	
10/21/81	0850			Begin 0-2-2(A)	
	0858		Begin I-1-4	↓	
	0919		End I-1-4		
	0925				Begin 0-1-1(B)
	0940			End 0-2-2(A)	↓
	1002	Begin I-1(C)			
	1023	End I-1(C)			
	1140		Begin I-1-2	Begin 0-2-4(A)	End 0-1-1(B)
	1157		↓	↓	
	1201		End I-1-2	End 0-2-4(A)	
	1240				
10/22/81	0755			Begin 0-1-1	
	0807		Begin I-1-3	↓	Begin 0-1-4
	0831		End I-1-3		↓
	0901	Begin I-2			
	0922	End I-2			
	0950			End 0-1-1	
	1007				End 0-1-4
	1056		Begin I-2-2(B)		
	1100		↓		Begin 0-2-2
	1105			Begin 0-2-3	↓
	1120		End I-2-2(B)	↓	
	1145			End 0-2-3	
	1155	Begin I-5			
	1217	End I-5			
	1300		Begin I-2-4		
	1304		↓		End 0-2-2
	1324		End I-2-4		

(continued)

TABLE 1.0. (concluded)

Date	Time	Inlet		Outlet	
		MASS[a]	HCSS[b]	MASS[c]	MKIII[d]
10/26/81	1000			Begin 0-2-1	Begin 0-2-4
	1002		Begin I-2-3	↓	↓
	1026		End I-2-3		
	1058	Begin I-6(A)			
	1119	End I-6(A)			
	1211		Begin I-3-2		
	1220		↓	End 0-2-1	
	1230				End 0-2-4
	1235		End I-3-2		
	1304	Begin I-7			
	1325	End I-7			
	1405		Begin I-1-1(B)		
	1429		End I-1-1(B)		
	1455		Begin I-3-4		
	1517		End I-3-4		
10/27/81	0805			Begin 0-2-2(B)	Begin 0-2-3
	0814		Begin I-3-1	↓	↓
	0838		End I-3-1		
	0901	Begin I-8		End 0-2-2(B)	
	0905	↓			
	0922	End I-8			
	0958		Begin I-3-3		
	1005		↓		End 0-2-3
	1022		End I-3-3		
	1046	Begin I-6(B)			
	1107	End I-6(B)			
	1418		Begin I-4-2		
	1442		End I-4-2	-	
10/30/81	0749		Begin I-4-1		
	0810		↓	Begin 0-2-4(B)	
	0813		End I-4-1	↓	
	0850		Begin I-4-3		
	0920		End I-4-3	End 0-2-4(B)	
	0935				
	0948		Begin I-4-4		
	1018		End I-4-4		
	1130			Begin 0-2-4(C)	Begin 0-2-1
	1146		Begin I-2-1(B)	↓	↓
	1216		End I-2-1(B)		
	1250			End 0-2-4(C)	
	1330				End 0-2-1
11/6/81	1013		Begin I-2-1(C)		
			↓		
	1037		End I-2-1(C)		
	1138				
	1150				

[a] Method 5.

[b] Andersen high capacity stack sampler.

[c] Method 17.

[d] Andersen Mark III.

APPENDIX B

PROCESS OPERATING DATA

10/7/81
Beaver Const. Co.
SoRI Run #1

13:35

MIX NUMBER 0008
FEEDER # 1 008.0 %
FEEDER # 2 019.8 %
FEEDER # 3 019.0 %
FEEDER # 4 019.7 %
FEEDER # 5 000.0 %
RECYCLE 028.6 %
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE 00.00 %

13:30

PRODUCTION RATE 0372 TPH
ASPHALT 010.3
AGGREGATE 0260
RECYCLE 0102
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0028
FEEDER #2 0072
FEEDER #3 0069
FEEDER #4 0073
FEEDER #5 0000
AGG. TONS 00001152
ASPHALT GAL. 00012229
RECYCLE TONS 00000502
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0064
FEEDER #019.8 % TONS RUN0158
FEEDER #019.0 % TONS RUN0152
FEEDER #019.7 % TONS RUN0158
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0503
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 154600
ACTUAL A/C PERCEN04.56
MIX TEMP. 0320
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0338
FUEL SAGE 0000 GPT
GAS SAE 0000 CF/T
FUEL GALLONS 00000000
GAS U. FT. 00000000

PRODUCTION RATE 0355 TPH
ASPHALT 011.8
AGGREGATE 0238
RECYCLE 0105
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0027
FEEDER #2 0068
FEEDER #3 0066
FEEDER #4 0070
FEEDER #5 0000
AGG TONS 00001181
ASPHALT GAL. 00012550
RECYCLE TONS 00000514
MIXRUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0067
FEEDER #019.8 % TONS RUN0167
FEEDER #019.0 % TONS RUN0160
FEEDER #019.7% TONS RUN0166
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0515
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 154600
ACTUAL A/C PERCEN04.52
MIX TEMP. 0279
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0327
FUEL SAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

13:40

```
PRODUCTION RATE   0353     TPH
ASPHALT           011.7
AGGREGATE         0237
RECYCLE           0104
FILLER            000.0
ADDITIVE        0000     PPH
FEEDER #1         0027
FEEDER #2       0068
FEEDER #3         0066
FEEDER #4       0070
FEEDER #5       0000
AGG. TONS           00001195
ASPHALT GAL.     00012713
RECYCLE TONS       00000521
MIX NUMBER RUNNIN0008
FEEDER #008.0 %      TONS RUN0069
FEEDER #019.8 %    TONS RUN0171
FEEDER #019.0 %      TONS RUN0164
FEEDER #019.7 %    TONS RUN0170
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0522
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS       0000
TARGET TONS RUN   0000
TONS TO GO        0000
TONS TO DATE      154600
ACTUAL A/C PERCEN04.61
MIX TEMP.         0296
ASPHALT TEMP.     0000
BAGHOUSE INLET TEMP0340
FUEL USAGE        0000     GPT
GAS USAE          0000    CF/T
FUEL GALLONS      00000000
GAS CU. FT.       00000000
```

13:45

```
PRODUCTION RATE   0349     TPH
ASPHALT           011.6
AGGREGATE           0235
RECYCLE           0102
FILLER            000.0
ADDITIVE          0000     PPH
FEEDER #1         0027
FEEDER #2           0068
FEEDER #3           0066
FEEDER #4           0070
FEEDER #5           0000
AGG. TONS           00001216
ASPHALT GAL.        00012940
RECYCLE TONS        00000530
MIX NUMBER RUNNIN0008
FEEDER #008.0 %      TONS RUN0072
FEEDER #019.8 %      TONS RUN0177
FEEDER #019.0 %      TONS RUN0170
FEEDER #019.7 %      TONS RUN0176
FEEDER #000.0 %      TONS RUN0000
RECYCLE 028.6 %      TONS RUN0530
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS       0000
TARGET TONS RUN   0000
TONS TO GO        0000
TONS TO DATE      154600
ACTUAL A/C PERCEN04.64
MIX TEMP.         0296
ASPHALT TEMP.     0000
BAGHOUSE INLET TEMP0339
FUEL USAGE        0000     GPT
GAS USAE          0000    CF/T
FUEL GALLONS      00000000
GAS CU. FT.       00000000
```

OCT 7 1991

13:50

```
PRODUCTION RATE  0331    TPH
ASPHALT          010.8
AGGREGATE        0224
RECYCLE          0096
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0025
FEEDER #2        0063
FEEDER #3        0062
FEEDER #4        0065
FEEDER #5        0000
AGG. TONS        00001234
ASPHALT GAL.     00013145
RECYCLE TONS     00000537
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0074
FEEDER #019.8 %    TONS RUN0182
FEEDER #019.0 %    TONS RUN0175
FEEDER #019.7 %    TONS RUN0181
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0538
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     154700
ACTUAL A/C PERCEN04.69
MIX TEMP.        0304
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0346
FUEL USAGE       0000    GPT
GAS USAE         0000   CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

13:55

```
PRODUCTION RATE  0323    TPH
ASPHALT          010.9
AGGREGATE        0224
RECYCLE          0088
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0025
FEEDER #2        0062
FEEDER #3        0060
FEEDER #4        0064
FEEDER #5        0000
AGG. TONS        00001257
ASPHALT GAL.     00013398
RECYCLE TONS     00000547
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0076
FEEDER #019.8 %    TONS RUN0189
FEEDER #019.0 %    TONS RUN0181
FEEDER #019.7 %    TONS RUN0188
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0548
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     154700
ACTUAL A/C PERCEN04.61
MIX TEMP.        0311
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0350
FUEL USAGE       0000    GPT
GAS USAE         0000   CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

14:00

PRODUCTION RATE	0327	TPH
ASPHALT	011.1	
AGGREGATE	0220	
RECYCLE	0096	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0025	
FEEDER #2	0063	
FEEDER #3	0062	
FEEDER #4	0065	
FEEDER #5	0000	
AGG. TONS	00001271	
ASPHALT GAL.	00013556	
RECYCLE TONS	00000553	
MIX NUMBER RUNNIN	0008	
FEEDER #008.0 %	TONS	RUN0078
FEEDER #019.8 %	TONS	RUN0193
FEEDER #019.0 %	TONS	RUN0185
FEEDER #019.7 %	TONS	RUN0192
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 028.6 %	TONS	RUN0554
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	154700	
ACTUAL A/C PERCEN	04.64	
MIX TEMP.	0293	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0330	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

14:05

PRODUCTION RATE	0326	TPH
ASPHALT	010.9	
AGGREGATE	0225	
RECYCLE	0090	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0024	
FEEDER #2	0062	
FEEDER #3	0060	
FEEDER #4	0063	
FEEDER #5	0000	
AGG. TONS	00001291	
ASPHALT GAL.	00013776	
RECYCLE TONS	00000562	
MIX NUMBER RUNNIN	0008	
FEEDER #008.0 %	TONS	RUN0080
FEEDER #019.8 %	TONS	RUN0199
FEEDER #019.0 %	TONS	RUN0191
FEEDER #019.7 %	TONS	RUN0198
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 028.6 %	TONS	RUN0563
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	154700	
ACTUAL A/C PERCEN	04.72	
MIX TEMP.	0302	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0342	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

14:10

```
PRODUCTION RATE  0338    TPH
ASPHALT          011.3
AGGREGATE        0229
RECYCLE          0098
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0026
FEEDER #2        0065
FEEDER #3        0063
FEEDER #4        0066
FEEDER #5        0000
AGG. TONS        00001311
ASPHALT GAL.     00013995
RECYCLE TONS     00000570
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0083
FEEDER #019.8 %    TONS RUN0205
FEEDER #019.0 %    TONS RUN0197
FEEDER #019.7 %    TONS RUN0204
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0571
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     154700
ACTUAL A/C PERCEN04.69
MIX TEMP.        0285
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0330
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

14:15

```
PRODUCTION RATE  0324    TPH
ASPHALT          010.8
AGGREGATE        0221
RECYCLE          0092
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0025
FEEDER #2        0063
FEEDER #3        0061
FEEDER #4        0065
FEEDER #5        0000
AGG. TONS        00001328
ASPHALT GAL.     00014186
RECYCLE TONS     00000578
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0085
FEEDER #019.8 %    TONS RUN0210
FEEDER #019.0 %    TONS RUN0201
FEEDER #019.7 %    TONS RUN0209
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0578
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     154700
ACTUAL A/C PERCEN04.69
MIX TEMP.        0304
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0343
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

14:20

PRODUCTION RATE 0338 TPH
ASPHALT 011.4
AGGREGATE 0230
RECYCLE 0097
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0026
FEEDER #2 0065
FEEDER #3 0063
FEEDER #4 0066
FEEDER #5 0000
AGG. TONS 00001351
ASPHALT GAL. 00014440
RECYCLE TONS 00000588
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0088
FEEDER #019.8 % TONS RUN0217
FEEDER #019.0 % TONS RUN0208
FEEDER #019.7 % TONS RUN0216
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0589
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 154800
ACTUAL A/C PERCEN04.77
MIX TEMP. 0287
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0334
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

14:25

PRODUCTION RATE 0325 TPH
ASPHALT 011.1
AGGREGATE 0223
RECYCLE 0091
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0025
FEEDER #2 0063
FEEDER #3 0061
FEEDER #4 0065
FEEDER #5 0000
AGG. TONS 00001361
ASPHALT GAL. 00014555
RECYCLE TONS 00000592
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0089
FEEDER #019.8 % TONS RUN0220
FEEDER #019.0 % TONS RUN0211
FEEDER #019.7 % TONS RUN0218
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0593
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 154800
ACTUAL A/C PERCEN04.72
MIX TEMP. 0299
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0343
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

14:32

```
PRODUCTION RATE  0325    TPH
ASPHALT          011.2
AGGREGATE        0223
RECYCLE          0091
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0025
FEEDER #2        0062
FEEDER #3        0061
FEEDER #4        0064
FEEDER #5        0000
AGG. TONS        00001382
ASPHALT GAL.     00014789
RECYCLE TONS     00000601
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0091
FEEDER #019.8 %    TONS RUN0226
FEEDER #019.0 %    TONS RUN0217
FEEDER #019.7 %    TONS RUN0225
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0602
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     154900
ACTUAL A/C PERCEN04.64
MIX TEMP.        0292
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0334
FUEL USAGE       0000    GPT
GAS USAE         0000   CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

14:35

```
PRODUCTION RATE  0324    TPH
ASPHALT          011.5
AGGREGATE        0222
RECYCLE          0090
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0025
FEEDER #2        0062
FEEDER #3        0061
FEEDER #4        0064
FEEDER #5        0000
AGG. TONS        00001402
ASPHALT GAL.     00015008
RECYCLE TONS     00000609
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0094
FEEDER #019.8 %    TONS RUN0231
FEEDER #019.0 %    TONS RUN0222
FEEDER #019.7 %    TONS RUN0230
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0610
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     154900
ACTUAL A/C PERCEN04.64
MIX TEMP.        0303
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0347
FUEL USAGE       0000    GPT
GAS USAE         0000   CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

14.40

PRODUCTION RATE	0328	TPH
ASPHALT	011.2	
AGGREGATE	0224	
RECYCLE	0093	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0025	
FEEDER #2	0064	
FEEDER #3	0062	
FEEDER #4	0065	
FEEDER #5	0000	
AGG. TONS	00001422	
ASPHALT GAL.	00015225	
RECYCLE TONS	00000617	
MIX RUNBER RUNNIN	0008	
FEEDER #008.0 %	TONS RUN	0096
FEEDER #019.8 %	TONS RUN	0237
FEEDER #019.0 %	TONS RUN	0228
FEEDER #019.7 %	TONS RUN	0236
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 028.6 %	TONS RUN	0618
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	154900	
ACTUAL A/C PERCEN	04.69	
MIX TEMP.	0296	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0338	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

14.45

PRODUCTION RATE	0335	TPH
ASPHALT	010.8	
AGGREGATE	0226	
RECYCLE	0098	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0025	
FEEDER #2	0064	
FEEDER #3	0062	
FEEDER #4	0065	
FEEDER #5	0000	
AGG. TONS	00001441	
ASPHALT GAL.	00015439	
RECYCLE TONS	00000625	
MIX RUNBER RUNNIN	0008	
FEEDER #008.0 %	TONS RUN	0098
FEEDER #019.8 %	TONS RUN	0243
FEEDER #019.0 %	TONS RUN	0233
FEEDER #019.7 %	TONS RUN	0242
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 028.6 %	TONS RUN	0626
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	155000	
ACTUAL A/C PERCEN	04.61	
MIX TEMP.	0299	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0340	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

OCT 7 1981

14:50

```
PRODUCTION RATE  0327    TPH
ASPHALT          011.2
AGGREGATE        0225
RECYCLE          0091
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0025
FEEDER #2        0063
FEEDER #3        0062
FEEDER #4        0065
FEEDER #5        0000
AGG. TONS        00001460
ASPHALT GAL.     00015656
RECYCLE TONS     00000634
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0100
FEEDER #019.8 %    TONS RUN0248
FEEDER #019.0 %    TONS RUN0238
FEEDER #019.7 %    TONS RUN0247
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0634
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     155000
ACTUAL A/C PERCEN04.72
MIX TEMP.        0299
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0333
FUEL USAGE       0000    GPT
GAS USAE         0000   CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

14:55

```
PRODUCTION RATE  0334    TPH
ASPHALT          011.4
AGGREGATE        0225
RECYCLE          0098
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0026
FEEDER #2        0064
FEEDER #3        0063
FEEDER #4        0066
FEEDER #5        0000
AGG. TONS        00001480
ASPHALT GAL.     00015876
RECYCLE TONS     00000642
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0103
FEEDER #019.8 %    TONS RUN0254
FEEDER #019.0 %    TONS RUN0244
FEEDER #019.7 %    TONS RUN0253
FEEDER #000.0 %    TONS RUN0000
RECYCLE 028.6 %    TONS RUN0643
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     155000
ACTUAL A/C PERCEN04.61
MIX TEMP.        0298
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0342
FUEL USAGE       0000    GPT
GAS USAE         0000   CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

OCT 7 1991

15:00

```
PRODUCTION RATE  0333     TPH
ASPHALT          010.9
AGGREGATE        0223
RECYCLE          0099
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0025
FEEDER #2        0064
FEEDER #3        0063
FEEDER #4        0066
FEEDER #5        0000
AGG. TONS        00001497
ASPHALT GAL.     00016057
RECYCLE TONS     00000649
MIX RUNBER RUNNIN0008
FEEDER #008.0 %     TONS RUN0105
FEEDER #019.8 %     TONS RUN0259
FEEDER #019.0 %     TONS RUN0249
FEEDER #019.7 %     TONS RUN0258
FEEDER #000.0 %     TONS RUN0000
RECYCLE 028.6 %     TONS RUN0650
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     155000
ACTUAL A/C PERCEN04.61
MIX TEMP.        0305
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0342
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

15:05

```
PRODUCTION RATE  0320     TPH
ASPHALT          010.9
AGGREGATE        0222
RECYCLE          0087
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0024
FEEDER #2        0062
FEEDER #3        0060
FEEDER #4        0063
FEEDER #5        0000
AGG. TONS        00001518
ASPHALT GAL.     00016296
RECYCLE TONS     00000658
MIX RUNBER RUNNIN0008
FEEDER #008.0 %     TONS RUN0107
FEEDER #019.8 %     TONS RUN0265
FEEDER #019.0 %     TONS RUN0255
FEEDER #019.7 %     TONS RUN0264
FEEDER #000.0 %     TONS RUN0000
RECYCLE 028.6 %     TONS RUN0659
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     155000
ACTUAL A/C PERCEN04.61
MIX TEMP.        0304
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0347
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

15:15

PRODUCTION RATE	0341	TPH
ASPHALT	010.8	
AGGREGATE	0222	
RECYCLE	0109	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0026	
FEEDER #2	0066	
FEEDER #3	0064	
FEEDER #4	0068	
FEEDER #5	0000	
AGG. TONS	00001555	
ASPHALT GAL.	00016699	
RECYCLE TONS	00000674	
MIX RUNBER RUNNIN	0008	
FEEDER #008.0 %	TONS RUN	0112
FEEDER #019.8 %	TONS RUN	0276
FEEDER #019.0 %	TONS RUN	0265
FEEDER #019.7 %	TONS RUN	0275
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 028.6 %	TONS RUN	0675
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	155100	
ACTUAL A/C PERCEN	04.64	
MIX TEMP.	0299	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0339	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

15:10

PRODUCTION RATE	0336	TPH
ASPHALT	011.0	
AGGREGATE	0224	
RECYCLE	0101	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0026	
FEEDER #2	0065	
FEEDER #3	0063	
FEEDER #4	0067	
FEEDER #5	0000	
AGG. TONS	00001535	
ASPHALT GAL.	00016480	
RECYCLE TONS	00000666	
MIX RUNBER RUNNIN	0008	
FEEDER #008.0 %	TONS RUN	0109
FEEDER #019.8 %	TONS RUN	0270
FEEDER #019.0 %	TONS RUN	0259
FEEDER #019.7 %	TONS RUN	0269
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 028.6 %	TONS RUN	0666
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	155100	
ACTUAL A/C PERCEN	04.56	
MIX TEMP.	0301	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0345	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

15:20

PRODUCTION RATE	0333	TPH
ASPHALT	011.2	
AGGREGATE	0224	
RECYCLE	0098	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0025	
FEEDER #2	0064	
FEEDER #3	0062	
FEEDER #4	0065	
FEEDER #5	0000	
AGG. TONS	00001575	
ASPHALT GAL.	00016926	
RECYCLE TONS	00000684	
MIX RUNBER RUNNIN	0008	
FEEDER #008.0 %	TONS RUN	0114
FEEDER #019.8 %	TONS RUN	0282
FEEDER #019.0 %	TONS RUN	0271
FEEDER #019.7 %	TONS RUN	0281
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 028.6 %	TONS RUN	0684
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	155100	
ACTUAL A/C PERCEN	04.61	
MIX TEMP.	0296	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0343	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

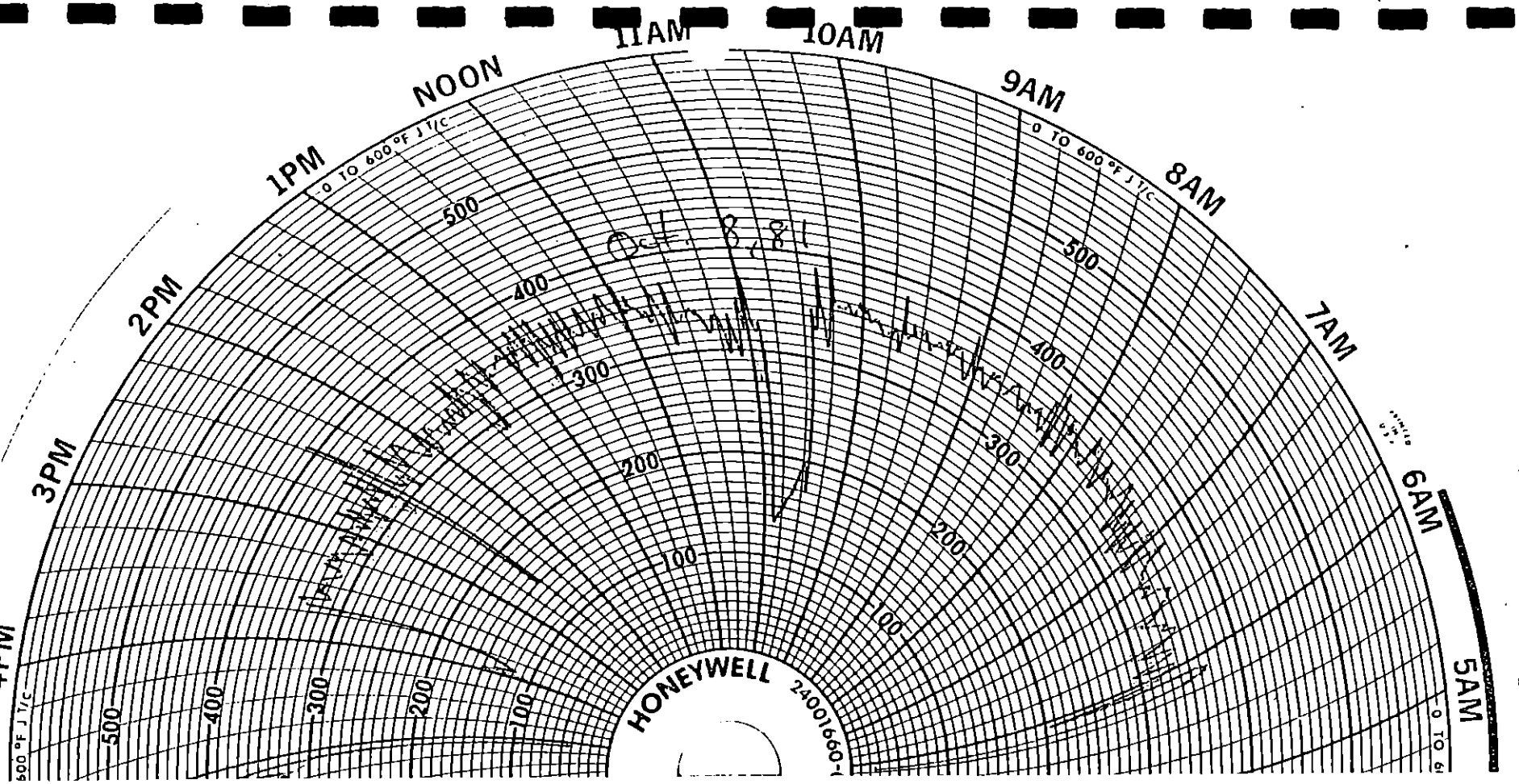
15:25

PRODUCTION RATE	0332	TPH
ASPHALT	010.8	
AGGREGATE	0224	
RECYCLE	0097	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0025	
FEEDER #2	0064	
FEEDER #3	0062	
FEEDER #4	0065	
FEEDER #5	0000	
AGG. TONS	00001595	
ASPHALT GAL.	00017148	
RECYCLE TONS	00000692	
MIX RUNBER RUNNIN	0008	
FEEDER #008.0 %	TONS RUN	0116
FEEDER #019.8 %	TONS RUN	0288
FEEDER #019.0 %	TONS RUN	0276
FEEDER #019.7 %	TONS RUN	0286
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 028.6 %	TONS RUN	0693
ASPHALT 004.9 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	155100	
ACTUAL A/C PERCEN	04.72	
MIX TEMP.	0298	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0347	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

ASPHALT DEVIATION OCT 7 1981

15:30

PRODUCTION RATE 0012 TPH
ASPHALT 011.6
AGGREGATE 0000
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0000
FEEDER #2 0002
FEEDER #3 0002
FEEDER #4 0002
FEEDER #5 0000
AGG. TONS 00001606
ASPHALT GAL. 00017299
RECYCLE TONS 00000695
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0118
FEEDER #019.8 % TONS RUN0291
FEEDER #019.0 % TONS RUN0279
FEEDER #019.7 % TONS RUN0289
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0696
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 155100
ACTUAL A/C PERCEN04.72
MIX TEMP. 0314
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0363
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000



Ran 2 mix formulas

No. 3 - 2210 tons - avg. t.p.h. - 290

No. 4 - 300 tons - avg. t.p.h. - 230

MIX NUMBER	0005
FEEDER # 1	010.0 %
FEEDER # 2	017.5 %
FEEDER # 3	019.0 %
FEEDER # 4	017.7 %
FEEDER # 5	000.7 %
RECYCLE	028.5 %
ASPHALT	004.9 %
FILLER	002.0 %
ADDITIVE	00.00 %

MIX NUMBER	0004
FEEDER # 1	037.0 %
FEEDER # 2	020.5 %
FEEDER # 3	032.0 %
FEEDER # 4	005.0 %
FEEDER # 5	000.0 %
RECYCLE	000.0 %
ASPHALT	005.2 %
FILLER	000.0 %
ADDITIVE	00.00 %

David Harris
Jackson City Dept.
of Public
Works
881-4510

10/9/85

8:50

'RODUCTION RATE 0320 TPH
SPHALT 010.9
GGREGATE 0215
ECYCLE 0094
ILLER 000.0
DDITIVE 0000 PPH
EEDER #1 0025
EEDER #2 0063
EEDER #3 0060
EEDER #4 0064
EEDER #5 0000
GG. TONS 00000616
SPHALT GAL. 00005507
ECYCLE TONS 00000256
IX NUMBER RUNNIN0008
EEDER #008.0 % TONS RUN0025
EEDER #019.8 % TONS RUN0062
EEDER #019.0 % TONS RUN0060
EEDER #019.7 % TONS RUN0062
EEDER #000.0 % TONS RUN0000
ECYCLE 028.6 % TONS RUN0255
SPHALT 004.9 %
ILLER 000.0 %
DDITIVE00.00 %
ARGET TONS 0000
ARGET TONS RUN 0000
ONS TO GO 0000
ONS TO DATE 158600
CTUAL A/C PERCEN04.83
IX TEMP. 0304
SPHALT TEMP. 0000
AGHOUSE INLET TEMP0359
UEL USAGE 0000 GPT
AS USAE 0000 CF/T
UEL GALLONS 00000000
AS CU. FT. 00000000

9:15

RODUCTION RATE 0329 TPH
SPHALT 010.8
GGREGATE 0218
ECYCLE 0091
ILLER 000.0
DDITIVE 0000 PPH
EEDER #1 0024
EEDER #2 0062
EEDER #3 0060
EEDER #4 0063
EEDER #5 0000
GG. TONS 00000729
SPHALT GAL. 00006785
ECYCLE TONS 00000303
IX NUMBER RUNNIN0008
EEDER #008.0 % TONS RUN0038
EEDER #019.8 % TONS RUN0095
EEDER #019.0 % TONS RUN0091
EEDER #019.7 % TONS RUN0095
EEDER #000.0 % TONS RUN0000
ECYCLE 028.6 % TONS RUN0303
SPHALT 004.9 %
ILLER 000.0 %
DDITIVE00.00 %
ARGET TONS 0000
ARGET TONS RUN 0000
ONS TO GO 0000
ONS TO DATE 158700
CTUAL A/C PERCEN04.75
IX TEMP. 0307
SPHALT TEMP. 0000
AGHOUSE INLET TEMP0356
UEL USAGE 0000 GPT
AS USAE 0000 CF/T
UEL GALLONS 00000000
AS CU. FT. 00000000

HANGE MIX ON

OCT 9 1981

ODUCTION RATE 0330 TPH
PHALT 008.8
REGATE 0225
CYCLE 0096
LLER 000.0
DITIVE 0000 PPH
EDER #1 0025
EDER #2 0049
EDER #3 0000
EDER #4 0066
EDER #5 0082
G. TONS 00000912
PHALT GAL. 00008354
CYCLE TONS 00000378
X RUNBER RUNNIN0009
EDER #008.0 % TONS RUN0045
EDER #015.0 % TONS RUN0085
EDER #000.0 % TONS RUN0000
EDER #020.0 % TONS RUN0113
EDER #025.0 % TONS RUN0141
CYCLE 028.0 % TONS RUN0378
PHALT 004.0 %
LLER 000.0 %
DITIVE00.00 %
RGET TONS 0000
RGET TONS RUN 0000
NS TO GO 0000
NS TO DATE 159000
UAL A/C PERCEN03.58
X TEMP. 0287
PHALT TEMP. 0000
GHOUSE INLET TEMP0363
EL USAGE 0000 GPT
S USAE 0000 CF/T
EL GALLONS 00000000
S CU. FT. 00000000

10:00

10:30

PRODUCTION RATE 0325 TPH
ASPHALT 008.8
AGGREGATE 0223
RECYCLE 0093
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0025
FEEDER #2 0063
FEEDER #3 0061
FEEDER #4 0064
FEEDER #5 0000
AGG. TONS 00001037
ASPHALT GAL. 00009431
RECYCLE TONS 00000431
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0041
FEEDER #019.8 % TONS RUN0101
FEEDER #019.0 % TONS RUN0097
FEEDER #019.7 % TONS RUN0100
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0430
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 159100
ACTUAL A/C PERCEN03.94
MIX TEMP. 0308
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0361
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

. GALLONS
GAS CU. FT. 00000000

11:00

PRODUCTION RATE 0313 TPH
ASPHALT 009.1
AGGREGATE 0215
RECYCLE 0089
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0024
FEEDER #2 0062
FEEDER #3 0058
FEEDER #4 0062
FEEDER #5 0000
AGG. TONS 00001147
ASPHALT GAL. 00010447
RECYCLE TONS 00000478
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0050
FEEDER #019.8 % TONS RUN0124
FEEDER #019.0 % TONS RUN0119
FEEDER #019.7 % TONS RUN0124
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0478
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 159300
ACTUAL A/C PERCEN03.97
MIX TEMP. 0305
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0359
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

11:30

PRODUCTION RATE 0321 TPH
ASPHALT 009.8
AGGREGATE 0216
RECYCLE 0096
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0024
FEEDER #2 0064
FEEDER 1 0060
FEEDB #4 0063
FEEDER #5 0000
AGG. TONS 00001255
ASPHAU GAL. 00011472
RECYCE TONS 00000526
MIX RUNBER RUNNIN0009
FEEDER #008.0 % TONS RUN0063
FEEDER #019.8 % TONS RUN0156
FEEDE #019.0 % TONS RUN0150
FEEDER #019.7 % TONS RUN0155
FEEDR #000.0 % TONS RUN0000
RECYLE 028.6 % TONS RUN0576
ASPHL T 004.9 %
FILLE 000.0 %
ADDITIVE00.00 %
TARGT TONS 0000
TARGT TONS RUN 0000
TONTO GO 0000
TONTO DATE 159400
ACTAL A/C PERCEN03.93
MIXTEMP. 0307
ASHALT TEMP. 0000
BAGHOSE INLET TEMP0362
FUEL BAGE 0000 GPT
GASUSAE 0000 CF/T
FUE GALLONS 00000000
GAS U. FT. 00000000

12:00

PRODUCTION RATE 0315 TPH
ASPHALT 009.1
AGGREGATE 0213
RECYCLE 0093
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0024
FEEDER #2 0047
FEEDER #3 0000
FEEDER #4 0063
FEEDER #5 0078
AGG.TONS 00001359
ASPHALT GAL. 00012450
RECYCLE TONS 00000571
MIX NUMBER RUNNIN0009
FEEDER #003.0 % TONS RUN0075
FEEDER #015.0 % TONS RUN0187
FEEDER #000.0 % TONS RUN0179
FEEDER #020.0 % TONS RUN0186
FEEDER #025.0 % TONS RUN0000
RECYCLE 028.0 % TONS RUN0571
ASPHALT 004.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARET TONS 0000
TARET TONS RUN 0000
TONS TO GO 0000
CONSTU DATE 159600
ACTUAL A/C PERCEN04.10
MIX TEMP. 0301
ASPHALT TEMP. 0001
BAGHOUSE INLET TEMP0356
FUEL USAGE 0000 GPT
GAS USAGE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

12:30

PRODUCTION RATE 0308 TPH
ASPHALT 008.0
AGGREGATE 0215
RECYCLE 0085
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0026
FEEDER #2 0046
FEEDER #3 0000
FEEDER #4 0061
FEEDER #5 0076
AG. TONS 00001483
ASPHALT GAL. 00013[illegible]
RECYCLE TONS 00000622
MIX NUMBER RUNNIN0009
FEEDER #003.0 % TONS RUN0061
FEEDER #015.0 % TONS RUN0114
FEEDER #000.0 % TONS RUN0000
FEEDER #020.0 % TONS RUN0152
FEEDER #025.0 % TONS RUN0190
RECYCLE 028 % TONS RUN0622
ASPHALT 004 %
FILLER 00.0 %
ADDITIVE00.00 %
TARET TONS 0000
TARET TONS RUN 000
TONS TO GO 000
CONS TO DATE 1591
ACTUAL A/C PERCEN06.78
MIX TEMP. 0306
ASPHALT TEMP. 000[illegible]
BAGHOUSE INLET TEMP0359
FUEL USAGE 0000 GPT
GAS USAGE 0000 CF/T
FUEL GALLONS 00000000
GAS CU.FT. 00000000

OCT 9 1981

CHANGE MIX ON

13:00

PRODUCTION RATE 0332 TPH
ASPHALT 010.4
AGGREGATE 0226
RECYCLE 0096
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0026
FEEDER #2 0066
FEEDER #3 0063
FEEDER #4 0066
FEEDER #5 0000
AGG. TONS 00001583
ASPHALT GAL. 00014462
RECYCLE TONS 00000663
MIX NUMBER RUNNIN0008
FEEDER #008.0 % TONS RUN0055
FEEDER #019.8 % TONS RUN0135
FEEDER #019.0 % TONS RUN0130
FEEDER #019.7 % TONS RUN0135
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0663
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 160000
ACTUAL A/C PERCEN03.77
MIX TEMP. 0296
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0354
FUEL USAGE 0000 GPI
GAS USAE 0000 CF/I
FUEL GALLONS 00000000
GAS CU. FT. 00000000

13:30

DUCTION RATE 0285 TPH
PHALT 011.4
GREGATE 0175
CYCLE 0099
LLER 000.0
ITIVE 0000 PPH
EDER #1 0025
EDER #2 0064
EDER #3 0060
EDER #4 0064
EDER #5 0000
G. TONS 000016/1
PHALT GAL. 00015537
CYCLE TONS 00000701
X RUNBER RUNNIN0008
EDER #008.0 % TONS RUN0055
EDER #019.8 % TONS RUN0161
EDER #019.0 % TONS RUN0154
EDER #019.7 % TONS RUN0160
EDER #000.0 % TONS RUN0000
CYCLE 028.6 % TONS RUN0701
PHALT 004.9 %
LLER 000.0 %
DITIVE00.00 %
RGET TONS 0000
RGET TONS RUN 0000
NS TO GO 0000
NS TO DATE 160100
TUAL A/C PERCEN05.05
X TEMP. 0298
PHALT TEMP. 0000
GHOUSE INLET TEMP0340
EL USAGE 0000 GPI
S USAE 0000 CF/I
EL GALLONS 00000000
S CU. FT. 00000000

OCT 9 1981

DEVIATION

14:00

TION RATE 0258 TPH
009.2
ATE 0173
E 0076
000.0
VE 0000 PPH
#1 0019
#2 0051
#3 0049
#4 0051
#5 0000
ONS 00001817
F GAL. 00017328
LE TONS 00000765
UNBER RUNNIN0008
ER #008.0 % TONS RUN0082
ER #019.8 % TONS RUN0204
ER #019.0 % TONS RUN0196
ER #019.7 % TONS RUN0203
R #000.0 % TONS RUN0000
LE 028.6 % TONS RUN0765
ALT 004.9 %
ER 000.0 %
IVE00.00 %
ET TONS 0000
ET TONS RUN 0000
O GO 0000
O DATE 160300
AL A/C PERCEN05.40
TEMP. 0297
ALT TEMP. 0000
HOUSE INLET TEMP0363
L USAGE 0000 GPT
USAE 0000 CF/T
L GALLONS 00000000
CU. FT. 00000000

14:30

PRODUCTION RATE 0254 TPH
ASPHALT 008.8
AGGREGATE 0172
RECYCLE 0073
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0019
FEEDER #2 0050
FEEDER #3 0048
FEEDER #4 0050
FEEDER #5 0000
AGG. TONS 00001898
ASPHALT GAL. 00018302
RECYCLE TONS 00000802
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0092
FEEDER #019.8 % TONS RUN0228
FEEDER #019.0 % TONS RUN0219
FEEDER #019.7 % TONS RUN0227
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0601
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 160400
ACTUAL A/C PERCEN05.01
MIX TEMP. 0291
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0351
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

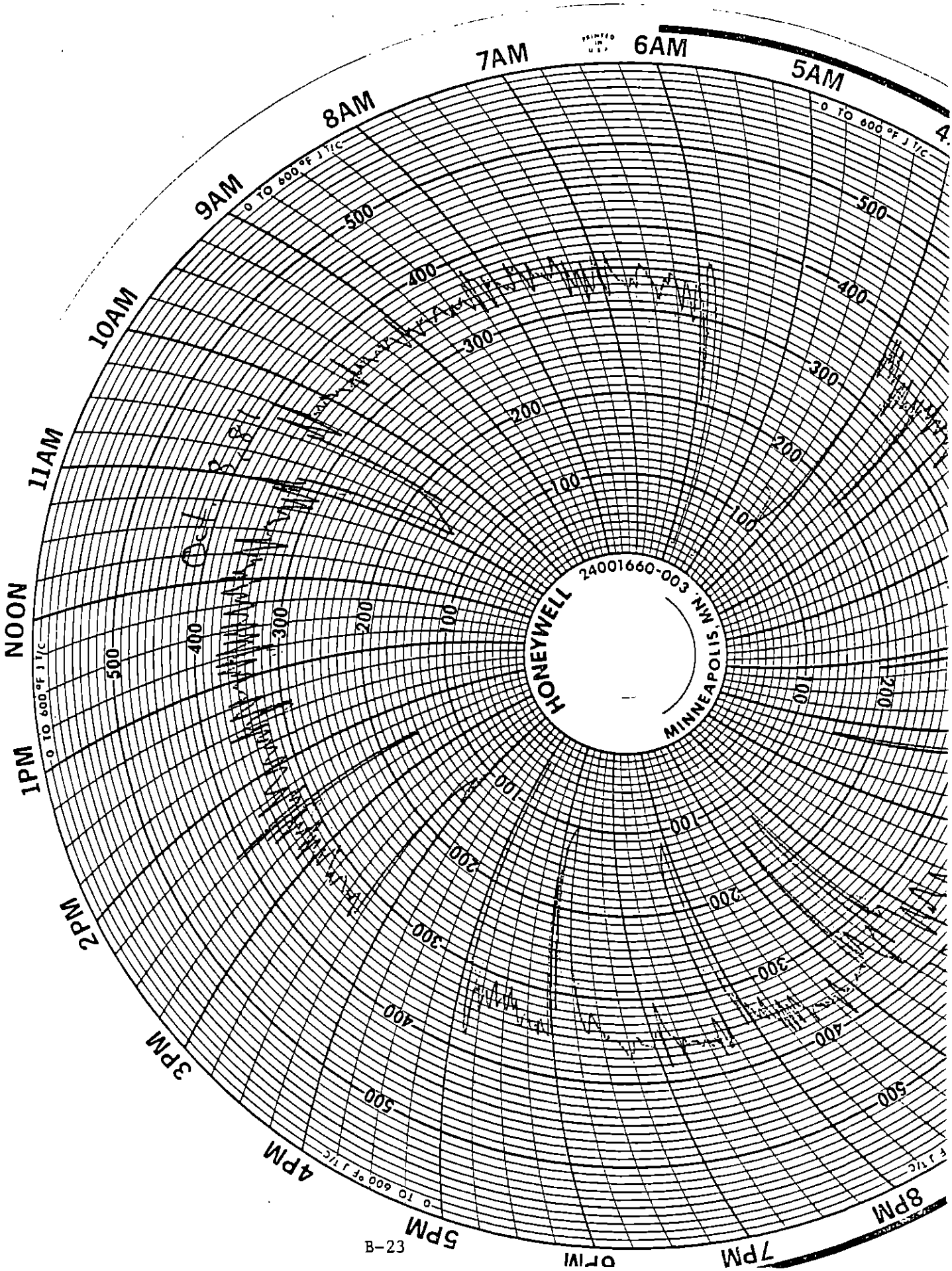
15:00

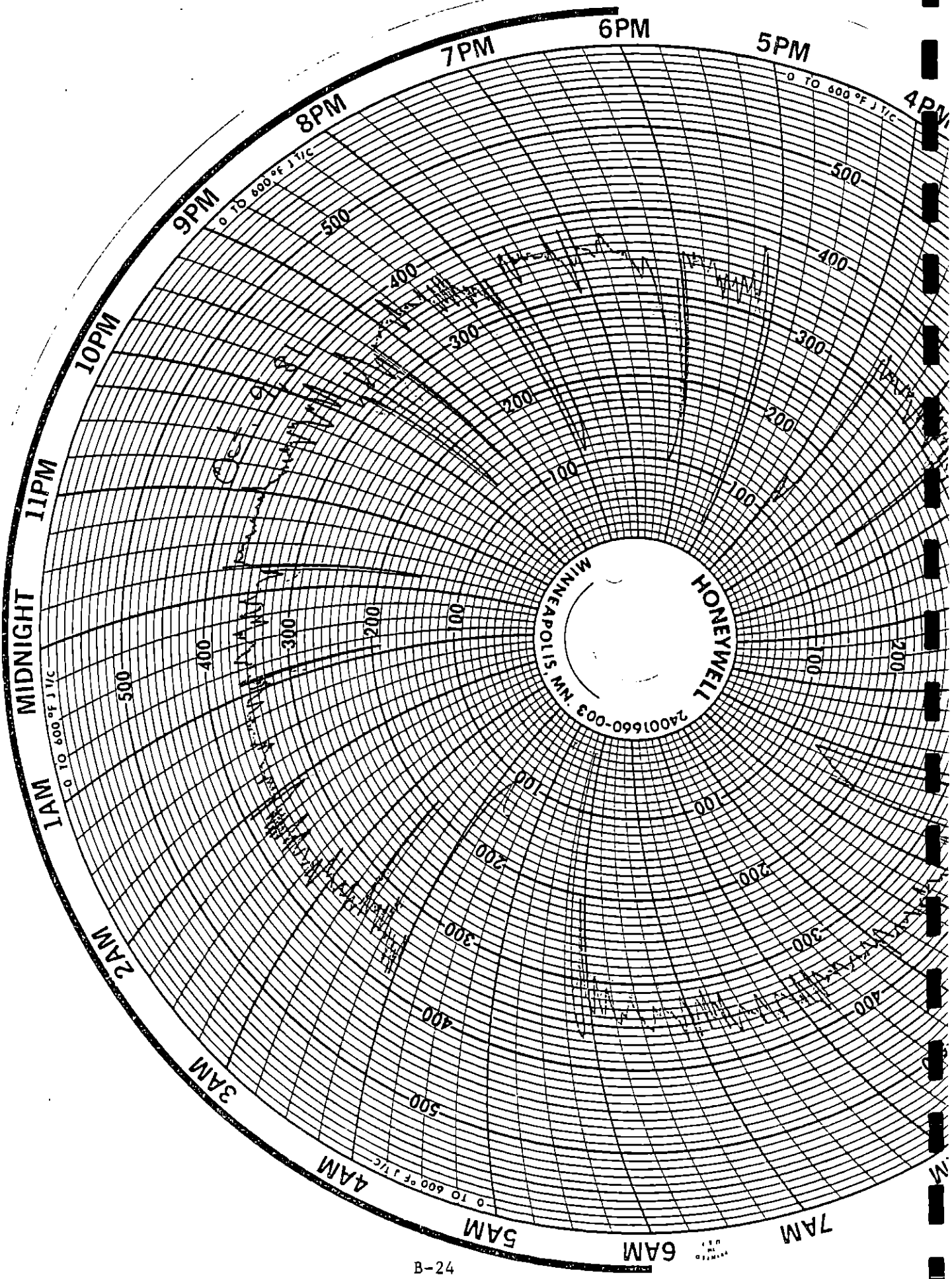
```
PRODUCTION RATE  0244     TPH
ASPHALT          009.8
AGGREGATE        0169
RECYCLE          0066
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0018
FEEDER #2        0048
FEEDER #3        0046
FEEDER #4        0048
FEEDER #5        0000
AGG. TONS        00001973
ASPHALT GAL.     00019213
RECYCLE TONS     00000834
MIX NUMBER RUNNIN0008
FEEDER #008.0 %     TONS RUN0101
FEEDER #019.8 %     TONS RUN0250
FEEDER #019.0 %     TONS RUN0240
FEEDER #019.7 %     TONS RUN0249
FEEDER #000.0 %     TONS RUN0000
RECYCLE 026.6 %     TONS RUN0834
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     160500
ACTUAL A/C PERCEN04.97
MIX TEMP.        0311
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0356
FUEL USAGE       0000     GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

CHANGE MIX ON

15:30

```
PRODUCTION RATE  5360     TPH
ASPHALT          007.2
AGGREGATE        7854
RECYCLE          0075
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0019
FEEDER #2        0050
FEEDER #3        0048
FEEDER #4        0050
FEEDER #5        0000
AGG. TONS        00002054
ASPHALT GAL.     00020041
RECYCLE TONS     00000868
MIX NUMBER RUNNIN0008
FEEDER #008.0 %     TONS RUN0072
FEEDER #019.8 %     TONS RUN0155
FEEDER #019.0 %     TONS RUN0000
FEEDER #019.7 %     TONS RUN0180
FEEDER #000.0 %     TONS RUN0225
RECYCLE 026.6 %     TONS RUN0868
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     160600
ACTUAL A/C PERCEN03.77
MIX TEMP.        0288
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0337
FUEL USAGE       0000     GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```


6AM
7AM
8AM
9AM
10AM
11AM
NOON
1PM
2PM
3PM
4PM
5PM
6PM
7PM
8PM
0 TO 600 °F
100
200
300
400
500
HONEYWELL
MINNEAPOLIS, MN
24001660-003


6PM
5PM
4PM
7PM
8PM
9PM
10PM
11PM
MIDNIGHT
1AM
2AM
3AM
4AM
5AM
6AM
7AM
0 TO 600 °F J T/C
100
200
300
400
500
HONEYWELL
MINNEAPOLIS, MN.
24001660-003

-NGE MIX COMPLETE

10:30

'IODUCTION RATE 0271 TPH
'PHALT 013.7
REGATE 0257
'CLE 0000
'LER 000.0
DITIVE 0000 PPM
'DER #1 0071
'DER #2 0055
DER #3 0076
'DER #4 0055
'DER #5 0000
. 'ONS 00000790
'HALT GAL. 00008492
YCLE TONS 00000243
'S NUMBER RUNNIN0005
'DER #027.0 % TONS RUN0153
DER #029.2 % 'ONS RUN0099
DER #026.0 % TONS RUN0138
DER #017.8 % TONS RUN0097
DER #000.0 % TONS RUN0000
'LLE 000.0 % TONS RUN0244
'HALT 005.0 %
.ER 009.0 %
E1V600.00 %
'GE' TONS 0000
'GE' TONS RUN 0000
'S TO DO 0000
'NS TO DATE 152800
.UAL A/C PERCEN05.05
.X TEMP. 0301
'PHALT TEMP. 0000
'HOUSE INLET TEMP0335
'. 'AGE 0000 GPT
. 'USAE 0000 CF/
. L GALLONS 00000000
'' F. T. 00000000

CHANGE MIX COMPLETE 10/16/91

11:05

PRODUCTION RATE 0271 TPH
ASPHALT 002.9
AGGREGATE 0181
RECYCLE 0091
FILLER 000.9
ADDITIVE 0000 PPM
FEEDER #1 0021
FEEDER #2 0053
FEEDER #3 0051
FEEDER #4 0053
FEEDER #5 0000
AGG. TONS 00000956
ASPHALT GAL. 00010154
RECYCLE TONS 0000026A
MIX NUMBER RUNNIN0008
FEEDER #002.0 % TONS RUN0026
FEEDER #017.8 % TONS RUN0065
FEEDER #017.9 % TONS RUN0061
FEEDER #017.7 % TONS RUN0065
FEEDER #000.0 % TONS RUN0000
RECYCLE 035.6 % TONS RUN0254
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO DO 0000
TONS TO DATE 162700
ACTUAL A/C PERCEN04.99
MIX TEMP. 0301
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0329
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/
FUEL GALLONS 00000000
GAS CU. FT. 00000000

10/19/31

OCT 19 1981

8:00

PRODUCTION RATE 0274 TPH
ASPHALT 0982
AGGREGATE 0192
RECYCLE 0093
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0021
FEEDER #2 0053
FEEDER #3 0051
FEEDER #4 0054
FEEDER #5 0000
AGG. TONS 00000359
ASPHALT GAL. 00006612
RECYCLE TONS 00000072
MIX RUNNER RUNNIN0008
FEEDER #004.0 % TONS RUN0020
FEEDER #019.4 % TONS RUN0050
FEEDER #019.0 % TONS RUN0048
FEEDER #019.7 % TONS RUN0049
FEEDER #000.0 % TONS RUN0000
RECYCLE 026.6 % TONS RUN0071
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 164100
ACTUAL A/C PERCEN04.41
MIX TEMP. 0293
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0359
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

[illegible]	0000	[illegible]
[illegible]NE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

8:30

PRODUCTION RATE	0009	TPH
ASPHALT	009.0	
AGGREGATE	0000	
RECYCLE	0000	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0000	
FEEDER #2	0001	
FEEDER #3	0001	
FEEDER #4	0001	
FEEDER #5	0000	
AGG. TONS	00000487	
ASPHALT GAL.	00004961	
RECYCLE TONS	00000129	
MIX RUNNER RUNNIN0008		
FEEDER #008.0 %	TONS	RUN0035
FEEDER #019.8 %	TONS	RUN0088
FEEDER #019.0 %	TONS	RUN0084
FEEDER #019.7 %	TONS	RUN0087
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 028.6 %	TONS	RUN0129
ASPHALT 004.4 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	164300	
ACTUAL A/C PERCEN04.49		
MIX TEMP.	0261	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP0267		
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

PLANT SYSTEM START

9:00

PRODUCTION RATE	0285	TPH
ASPHALT	008./	
AGGREGATE	0136	
RECYCLE	0080	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0022	
FEEDER #2	0055	
FEEDER #3	0052	
FEEDER #4	0055	
FEEDER #5	0000	
AGG. TONS	00000539	
ASPHALT GAL.	00005512	
RECYCLE TONS	00000154	
MIX RUNNER RUNNIN0009		
FEEDER #008.0 %	TONS	RUN0042
FEEDER #019.8 %	TONS	RUN0105
FEEDER #019.0 %	TONS	RUN0099
FEEDER #019./ %	TONS	RUN0103
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 028.6 %	TONS	RUN0154
ASPHALT 004.4 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	164300	
ACTUAL A/C PERCEN04.37		
MIX TEMP.	0298	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP0358		
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

OCT 19 1981

9:30

```
PRODUCTION RATE  0284     TPH
ASPHALT          008.6
AGGREGATE        0185
RECYCLE          0090
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0021
FEEDER #2        0054
FEEDER #3        0051
FEEDER #4        0054
FEEDER #5        0000
AGG. TONS        00000637
ASPHALT GAL.     00006534
RECYCLE TONS     00000200
MIX RUNBER RUNNIN0008
FEEDER #008.0 %    TONS RUN0085
FEEDER #019.8 %    TONS RUN0210
FEEDER #019.0 %    TONS RUN0202
FEEDER #019.7 %    TONS RUN0209
FEEDER #000.0 %    TONS RUN0000
RECYCLE 023.6 %    TONS RUN0200
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     164400
ACTUAL A/C PERCEN04.49
MIX TEMP.        0297
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0363
FUEL USAGE       0000     GPI
GAS USAE         0000     CF/I
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

10:00

```
PRODUCTION RATE  9261     TPH
ASPHALT          008.4
AGGREGATE        0174
RECYCLE          0079
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0020
FEEDER #2        0051
FEEDER #3        0049
FEEDER #4        0051
FEEDER #5        0000
AGG. TONS        00000736
ASPHALT GAL.     00007602
RECYCLE TONS     00000248
MIX RUNBER RUNNIN0009
FEEDER #005.0 %    TONS RUN0097
FEEDER #019.8 %    TONS RUN0240
FEEDER #019.0 %    TONS RUN0230
FEEDER #019.7 %    TONS RUN0239
FEEDER #000.0 %    TONS RUN0000
RECYCLE 026.6 %    TONS RUN0248
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      9909
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     164600
ACTUAL A/C PERCEN04.53
MIX TEMP.        0296
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0362
FUEL USAGE       0000     GPI
GAS USAE         0000     CF/I
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

10:30

PRODUCTION RATE 0254 TPH
ASPHALT 008.6
AGGREGATE 0177
RECYCLE 0068
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0019
FEEDER #2 0048
FEEDER #3 0046
FEEDER #4 0049
FEEDER #5 0000
AGG. TONS 00000854
ASPHALT GAL. 00008881
RECYCLE TONS 00000302
MIX NUMBER RUNNIN0008
FEEDER #008.0 % TONS RUN0111
FEEDER #019.8 % TONS RUN0275
FEEDER #019.0 % TONS RUN0264
FEEDER #019.7 % TONS RUN0274
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0301
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 164800
ACTUAL A/C PERCEN04.57
MIX TEMP. 0260
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0379
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

11:00

PRODUCTION RATE 0265 TPH
ASPHALT 008.6
AGGREGATE 0177
RECYCLE 0079
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0020
FEEDER #2 0052
FEEDER #3 0049
FEEDER #4 0052
FEEDER #5 0000
AGG. TONS 00000932
ASPHALT GAL. 00009727
RECYCLE TONS 00000336
MIX NUMBER RUNNIN0008
FEEDER #008.0 % TONS RUN0120
FEEDER #019.8 % TONS RUN0298
FEEDER #019.0 % TONS RUN0286
FEEDER #019.7 % TONS RUN0297
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0336
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 164900
ACTUAL A/C PERCEN04.53
MIX TEMP. 0318
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0364
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

CHANGE MIX COMPLETE

12:00

PRODUCTION RATE 0222 TPH
ASPHALT 009.4
AGGREGATE 0213
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0058
FEEDER #2 0044
FEEDER #3 0061
FEEDER #4 0044
FEEDER #5 0000
AGG. TONS 00001157
ASPHALT GAL. 00011871
RECYCLE TONS 00000347
MIX NUMBER RUNNIN0005
FEEDER #027.0 % TONS RUN0154
FEEDER #020.2 % TONS RUN0198
FEEDER #028.0 % TONS RUN0224
FEEDER #019.8 % TONS RUN0195
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0347
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 165200
ACTUAL A/C PERCEN04.20
MIX TEMP. 0318
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0348
FUEL USAGE 0000 GPI
GAS USAE 0000 CF/I
FUEL GALLONS 00000000
GAS CU. FT. 00000000

[illegible] COMPLETE

12:30

PRODUCTION RATE 0261 TPH
ASPHALT 008.3
AGGREGATE 0174
RECYCLE 0079
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0029
FEEDER #2 0051
FEEDER #3 0049
FEEDER #4 0052
FEEDER #5 0000
AGG. TONS 00001236
ASPHALT GAL. 00012686
RECYCLE TONS 00000363
MIX NUMBER RUNNIN0009
FEEDER #008.0 % TONS RUN0068
FEEDER #019.8 % TONS RUN0168
FEEDER #019.0 % TONS RUN0161
FEEDER #019.7 % TONS RUN0167
FEEDER #000.0 % TONS RUN0000
RECYCLE 029.6 % TONS RUN0363
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 165200
ACTUAL A/C PERCEN04.65
MIX TEMP. 0305
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0342
FUEL USAGE 0000 GPI
GAS USAE 0000 CF/I
FUEL GALLONS 00000000
GAS CU. FT. 00000000

13:00

```
PRODUCTION RATE  0268     TPH
ASPHALT          008.2
AGGREGATE        0178
RECYCLE          0082
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0021
FEEDER #2        0052
FEEDER #3        0050
FEEDER #4        0053
FEEDER #5        0000
AGG. TONS        00001354
ASPHALT GAL.     00013970
RECYCLE TONS     00000416
MIX RUNBER RUNNIN0008
FEEDER #008.0 %     TONS RUN0082
FEEDER #019.8 %     TONS RUN0203
FEEDER #019.0 %     TONS RUN0195
FEEDER #019.7 %     TONS RUN0202
FEEDER #000.0 %     TONS RUN0000
RECYCLE 028.6 %     TONS RUN0416
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     165500
ACTUAL A/C PERCEN04.53
MIX TEMP.        0307
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0352
FUEL USAGE       0000     GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

13 30

```
PRODUCTION RATE  0180     TPH
ASPHALT          008.8
AGGREGATE        0167
RECYCLE          0004
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0059
FEEDER #2        0046
FEEDER #3        0063
FEEDER #4        0046
FEEDER #5        0009
AGG. TONS        00001424
ASPHALT GAL.     00014713
RECYCLE TONS     00000447
MIX RUNBER RUNNIN0005
FEEDER #027.0 %     TONS RUN0130
FEEDER #020.2 %     TONS RUN0180
FEEDER #028.0 %     TONS RUN0199
FEEDER #019.9 %     TONS RUN0178
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0447
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     165500
ACTUAL A/C PERCEN04.54
MIX TEMP.        0299
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0357
FUEL USAGE       0000     GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

Change Mix Size

CHANGE MIX COMPLETE

OCT 19 1981

1400

PRODUCTION RATE 0236 TPH
ASPHALT 007.6
AGGREGATE 0148
RECYCLE 0080
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0018
FEEDER #2 0046
FEEDER #3 0044
FEEDER #4 0046
FEEDER #5 0000
AGG. TONS 00001530
ASPHALT GAL. 0001573?
RECYCLE TONS 00000454
MIX RUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0074
FEEDER #019.8 % TONS RUN0184
FEEDER #019.0 % TONS RUN0176
FEEDER #019.7 % TONS RUN0183
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0454
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 165600
ACTUAL A/C PERCEN05.17
MIX TEMP. 0302
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0361
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

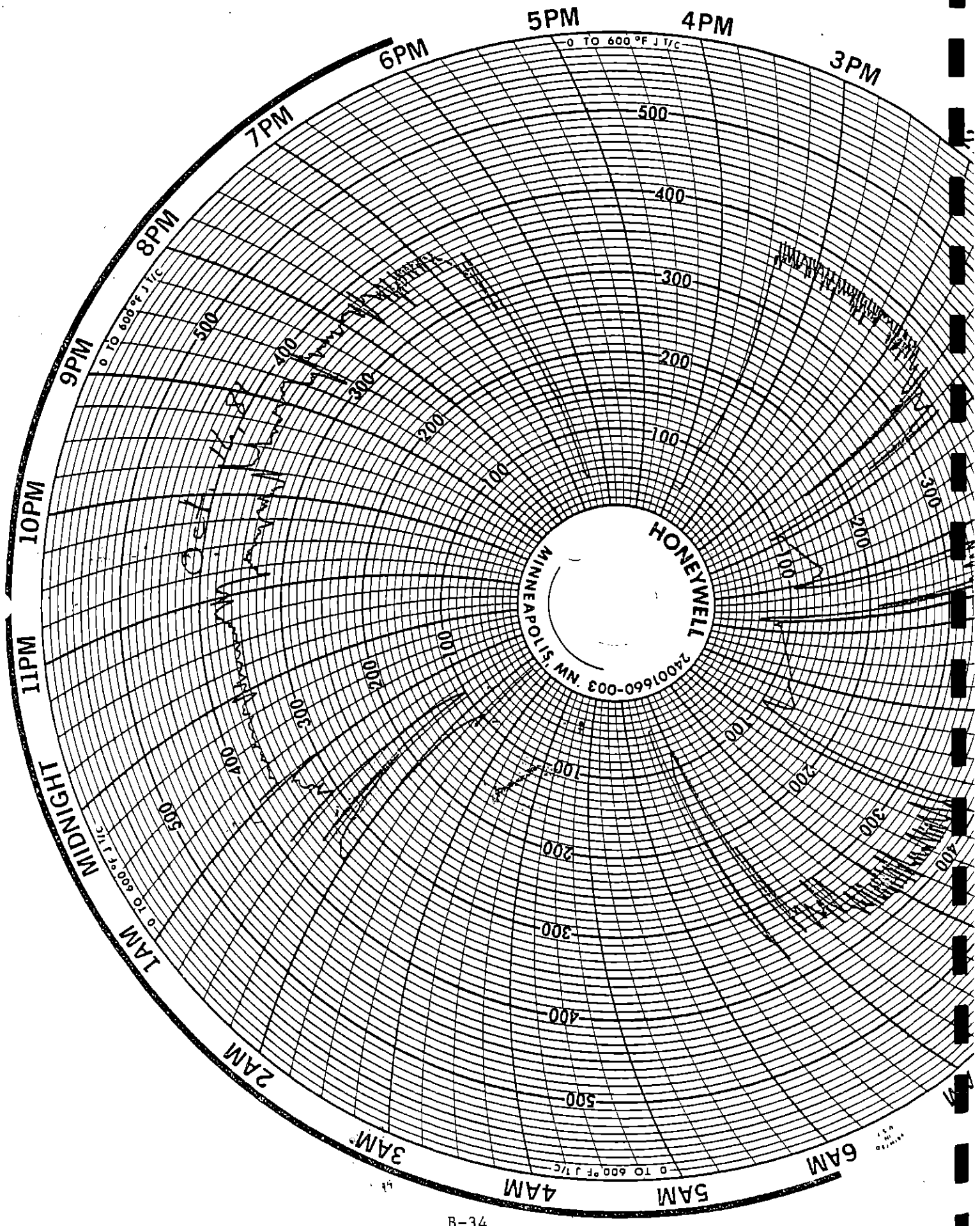
1430

PRODUCTION RATE 0230 TPH
ASPHALT 011.7
AGGREGATE 0218
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0060
FEEDER #2 004?
FEEDER #3 0065
FEEDER #4 004?
FEEDER #5 0000
AGG. TONS 00001654
ASPHALT GAL. 00017115
RECYCLE TONS 00000481
MIX RUNBEN RUNNIN0005
FEEDER #02?.0 % TONS RUN0150
FEEDER #020.2 % TONS RUN0194
FEEDER #028.0 % TONS RUN0219
FEEDER #019.9 % TONS RUN0192
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0481
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 165800
ACTUAL A/C PERCEN04.95
MIX TEMP. 0511
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0341
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

Change Mix Spec.

10/19/81

4AM
3AM
5AM
2AM
6AM
7AM
8AM
9AM
10AM
11AM
NOON
1PM
2PM
3PM
4PM
5PM
0 TO 600 °F J T/C
HONEYWELL
MINNEAPOLIS, MN
24001660-003


5PM
4PM
3PM
6PM
7PM
8PM
9PM
10PM
11PM
MIDNIGHT
1AM
2AM
3AM
4AM
5AM
6AM
0 TO 600 °F J T/C
500
400
300
200
100
HONEYWELL
MINNEAPOLIS, MN.
24001660-003

LOW AIR PRESSURE

PLANT SEQUENTIAL START

8:00

PRODUCTION RATE 0231 TPH
ASPHALT 007.9
AGGREGATE 0156
RECYCLE 0067
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0018
FEEDER #2 0045
FEEDER #3 0043
FEEDER #4 0046
FEEDER #5 0009
AGG. TONS 00000108
ASPHALT GAL. 00001222
RECYCLE TONS 00000045
MIX NUMBER RUNNIN0008
FEEDER #008.0 % TONS RUN0016
FEEDER #017.8 % TONS RUN0061
FEEDER #019.0 % TONS RUN0030
FEEDER #019.7 % TONS RUN0031
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0045
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 166100
ACTUAL A/C PERCEN04.53
MIX TEMP. 0312
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0361
FUEL USAGE 0000 GPI
GAS USAE 0000 CFT
FUEL GALLONS 00000000
GAS CU. FT. 00000000

8:30

```
PRODUCTION RATE  0230     TPH
ASPHALT          007.7
AGGREGATE        0156
RECYCLE          0066
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0017
FEEDER #2        0044
FEEDER #3        0042
FEEDER #4        0045
FEEDER #5        0000
AGG. TONS        00001183
ASPHALT GAL.     00002041
RECYCLE TONS     00000078
MIX NUMBER RUNNIN0009
FEEDER #009.0 %     TONS RUN0021
FEEDER #017.8 %     TONS RUN0053
FEEDER #017.0 %     TONS RUN0051
FEEDER #017.7 %     TONS RUN0053
FEEDER #000.0 %     TONS RUN0000
RECYCLE 028.6 %     TONS RUN0078
ASPHALT 004.9 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     166100
ACTUAL A/C PERCEN04.61
MIX TEMP.        0317
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0368
FUEL USAGE       0000    GPI
GAS USAE         0000    CF/I
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

OCT 16 1981

9:00

```
PRODUCTION RATE  0227     TPH
ASPHALT          011.4
AGGREGATE        0216
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0059
FEEDER #2        0046
FEEDER #3        0063
FEEDER #4        0046
FEEDER #5        0000
AGG. TONS        00000306
ASPHALT GAL.     00006422
RECYCLE TONS     00000093
MIX NUMBER RUNNIN0005
FEEDER #027.0 %     TONS RUN0053
FEEDER #020.2 %     TONS RUN0040
FEEDER #028.0 %     TONS RUN0055
FEEDER #017.8 %     TONS RUN0034
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0093
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     166300
ACTUAL A/C PERCEN04.95
MIX TEMP.        0307
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0345
FUEL USAGE       0000    GPI
GAS USAE         0000    CF/I
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

CHANGE MIX ON

CHANGE MIX COMPLETE

10:00

PRODUCTION RATE 0219 TPH
ASPHALT 007.1
AGGREGATE 0146
RECYCLE 0066
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0017
FEEDER #2 0042
FEEDER #3 0041
FEEDER #4 0043
FEEDER #5 0000
AGG. TONS 00000453
ASPHALT GAL. 00005049
RECYCLE TONS 00000139
MIX NUMBER RUNNIN0008
FEEDER #008.0 % TONS RUN0021
FEEDER #017.9 % TONS RUN0052
FEEDER #019.0 % TONS RUN0050
FEEDER #019.7 % TONS RUN0052
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0139
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 166500
ACTUAL A/C PERCEN04.45
MIX TEMP. 0307
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0344
FUEL USAGE 0000 GPT
GAS USE 0000 CF/T
FUEL GALONS 00000000
GAS CU.F.T. 00000000

10:30

PRODUCTION RATE 0221 TPH
ASPHALT 006.8
AGGREGATE 0152
RECYCLE 0062
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0036
FEEDER #2 0046
FEEDER #3 0059
FEEDER #4 0043
FEEDER #5 0000
AGG. TONS 00000544
ASPHALT GAL. 00006032
RECYCLE TONS 00000179
MIX NUMBER RUNNIN0005 ✓
FEEDER #027.0 % TONS RUN0032
FEEDER #020.2 % TONS RUN0079
FEEDER #028.0 % TONS RUN0076
FEEDER #019.2 % TONS RUN0078
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0179
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 166600
ACTUAL A/C PERCEN04.66
MIX TEMP. 0316
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0356
FUEL USAGE 0000 GPT
GAS USAGE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

11:00

PRODUCTION RATE 0272 TPH
ASPHALT 008.6
AGGREGATE 0180
RECYCLE 0093
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0021
FEEDER #2 0052
FEEDER #3 0050
FEEDER #4 0053
FEEDER #5 0000
AGG.TONS 00000655
ASPHALT GAL. 0000743
RECYLE TONS 00000213
MIX NUMBER RUNNIN0008
FEEDER #008.0 % TONS RUN0026
FEEDER #019.8 % TONS RUN0064
FEEDER #019.0 % TONS RUN0061
FEEDER #019.7 % TONS RUN0064
FEEDER #000.0 % TONS UN0000
RECYLE 028.6 % TONS RUN0213
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARET TONS 0000
TARET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 166800
ACTUAL A/C PERCEN04.57
MIXTEMP. 0306
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0349
FUEL USAGE 0000 GPT
GASUSAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

11:30

PRODUCTION RATE 0288 TPH
ASPHAT 009.5
AGGREGATE 0194
RECYLE 0084
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0022
FEEDER #2 0056
FEEDER #3 0054
FEEDER #4 0057
FEEDER #5 0000
AGG.TONS 00000738
ASPHALT GAL. 00008140
RECYLE TONS 00000249
MIXRUNBER RUNNIN0008
FEEDER #008.0 % TONS RUN0036
FEEDER #019.8 % TONS RUN0088
FEEDER #019.0 % TONS RUN0085
FEEDER #019.7 % TONS RUN0088
FEEDER #000.0 % TONS RUN0000
RECYLE 028.6 % TONS RUN0249
ASPHALT 004.9 %
FILER 000.0 %
ADDITIVE00.00 %
TARET TONS 0000
TARET TONS RUN 0000
TON TO GO 0000
TON TO DATE 1660
ACTUAL A/C PERCEN04.61
MIXTEMP. 0316
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0365
FUEL USAGE 0000 GPT
GASUSAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

12:00

```
 ODUCTION RATE  0308     TPH
ASPHLT          010.2
AGGRGATE        0207
RECYLE          0091
FILLER          000.0
ADDITIVE        0000    PPH
FEEDR #1        0023
FEEDR #2        0060
FEEDR #3        0058
FEEDR #4        0062
FEEDER#5        0000
AGG.TONS        00000860
ASPHLT GAL.     00009462
RECYLE TONS     00000303
MIXNUMBER RUNNIN0008
FEEDR #008.0 %    TONS RUN0050
FEEDR #019.8 %    TONS RUN0124
FEEDR #019.0 %    TONS RUN0119
FEEDR #019.7 %    TONS RUN0123
FEEDR #000.0 %    TONS RUN0000
RECYLE 028.6 %    TONS RUN0302
ASPHALT 004.9 %
FILER  000.0 %
ADDITIVE00.00 %
TARET TONS      0000
 ET TONS RUN    0000
 S TO GO        0000
 S TO DATE      167000
ACTUAL A/C PERCEN04.53
MIXTEMP.        0295
ASPHALT TEMP.   0000
WAREHOUSE INLET TEMP0352
FUEL USAGE      0000    GPT
GAS USAGE       0000    CF/T
FUEL GALLONS    00000000
GAS CU. FT.     00000000
```

12:30

```
PRODUCTION RATE  0314     TPH
ASPHLT           010.0
AGGEGATE         0202
RECYLE           0096
FILER            000.0
ADDITIVE         0000     PPH
FEEDR #1         0023
FEEDR #2         0060
FEEDR #3         0058
FEEDR #4         0062
FEEDR #5         0000
AGG TONS         00000966
ASPHLT GAL.      00010591
RECYLE TONS      00000349
MIXNUMBER RUNNIN0008
FEEDR #008.0 %    TONS RUN0059
FEEDR #019.8 %    TONS RUN0147
FEEDR #019.0 %    TONS RUN0141
FEEDR #019.7 %    TONS RUN0146
FEEDR #000.0 %    TONS RUN0000
RECYLE 028.6 %    TONS RUN0349
ASPHALT 004.9 %
FILER  000.0 %
ADDITIVE00.00 %
TARET TONS       0000
TARET TONS RUN   0000
TONS TO GO       0000
TONS TO DATE     167200
ACTUAL A/C PERCEN04.61
MIXTEMP.         0293
ASPHALT TEMP.    0000
WAREHOUSE INLET TEMP0351
FUEL USAGE       0000    GPT
GAS USAGE        0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

OCT 20 1981

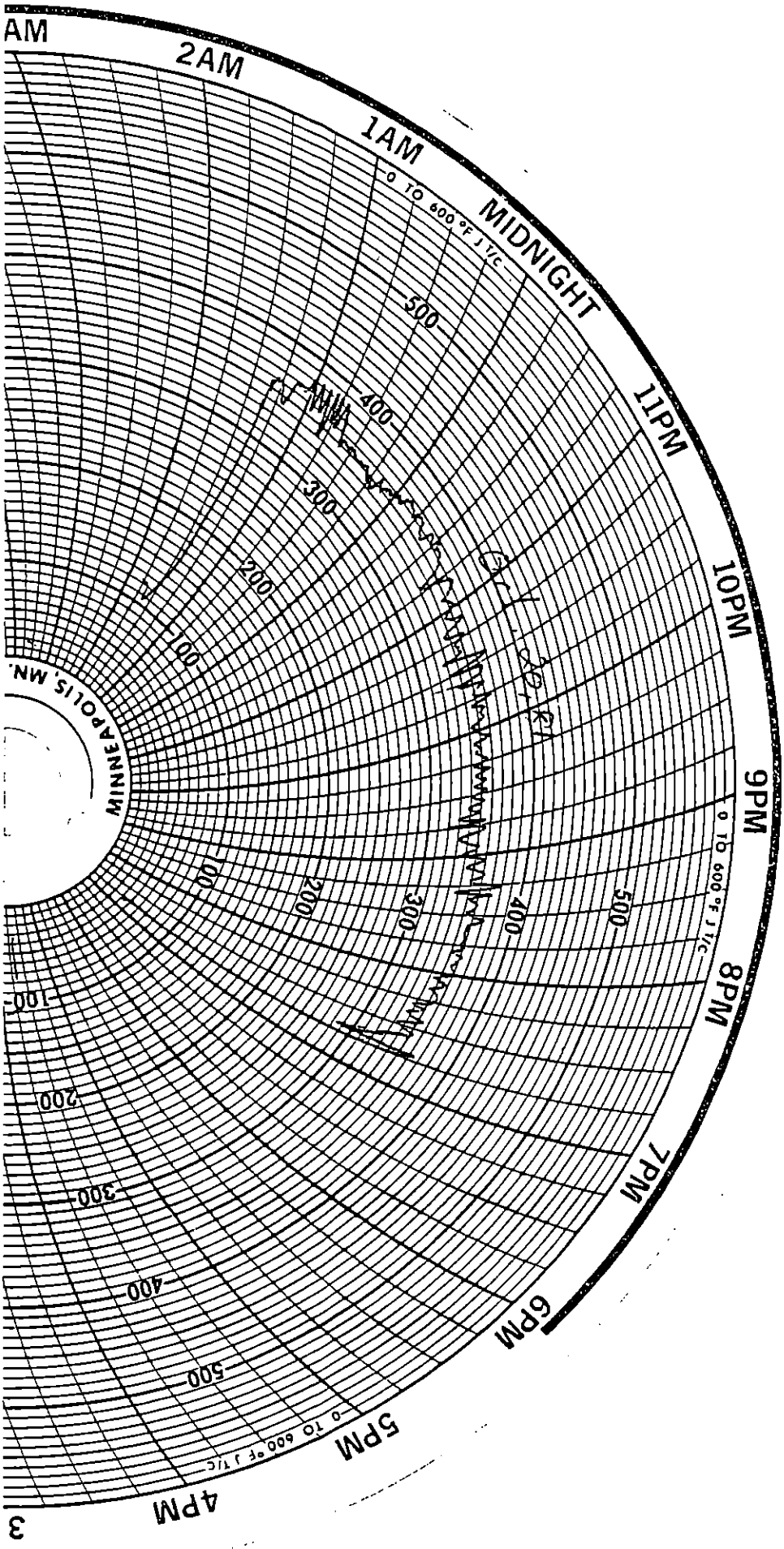
1300

PRODUCTION RATE 0253 TPH
ASPHALT 008.1
AGGREGATE 0172
RECYCLE 0073
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0019
FEEDER #2 0049
FEEDER #3 0047
FEEDER #4 0049
FEEDER #5 0000
AGG. TONS 00001034
ASPHALT GAL. 00011335
RECYCLE TONS 00000379
MIX NUMBER RUNNIN0008
FEEDER #008.1% TONS RUN0067
FEEDER #019.8 % TONS RUN0167
FEEDER #019.0 % TONSRUN0160
FEEDER #019.7 % TONS RUN0166
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0379
ASPHALT 004.7 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 167300
ACTUAL A/C PERCEN04.57
MIX TEMP. 0314
ASPHALT TMP. 0000
BAGHOUSE INLET TEMP0367
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1325

PRODUCTION RATE 0220 TPH
ASPHALT 008.7
AGGREGATE 0174
RECYCLE 0037
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0016
FEEDER #2 0042
FEEDER #3 0040
FEEDER #4 0042
FEEDER #5 0000
AGG.TONS 00001110
ASPHALT GAL. 00012160
RECYCLETONS 00000410
MIXNUMBER RUNNIN0008
FEEDER #008.0 % TONS RUN0076
FEEDR #019.8 % TONS RUN0167
FEEDR #019.0 % TONS RUN0161
FEEDR #019.7 % TONS RUN0166
FEEDR #000.0 % TONS RUN0000
RECYCLE 028.6 % TONS RUN0410
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 9000
TONS TO DATE 167500
ACTUAL A/C PERCEN04.53
MIX TEMP. 0307
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0351
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

ASPHALT DEVIATION


AM
2AM
1AM
MIDNIGHT
11PM
10PM
9PM
8PM
7PM
6PM
5PM
4PM
3
MINNEAPOLIS, MN.
0 TO 600°F 1 T/C
100
200
300
400
500

OCT 2 1 1981

9/2/81

9IN # 2 HIGH

PLANT SEQUENTIAL START

8:30

PRODUCTION RATE 0238 TPH
ASPHALT 007.9
AGGREGATE 0163
RECYCLE 0067
FILLER 000.9
ADDITIVE 0000 PPH
FEEDER #1 0018
FEEDER #2 0046
FEEDER #3 0044
FEEDER #4 0047
FEEDER #5 0000
AGG. TONS 00001253
ASPHALT GAL. 0001688.50
RECYCLE TONS 0000947.5
MIX NUMBER RUNNI0008
FEEDER #008.0 % TONS RUN0076
FEEDER #019.8 % TONS RUN0221
FEEDER #019.0 % TONS RUN0222
FEEDER #019.7 % TONS RUN0230
FEEDER #000.0 % TONS RUN00
RECYCLE 028.6 % TONS RUN0475
ASPHALT 004.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 167509
ACTUAL A/C PERCEN04.61
MIX TEMP. 0296
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0443
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

OCT 21 1981

9:15

PRODUCTION RATE 0258 TPH
ASPHALT 012.5
AGGREGATE 0245
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0054
FEEDER #2 0066
FEEDER #3 0035
FEEDER #4 0081
FEEDER #5 0000
AGG. TONS 00001379
ASPHALT GAL. 00015215
RECYCLE TONS 00000495
MIX NUMBER RUNNIN0006 ✓
FEEDER #022.4 % TONS RUN0153
FEEDER #026.7 % TONS RUN0199
FEEDER #014.0 % TONS RUN0095
FEEDER #032.0 % TONS RUN0190
FEEDER #000.0 % TONS RUN0000
RECYCLE 000% % TONS RUN0495
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 167700
ACTUAL A/C PERCEN04.97
MIX TEMP. 0297
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0321
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

9:45

PRODUCTION RATE 0251 TPH
ASPHALT 012.4
AGGREGATE 0239
RECYCLE 000%
FILLER 0000
ADDITIVE 0000 PPH
FEEDER #1 0054
FEEDER #2 0064
FEEDER #3 0035
FEEDER #4 0082
FEEDER #5 0000
AGG. TONS 00001524
ASPHALT GAL. 00016871
RECYCLE TONS 00000495
MIX NUMER RUNNIN0006 ✓
FEEDER #022.4 % - TONS RUN0167
FEEDER 026.7 % TONS RUN0177
FEEDER#014.0 % TONS RUN0105
FEEDER#032.0 % TONS RUN0259
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0495
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGE TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 1699
ACTUAL A/C PERCEN04.89
MIX TEMP. 0296
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0331
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

OCT 21 1981

10:15

PRODUCTION RATE 0200 TPH
ASPHALT 009.5
AGGREGATE 0190
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0043
FEEDER #2 0053
FEEDER #3 0028
FEEDER #4 0065
FEEDER #5 0000
AGG.TONS 00001641
ASPHALT GAL. 00018203
RECYCLE TONS 000075
MIXRUNBER RUNNING0006
FEEDER #022.4 % TONS RUN0195
FEEDER #026.7 % TONS RUN0232
FEEDER #014.0 % TONS RUN0122
FEEDER #032.0 % TONS RUN0278
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0495
ASPHALT 004.9 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 168000
ACUAL A/C PERCIEN04.73
MI TEMP 0302
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0345
FUL USAGE 0000 GPT
GAL USAE 0000 CF/T
FUL GALLONS 00000000
GAL CU.FT. 00000000

11:15

PRODUCTION RATE 0205 TPH
ASPHAT 009.8
AGGRGATE 0195
RECYLE 0000
FILLR 000.0
ADDITIVE 0000 PPH
FEEDR #1 0042
FEEDR #2 0052
FEEDR #3 0027
FEEDR #4 0064
FEEDR #5 0000
AGG. TONS 00001711
ASPHALT GAL. 00019974
RECYCLE TONS 00000501
MIXRUNBER RUNNING0006
FEEDR #022.4 % TONSRUN0140
FEEDR #026.7 % TONSRUN0177
FEEDR #014.0 % TONS RUN0093
FEEDR #032.0 % TONS RUN0212
FEEDR #000.0 % TONS RUN0000
RECYCLE 000.0 % TONSRUN0501
ASPHALT 004.9 %
FILER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONSRUN 0000
TONS TO GO 0000
TONS TO DATE 168200
ACUAL A/C PERCIEN04.81
MI TEMP. 0313
ASHALT TEMP. 0000
BAGHOUSE INLET TEMP343
FUL USAGE 000 GPT
GALUSAE 0000 CF/T
FUL GALLONS 00000000
GALCU. FT. 00000000

12:00

PRODUCTION RATE 0195 TPH
ASPHALT 010.3
AGGREGATE 0185
RECYCLE 0000
FILLER 000.0
ADDITIVE 000 PPH
FEEDER #1 0069
FEEDER #2 0040
FEEDER #3 0062
FEEDER #4 0010
FEEDER #5 0000
AGG.TONS 00001906
ASPHLT GAL. 00021202
RECYCLE TONS 00000501
MIX NUMBER RUNINO004 ✓
FEEDR #037.0 % TONS RUN0176
FEEDR #020.0 % TONSRUN0110
FEEDR #032.0 % TONS RUN0170
FEEDR #005.0 % TONS RUN0027
FEEDR #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0501
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONSRUN 0000
TONS TO GO 0000
TONS TO DATE 168300
ACTUAL A/C PERCEN04.98
MIX TEMP. 0314
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0338
FUEL USAGE 0000 GPT
GAS USAGE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT 00000000

1230

PRODUCTION RATE 0195 TPH
ASPHALT 010.1
AGGREGATE 0185
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0072
FEEDER #2 0041
FEEDER #3 0064
FEEDER #4 0010
FEEDER #5 0000
AGG TONS 00002011
ASPHALT GAL. 00022454
RECYCLE TONS 00000501
MIX NUMBER RUNINO004 ✓
FEEDR #037.0 % TONS RUN0237
FEEDR #020.0 % TONS RUN0136
FEEDR #032.0 % TONS RUN0205
FEEDR #005.0 % TONS RUN0032
FEEDR #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0501
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 168400
ACTUAL A/C PERCEN05.14
MIX TEMP. 0314
ASPHALT TEMP. 0000
BAGHOUSE INLET TMP0335
FUEL USAGE 0000 GPT
GAS USAGE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

CHANGE MIX COMPLETE OCT 22 1981

10/22/81

7:45

PRODUCTION RATE 0154 TPH
ASPHALT 007.9
AGGREGATE 0146
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0055
FEEDER #2 0032
FEEDER #3 0049
FEEDER #4 0008
FEEDER #5 0000
AGG. TONS 00002362
ASPHALT GAL. 00026228
RECYCLE TONS 00000531
MIX NUMBER RUNNING004
FEEDER #037.0 % TONS RUN0233
FEEDER #020.8 % TONS RUN0151
FEEDER #032.0 % TONS RUN0202
FEEDER #005.0 % TONS RUN0032
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0531
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 168800
ACTUAL A/C PERCENT05.18
MIX TEMP. 0325
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0340
FUEL USAGE 0000 GPH
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

8:30

PRODUCTION RATE 0170 TPH
ASPHALT 007.9
AGGREGATE 0151
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0059
FEEDER #2 0035
FEEDER #3 0054
FEEDER #4 0009
FEEDER #5 0000
AGG. TONS 00002495
ASPHALT GAL. 00027918
RECYCLE TONS 00000561
MIX NUMBER RUNNING004
FEEDER #037.0 % TONS RUN0250
FEEDER #020.8 % TONS RUN0160
FEEDER #032.0 % TONS RUN0246
FEEDER #005.0 % TONS RUN0042
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0561
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 169000
ACTUAL A/C PERCENT05.14
MIX TEMP. 0326
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0345
FUEL USAGE 0000 GPH
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

900

PRODUCTION RATE 0167 TPH
ASPHALT 008.3
AGGREGATE 0160
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0060
FEEDER #2 0035
FEEDER #3 0054
FEEDER #4 0008
FEEDER #5 0000
AGG. TONS 00002565
ASPHALT GAL. 00028660
RECYCLE TONS 00000531
MIX NUMBER RUNN1N0004
FEEDER #037.0 % TONS RUN0512
FEEDER #020.8 % TONS RUN0176
FEEDER #032.0 % TONS RUN0270
FEEDER #005.0 % TONS RUN0042
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0531
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 169000
ACTUAL A/C PERCEN05.14
MIX TEMP. 0318
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0334
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

930

PRODUCTION RATE 0155 TPH
ASPHALT 008.1
AGGREGATE 0147
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0055
FEEDER #2 0032
FEEDER #3 0049
FEEDER #4 0008
FEEDER #5 0000
AGG. TONS 00002630
ASPHALT GAL. 00027498
RECYCLE TONS 00000531
MIX NUMBER RUNN1N0004
FEEDER #037.0 % TONS RUN0339
FEEDER #020.8 % TONS RUN0171
FEEDER #032.0 % TONS RUN0295
FEEDER #005.0 % TONS RUN0046
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0531
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 169100
ACTUAL A/C PERCEN05.14
MIX TEMP. 0343
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0345
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1000

```
PRODUCTION RATE  0169      TPH
ASPHALT          008.8
AGGREGATE        0160
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPM
FEEDER #1        0050
FEEDER #2        0035
FEEDER #3        0054
FEEDER #4        0008
FEEDER #5        0000
AGG. TONS        00002743
ASPHALT GAL.     00030781
RECYCLE TONS     00000531
MIX NUMBER RUNNING0004
FEEDER #37.0 %    TONS RUN0366
FEEDER #020.8 %    TONS RUN06
FEEDER #032.0 %    TONS RUN0316
FEEDER #5.0 %    TONS RUN0049
FEEDER #000.0 %    TONS RUN00
RECYCLE00.0 %    TONRUN0531
ASPHALT05.2 %
FILLER000.0 %
ADDITIVE00.00 %
TARGET TONS       0000
TARGETTONS RUN  0000
TONS TO GO        0000
TONS TO DATE      16720
ACTUAL A/C PERCENT05.14
MIX TEMP.         0331
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0348
FUEL USAGE        0000     GPT
GAS USE           0000    CF/T
FUEL GALLONS     00000000
GAS CU.FT.       00000000
```

1030

```
PRODUCTION RATE  0172      TPH
ASPHALT          008.8
AGGREGATE        0163
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPM
FEEDER#1         0061
FEEDER#2         0036
FEEDER#3         0055
FEEDER #4        009
FEEDER #5        000
AGG. TONS        00002810
ASPHALT GAL.     00031667
RECYCLE TONS     00000531
MIX NUMBER RUNNING0004
FEEDER #037.0 %    TONS RUN04
FEEDER #020.8 %    TONSRUN0221
FEEDER #032.0 %    TONS RUN0340
FEEDER #005.0 %    TONS RUN0053
FEEDER #000.0 %    TONS RUN0000
RECYCLE 00.0 %    TONS RUN05
ASPHALT 005.2 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET  TONS       0000
TARGET  TONS RUN 0000
TONS TO GO        0000
TONS TO DATE      16720
ACTUAL A/C PERCENT05.10
MIX TEMP.         0325
ASPHALT TEMP.     0000
BAGHOUSE INLET TEMP0333
FUEL USAGE        0000     GPT
GAS USAGE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

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1100

PRODUCTION RATE 0199 TPH
ASPHALT 019.5
AGGREGATE 0189
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 TPH
FEEDR #1 0069
FEEDR #2 0040
FEEDR #3 0062
FEEDR #4 0010
FEEDR #5 0000
AGG.TONS 00002895
ASPHLT GAL. 00032580
RECYCLE TONS 00000531
MIX NMBER RUNNR0004
FEEDR #037.0 % TONS RUN0425
FEEDR #020.8 % TONS RUN0239
FEEDR #032.0 % TONS RUN0367
FEEDR #005.0 % TONS RUN0057
FEEDR #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0531
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 169400
ACTUAL A/C PERCEN04.94
MIX TEMP. 0315
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0333
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1130

PRODCTION RATE 0190 TPH
ASPHLT 009.9
AGGEGATE 0180
RECLE 0000
FILER 000.0
ADDITIVE 0000 TPH
FEEDR #1 0069
FEEDR #2 0040
FEEDR #3 0062
FEEDR #4 0010
FEEDR #5 0000
AGG.TONS 00002983
ASPHALT GAL. 00033626
RECYLE TONS 00000531
MIX NUMBER RUNNR0004
FEEDR #037.0 % TONS RUN0459
FEEDER #020.8 % TONS RUN0258
FEEDER #032.0 % TONS RUN0397
FEEDER #005.0 % TONS RUN0062
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0531
ASPHALT 005.2 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 169400
ACTUAL A/C PERCEN05.14
MIX TEMP. 0324
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0357
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

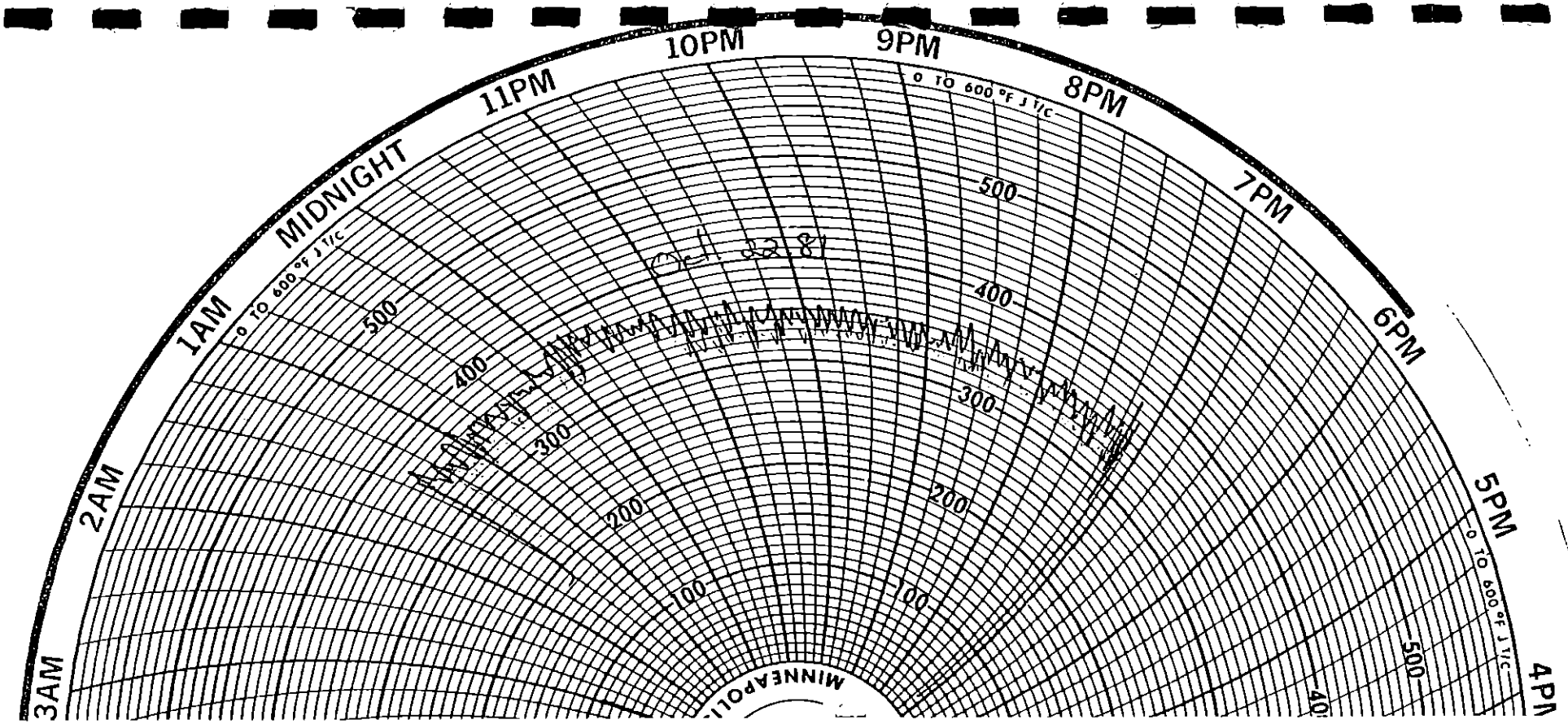
1230

```
PRODUCTION RATE  0200     TPH
ASPHALT          010.3
AGGREGATE        0190
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0073
FEEDER #2        0042
FEEDER #3        0065
FEEDER #4        0010
FEEDER #5        0000
AGG. TONS        00003202
ASPHALT GAL.     00036220
RECYCLE TONS     00000531
MIX RUNBER RUNNIN0004
FEEDER #037.0 %    TONS RUN0544
FEEDER #020.8 %    TONS RUN0306
FEEDER #032.0 %    TONS RUN0470
FEEDER #005.0 %    TONS RUN0074
FEEDER #000.0 %    TONS RUN0000
RECYCLE 000.0 %    TONS RUN0531
ASPHALT 005.2 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     169700
ACTUAL A/C PERCEN05.10
MIX TEMP.        0320
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0329
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

1330

```
PRODUCTION RATE  0204     TPH
ASPHALT          010.4
AGGREGATE        0194
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPM
FEEDER #1        0075
FEEDER #2        0043
FEEDER #3        0067
FEEDER #4        0011
FEEDER #5        0000
AGG. TONS        00003367
ASPHALT GAL.     00038173
RECYCLE TONS     00000531
MIX RUNBER RUNNIN0004
FEEDER #037.0 %    TONS RUN0608
FEEDER #020.8 %    TONS RUN0342
FEEDER #032.0 %    TONS RUN0526
FEEDER #005.0 %    TONS RUN0082
FEEDER #000.0 %    TONS RUN0000
RECYCLE 000.0 %    TONS RUN0531
ASPHALT 005.2 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     169800
ACTUAL A/C PERCEN05.10
MIX TEMP.        0325
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0333
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

4PM
3PM
2PM
1PM
NOON
11AM
10AM
9AM
8AM
7AM
6AM
5
500
400
300
200
100
HONEYWELL


10PM
9PM
8PM
7PM
6PM
5PM
4PM
11PM
MIDNIGHT
1AM
2AM
3AM
0 TO 600 °F J 1/C
500
400
300
200
100
0 TO 600 °F J 1/C
500
400
300
200
100
0 TO 600 °F J 1/C
500
400
MINNEAPOLIS

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0930

```
PRODUCTION RATE  0365     TPH
ASPHALT          008.1
AGGREGATE        0157
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0042
FEEDER #2        0032
FEEDER #3        0045
FEEDER #4        0036
FEEDER #5        0000
AGG. TONS        00000421
ASPHALT GAL.     00004513
RECYCLE TONS     00000000
MIX NUMBER RUNNING0005 ✓
FEEDER #027.0 %     TONS RUN0041
FEEDER #020.2 %     TONS RUN0031
FEEDER #028.0 %     TONS RUN0044
FEEDER #019.8 %     TONS RUN0030
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     170500
ACTUAL A/C PERCENT05.05
MIX TEMP.        0377
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0253
FUEL USAGE       0000     GPH
GAS USAE         0000     CFH
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

1000

PRODUCTION RATE 0160 TPH
ASPHALT 007.9
AGGREGATE 0152
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0042
FEEDER #2 0062
FEEDER #3 0045
FEEDER #4 0033
FEEDER #5 0000
AGG. TONS 00000464
ASPHALT GAL. 00005312
RECYCLE TONS 00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 % TONS RUN0053
FEEDER #020.2 % TONS RUN0040
FEEDER #028.0 % TONS RUN0056
FEEDER #019.8 % TONS RUN0039
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 1/0600
ACTUAL A/C PERCEN05.03
MIX TEMP. 0318
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0336
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1030

PRODUCTION RATE 0162 TPH
ASPHALT 008.1
AGGREGATE 0154
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0042
FEEDER #2 0033
FEEDER #3 0045
FEEDER #4 0033
FEEDER #5 0000
AGG. TONS 00000569
ASPHALT GAL. 00006537
RECYCLE TONS 00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 % TONS RUN0083
FEEDER #020.2 % TONS RUN0062
FEEDER #028.0 % TONS RUN0056
FEEDER #019.8 % TONS RUN0051
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 1/0700
ACTUAL A/C PERCEN04.93
MIX TEMP. 0315
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0328
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1100

```
PRODUCTION RATE  0171     TPH
ASPHALT          008.4
AGGREGATE        0163
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0045
FEEDER #2        0035
FEEDER #3        0048
FEEDER #4        0034
FEEDER #5        0000
AGG. TONS        00000665
ASPHALT GAL.     00007641
RECYCLE TONS     00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 %     TONS RUN0110
FEEDER #020.2 %     TONS RUN0082
FEEDER #028.0 %     TONS RUN0114
FEEDER #019.8 %     TONS RUN0081
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     170800
ACTUAL A/C PERCEN04.99
MIX TEMP.        0317
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0336
FUEL USAGE       0000     GPT
GAS USAE         0000     CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

1130

```
PRODUCTION RATE  0164     TPH
ASPHALT          008.0
AGGREGATE        0156
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0044
FEEDER #2        0034
FEEDER #3        0047
FEEDER #4        0063
FEEDER #5        0000
AGG. TONS        00000738
ASPHALT GAL.     00008478
RECYCLE TONS     00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 %     TONS RUN0128
FEEDER #020.2 %     TONS RUN0096
FEEDER #028.0 %     TONS RUN0133
FEEDER #019.8 %     TONS RUN0094
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     170800
ACTUAL A/C PERCEN04.99
MIX TEMP.        0322
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0343
FUEL USAGE       0000     GPT
GAS USAE         0000     CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

1200

```
PRODUCTION RATE  0201     TPH
ASPHALT          010.0
AGGREGATE        0191
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPM
FEEDER #1        0050
FEEDER #2        0038
FEEDER #3        0054
FEEDER #4        0038
FEEDER #5        0000
AGG. TONS        00000825
ASPHALT GAL.     00009487
RECYCLE TONS     00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 %     TONS RUN0156
FEEDER #020.2 %     TONS RUN0116
FEEDER #028.0 %     TONS RUN0161
FEEDER #019.8 %     TONS RUN0114
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     170900
ACTUAL A/C PERCENT5.07
MIX TEMP.        0309
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0330
FUEL USAGE       0000     GPH
GAS USAE         0000     CF/H
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

1230

```
PRODUCTION RATE  0190     TPH
ASPHALT          009.8
AGGREGATE        0180
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPM
FEEDER #1        0051
FEEDER #2        0039
FEEDER #3        0055
FEEDER #4        0039
FEEDER #5        0000
AGG. TONS        00000906
ASPHALT GAL.     00010433
RECYCLE TONS     00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 %     TONS RUN0167
FEEDER #020.2 %     TONS RUN0145
FEEDER #028.0 %     TONS RUN0173
FEEDER #019.8 %     TONS RUN0122
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     171000
ACTUAL A/C PERCENT5.03
MIX TEMP.        0334
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0332
FUEL USAGE       0000     GPH
GAS USAE         0000     CF/H
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

1300

PRODUCTION RATE 0223 TPH
ASPHALT 011.0
AGGREGATE 0212
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0058
FEEDER #2 0044
FEEDER #3 0061
FEEDER #4 0044
FEEDER #5 0000
AGG. TONS 00000992
ASPHALT GAL. 00011432
RECYCLE TONS 00000000
MIX RUNBER RUNNIN0005
FEEDER #027.0 % TONS RUN0171
FEEDER #020.2 % TONS RUN0143
FEEDER #028.0 % TONS RUN0199
FEEDER #019.8 % TONS RUN0140
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 171190
ACTUAL A/C PERCEN04.99
MIX TEMP. 0324
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0353
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1330

PRODUCTION RATE 0227 TPH
ASPHALT 011.7
AGGREGATE 0215
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0060
FEEDER #2 0047
FEEDER #3 0065
FEEDER #4 0047
FEEDER #5 0000
AGG. TONS 00001128
ASPHALT GAL. 00012995
RECYCLE TONS 00000000
MIX RUNBER RUNNIN0005
FEEDER #027.0 % TONS RUN0230
FEEDER #020.2 % TONS RUN0172
FEEDER #028.0 % TONS RUN0238
FEEDER #019.8 % TONS RUN0168
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 171200
ACTUAL A/C PERCEN04.99
MIX TEMP. 0332
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0363
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

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SYSTEM STAR

1400

PRODUCTION RATE 0246 TPH
ASPHALT 012.2
AGGREGATE 0234
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0051
FEEDER #2 0039
FEEDER #3 0055
FEEDER #4 0039
FEEDER #5 0000
AGG. TONS 00001230
ASPHALT GAL. 00014168
RECYCLE TONS 00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 % TONS RUN0259
FEEDER #020.2 % TONS RUN0194
FEEDER #028.0 % TONS RUN0268
FEEDER #019.8 % TONS RUN0190
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 171300
ACTUAL A/C PERCEN04.99
MIX TEMP. 0307
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0337
FUEL USAGE 0000 GPH
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1430

PRODUCTION RATE 0251 TPH
ASPHALT 012.9
AGGREGATE 0238
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0065
FEEDER #2 0050
FEEDER #3 0069
FEEDER #4 0050
FEEDER #5 0000
AGG. TONS 00001367
ASPHALT GAL. 00015769
RECYCLE TONS 00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 % TONS RUN0298
FEEDER #020.2 % TONS RUN0223
FEEDER #028.0 % TONS RUN0307
FEEDER #019.8 % TONS RUN0219
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 171500
ACTUAL A/C PERCEN05.04
MIX TEMP. 0325
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0357
FUEL USAGE 0000 GPH
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1500

```
PRODUCTION RATE  0204     TPH
ASPHALT          012.4
AGGREGATE        0192
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0073
FEEDER #2        0057
FEEDER #3        0078
FEEDER #4        0057
FEEDER #5        0000
AGG. TONS        00001480
ASPHALT GAL.     00017092
RECYCLE TONS     00000000
MIX RUNBER RUNNIN0005
FEEDER #027.0 %     TONS RUN0330
FEEDER #020.2 %     TONS RUN0247
FEEDER #028.0 %     TONS RUN0342
FEEDER #019.8 %     TONS RUN0242
FEEDER #000.0 %     TONS RUN0000
RECYCLE 000.0 %     TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     171600
ACTUAL A/C PERCEN05.19
MIX TEMP.        0329
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0374
FUEL USAGE       0000     GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

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1530

```
PRODUCTION RATE  0012     TPH
ASPHLT           #12.4
AGGRSATE         0000
RECYLE             0000
FILLR              000.0
ADDITIVE           0000    . PPH
FEEER #1         #003
FEEER #2           0002
FEEER #3         0003
FEEER #4           0002
FEEER #5         0000
AGG TONS           00001568
ASPHALT GAL.       00018195
RECYLE TONS        00000000
MIXRUNBER RUNNIN0005
FEEER #027.0 %      TONS RUN0355
FEEER #020.2 %    TONS RUN0265
FEEER #028.0 %    TONS RUN0369
FEEER #019.8 %      TONS RUN0260
FEEER #000.0 %      TONS RUN0000
RECYLE 000.0 %      TONS RUN0000
ASPHALT 005.01
FILER   000.0 %
ADDITIVE00.00 %
TARET TONS     0000
TARET TONS RN  0000
TONS TO GO,        0000
TONS TO DATE       171700
ACTUAL A/C PERCEN04.95
MIXTEMP.,      0284
ASPHALT TEMP.      0000
BAGHOUSE INLET TEMP0213
FUEL USAGE     0000     GPT
GAS USAE           0000 CF/T
FUEL GALLONS       0000000
GAS CU. FT.        00000000
```

OCT 2[illegible] 1981

0830

PRODUCTION RATE	0218	TPH
ASPHALT	011.1	
AGGREGATE	0207	
RECYCLE	0000	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0057	
FEEDER #2	0044	
FEEDER #3	0060	
FEEDER #4	0044	
FEEDER #5	0000	
AGG. TONS	00000294	
ASPHALT GAL.	00003383	
RECYCLE TONS	00000000	
MIX NUMBER RUNNING	0005	
FEEDER #027.0 %	TONS	RUN0134
FEEDER #020.2 %	TONS	RUN0100
FEEDER #028.0 %	TONS	RUN0139
FEEDER #019.8 %	TONS	RUN0098
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 000.0 %	TONS	RUN0000
ASPHALT 005.0 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	172000	
ACTUAL A/C PERCEN	05.03	
MIX TEMP.	0340	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0362	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

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700

PRODUCTION RATE	0217	TPH
ASPHALT	010.9	
AGGREGATE	0206	
RECYCLE	0000	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0057	
FEEDER #2	0044	
FEEDER #3	0060	
FEEDER #4	0044	
FEEDER #5	0000	
AGG. TONS	00000204	
ASPHALT GAL.	00002334	
RECYCLE TONS	00000000	
MIX NUMBER RUNNING	0005	
FEEDER #027.0 %	TONS	RUN0104
FEEDER #020.2 %	TONS	RUN0051
FEEDER #028.0 %	TONS	RUN0117
FEEDER #019.8 %	TONS	RUN0079
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 000.0 %	TONS	RUN0000
ASPHALT 005.0 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	171900	
ACTUAL A/C PERCEN	04.99	
MIX TEMP.	0339	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0375	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

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0930

PRODUCTION RATE 0220 TPH
ASPHALT 010.3
AGGREGATE 0209
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0057
FEEDER #2 0044
FEEDER #3 0061
FEEDER #4 0044
FEEDER #5 0000
AGG. TONS 00000523
ASPHALT GAL. 00010022
RECYCLE TONS 00000000
MIX NUMBER RUNNING0005
FEEDER #027.0 % TONS RUN0199
FEEDER #020.2 % TONS RUN0149
FEEDER #028.0 % TONS RUN02[illegible]
FEEDER #019.8 % TONS RUN0146
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 172200
ACTUAL A/C PERCEN04.95
MIX TEMP. 0329
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0363
FUEL USAGE 0000 GPT
GAS USAGE 0000 CFT
FUEL GALLONS 00000000
GAS CU. FT. 00000000

0400

PRODUCTION RATE 0210 TPH
ASPHALT 011.0
AGGREGATE 0199
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0057
FEEDER #2 0044
FEEDER #3 0061
FEEDER #4 0044
FEEDER #5 0000
AGG. TONS 00000413
ASPHALT GAL. 00004736
RECYCLE TONS 00000000
MIX NUMBER RUNNING0005
FEEDER #027.0 % TONS RUN0167
FEEDER #020.2 % TONS RUN0125
FEEDER #028.0 % TONS RUN0174
FEEDER #019.8 % TONS RUN0123
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 172100
ACTUAL A/C PERCEN04.99
MIX TEMP. 0335
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0363
FUEL USAGE 0000 GPT
GAS USAGE 0000 CFT
FUEL GALLONS 00000000
GAS CU. FT. 00000000

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1030

PRODUCTION RATE 0195 TPH
ASPHALT 009.6
AGGREGATE 0185
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0051
FEEDER #2 0039
FEEDER #3 0055
FEEDER #4 0039
FEEDER #5 0000
AGG. TONS 00000685
ASPHALIGAL.. 00007908
RECYCLI TONS 00000000
MIX RUNBER RUNNIN0005
FEEDER #27.0 % TONS RUN245
FEEDB #020.2 % TONS RUN0183
FEEDER #028.0 % TONS RUN0254
FEEDB #019.8 % TONS RUN0179
FEEDB #000.0 % TONS RUN0000
RECYCE 000.0 % TONS RUN0000
ASPHLT 005.0 %
FILLB 000.0 %
ADDITIVE00.00 %
TARET TONS 0000
TARGT TONS RUN 0000
TONSTO GO 0000
TONSTO DATE 172400
ACTUL A/C PERCEN05.19
MIX TEMP. 0341
ASPHLT TEMP.. 000
BAGHOUSE INLET TEMP0379
FUELUSAGE 0000 GPT
GAS(SAE 0000 F/T
FUELGALLONS 0000000
GASCU. FT. 00000000

1100

PRODUCTION RATE 0214 TPH
ASPHALT 010.7
AGGREGATE 0203
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0055
FEEDER #2 0042
FEEDER #3 0058
FEEDER #4 0042
FEEDER #5 0000
AGG. TONS 00000791
ASPHALT GAL. 00009126
RECYCLE TONS 00000000
MIX RUNBER RUNNIN0005
FEEDER #02/.0 % TONS RUN0275
FEEDER #020.2 % TONS RUN0205
FEEDER #028.0 % TONS RUN0285
FEEDER #019.8 % TONS RUN0201
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 172500
ACTUAL A/C PERCEN04.83
MIX TEMP. 0332
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0338
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

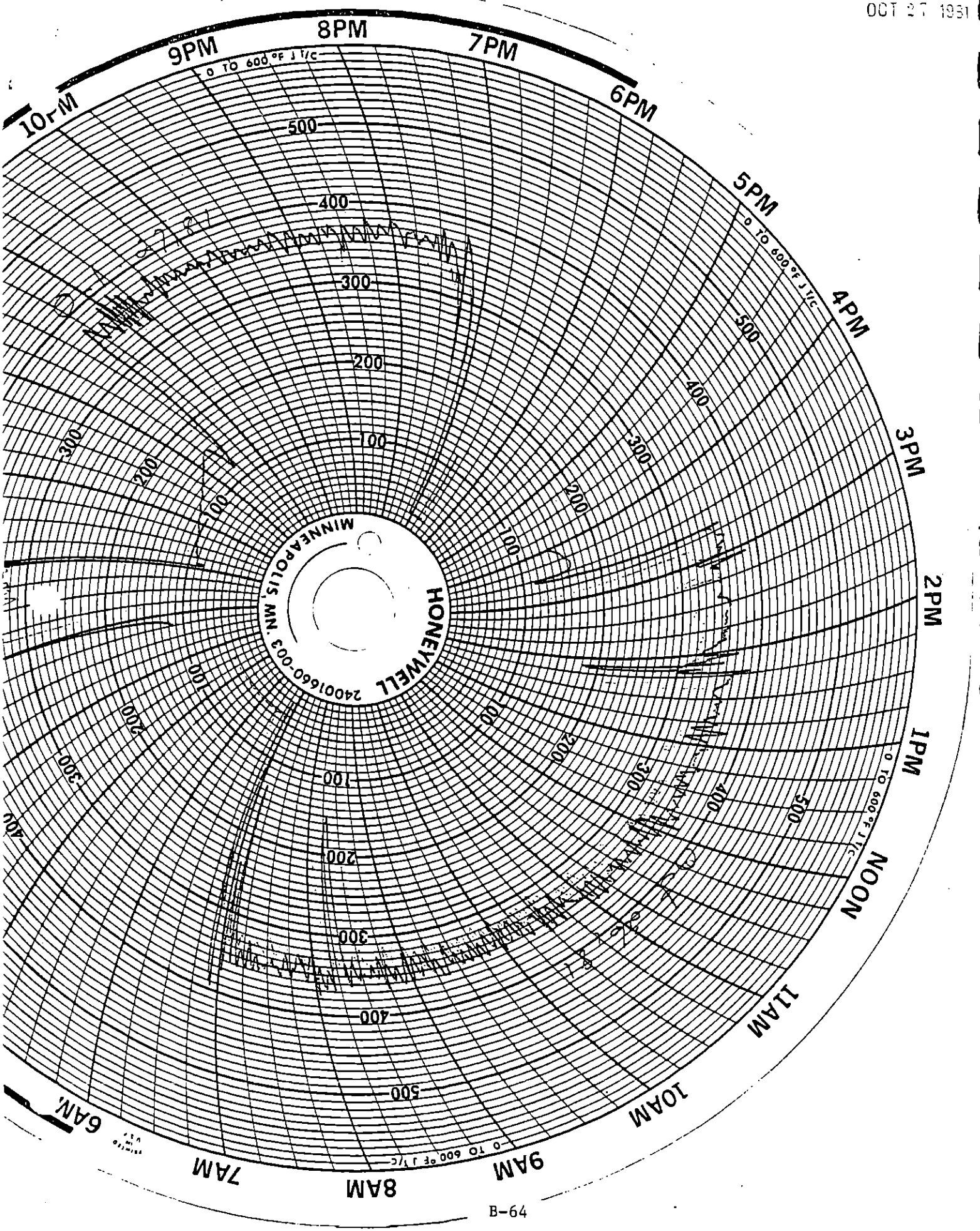
OCT 27 1991

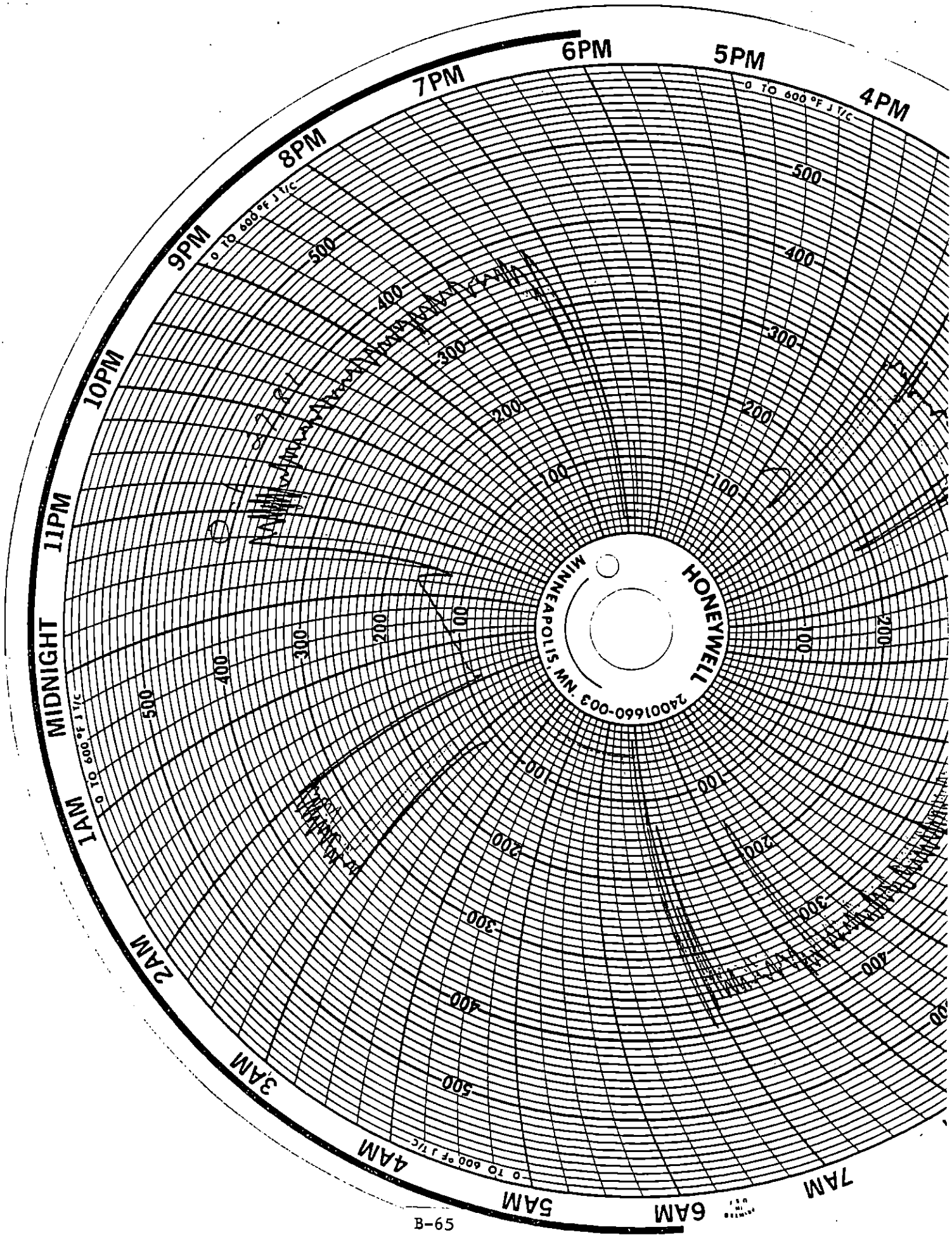
1400

PRODUCTION RAE 0141 TPH
ASPHALT 007.0
AGGREGATE 0134
RECYCLE 0000
FILER 000.0
ADDITIVE 0000 PPH
FEEER #1 0035
FEEER #2 0028
FEEER #3 0038
FEEER #4 0028
FEEER #5 0000
AGG. TONS 00000914
ASPHALT GAL. 00010609
RECYCLE TONS 00000000
MIXNUMBER RUNNIN0005
FEEER #027.0 % TONS RUN0309
FEEER #020.2 % TONS RUN0231
FEEDR #028.0 % TONS RUN0321
FEEER #018 % TONS RUN0227
FEEER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILER 000.0 %
ADDITIVE00.00 %
TARET TONS 0000
TARET TONS RUN 0000
TON TO GO 0000
TONTO DATE 172600
ACTUAL A/C PERCEN04.95
MIXTEMP. 0327
ASPALT TEM 0000
BAHOUSE INLET TEMP0339
FUE USAGE 0000 GPT
GASUSAE 0000 CF/T
FUEL GLLONS 00000000
GAS CU. FT. 00000000

1430

PRODUCTION RATE 0138 TPH
ASPHALT 006.9
AGGREGATE 0131
RECYCLE 0000
FILER 000.0
ADDITIVE 0000 PPH
FEEER #1 036
FEEER #2 0028
FEEER #3 0039
FEEER #4 0028
FEEER #5 0000
AGG TONS 00000966
ASPHALT GAL. 00011207
RECLE TONS 00000000
MIXNUMBER RUNNIN0005
FEEER #027.0 % TONS RUN032
FEEER #020.2 % TONS RUN0246
FEEDER #028.0 % TONS RUN0336
FEEER #019.8 % TONS RUN0238
FEEER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILER 000.0 %
ADDITIVE00.00 %
TARET TONS 0000
TARGET TONS RUN 0000
TON TO GO 0000
TON TO DATE 172600
ACTLL A/C PERCEN04.93
MIX TEMP. 034*
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0346
FUE USAGE 0000 GPT
GAS USE 0000 CF/T
FUEL GALLONS 00000000
GASU. FT. 00000000


12 MIDNIGHT
1AM
2AM
3AM
4AM
5AM
6AM
7AM
8AM
9AM
10AM
11AM
NOON
1PM
2PM
3PM
4PM
5PM
6PM
7PM
8PM
9PM
10PM
0 TO 600 °F J T/C
100
200
300
400
500
HONEYWELL
MINNEAPOLIS, MIN.
24001660-003


6PM
5PM
4PM
7PM
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9PM
10PM
11PM
MIDNIGHT
1AM
2AM
3AM
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5AM
6AM
7AM
0 TO 600 °F J T/C
-500
-400
-300
-200
-100
100
200
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400
500
HONEYWELL
MINNEAPOLIS, MN.
24001660-003

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GALLONS 0000000
GAS CU. FT. 00000000

0830

PRODUCTION RATE 0196 TPH
ASPHALT 009.4
AGGREGATE 0186
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0050
FEEDER #2 0039
FEEDER #3 0055
FEEDER #4 0038
FEEDER #5 0000
AGG. TONS 00000227
ASPHALT GAL. 00002631
RECYCLE TONS 00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 % TONS RUN0061
FEEDER #020.2 % TONS RUN0041
FEEDER #028.0 % TONS RUN0066
FEEDER #019.8 % TONS RUN0047
FEEDER #000.0 % TONS RUN0001
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 172900
ACTUAL A/C PERCEN04.98
MIX TEMP. 0330
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0348
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

0700

PRODUCTION RATE 0203 TPH
ASPHALT 010.0
AGGREGATE 0193
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0050
FEEDER #2 0039
FEEDER #3 0055
FEEDER #4 0038
FEEDER #5 0000
AGG. TONS 00000125
ASPHALT GAL. 00001417
RECYCLE TONS 00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 % TONS RUN0035
FEEDER #020.2 % TONS RUN0025
FEEDER #028.9 % TONS RUN0036
FEEDER #019.8 % TONS RUN0025
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 172800
ACTUAL A/C PERCEN05.01
MIX TEMP. 0347
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0341
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

10:00

```
PRODUCTION RATE  0198     TPH
ASPHALT          009.9
AGGREGATE        0188
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0051
FEEDER #2        0040
FEEDER #3        0056
FEEDER #4        0039
FEEDER #5        0000
AGG. TONS        00000564
ASPHALT GAL.     00006557
RECYCLE TONS     00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 %   TONS RUN0160
FEEDER #020.2 %   TONS RUN0120
FEEDER #028.0 %   TONS RUN0166
FEEDER #019.8 %   TONS RUN0117
FEEDER #000.0 %   TONS RUN0000
RECYCLE 000.0 %   TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     173300
ACTUAL A/C PERCEN04.98
MIX TEMP.        0333
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0348
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

09:00

```
PRODUCTION RATE  0199     TPH
ASPHALT          009.8
AGGREGATE        0189
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000     PPH
FEEDER #1        0051
FEEDER #2        0040
FEEDER #3        0056
FEEDER #4        0039
FEEDER #5        0000
AGG. TONS        00000400
ASPHALT GAL.     00004652
RECYCLE TONS     00000000
MIX NUMBER RUNNIN0005
FEEDER #027.0 %    TONS RUN0113
FEEDER #020.2 %    TONS RUN0084
FEEDER #028.0 %    TONS RUN0117
FEEDER #019.8 %    TONS RUN0083
FEEDER #000.0 %    TONS RUN0000
RECYCLE 000.0 %    TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     173[illegible]
ACTUAL A/C PERCEN05.01
MIX TEMP.        0316
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0351
FUEL USAGE       0000    GPT
GAS USAE         0000    CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

1100

```
PRODUCTION RATE  0196    TPH
ASPHALT          010.0
AGGREGATE        0186
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0052
FEEDER #2        0041
FEEDER #3        0057
FEEDER #4        0040
FEEDER #5        0000
AGG. TONS        00000767
ASPHALT GAL.     00008904
RECYCLE TONS     00000000
MIX RUNBER RUNNIN0005
FEEDER #027.0 %    TONS RUN0217
FEEDER #020.2 %    TONS RUN0162
FEEDER #028.0 %    TONS RUN0225
FEEDER #019.8 %    TONS RUN0159
FEEDER #000.0 %    TONS RUN0000
RECYCLE 000.0 %    TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGET TONS RUN  0000
TONS TO GO       0000
TONS TO DATE     173500
ACTUAL A/C PERCEN04.85
MIX TEMP.        0315
ASPHALT TEMP.    0000
BAGHOUSE INLET TEMP0361
FUEL USAGE       0000    GPT
GAS USAE         0000   CF/T
FUEL GALLONS     00000000
GAS CU. FT.      00000000
```

196 TPH

1030

```
PRODUCTION RATE  0196    TPH
ASPHALT          009.9
AGGREGATE        0186
RECYCLE          0000
FILLER           000.0
ADDITIVE         0000    PPH
FEEDER #1        0051
FEEDER #2        0040
FEEDER #3        0056
FEEDER #4        0039
FEEDER #         0000
AGG. TONS        00000645
ASPHALT GAL.     0000/485
RECYCLE TONS     00000000
MIX RUNBER RUNNIN0005
FEEDER #0[illegible].0 %    TONS RUN0183
FEEDER#020.2 %    TONS RUN0137
FEEDER#028.0 %    TONS RUN0189
FEEDER #019.8 %    TONS RUN0154
FEEDER#000.0 %    TONS RUN0000
RECYCLE 000.0 %    TONS RUN0000
ASPHALT 005.0 %
FILLER  000.0 %
ADDITIVE00.00 %
TARGET TONS      0000
TARGETTONS RUN   0000
TONS TO GO       0000
TONS TO DATE     173300
ACTUAL A/C PERCEN04.93
MIX TEMP.        0323
ASPHALT TEMP.    0000
BAGHOUSEINLET TEMP0335
FUEL USAGE       0000    GPT
GAS USE          0000   CF/T
FUEL GALLONS     0000000
GAS CU FT.       00000000
```

BIN # 2 HIGH

1200

PRODUCTION RATE 0176 TPH
ASPHALT 008.7
AGGREGATE 0167
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0045
FEEDER #2 0035
FEEDER #3 0048
FEEDER #4 0034
FEEDER #5 0000
AGG. TONS 00000948
ASPHALT GAL. 00011010
RECYCLE TONS 00000000
MIX RUNBER RUNNIN0005
FEEDER #027.0 % TONS RUN0257
FEEDER #020.2 % TONS RUN0192
FEEDER #028.0 % TONS RUN0266
FEEDER #019.8 % TONS RUN0188
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 173600
ACTUAL A/C PERCEN04.85
MIX TEMP. 0342
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0331
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1130

PRODUCTION RATE 0198 TPH
ASPHALT 009.9
AGGREGATE 0188
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0052
FEEDER #2 0041
FEEDER #3 0057
FEEDER #4 0040
FEEDER #5 0000
AGG. TONS 00000830
ASPHALT GAL. 00009634
RECYCLE TONS 00000000
MIX RUNBER RUNNIN0005
FEEDER #027.0 % TONS RUN0235
FEEDER #020.2 % TONS RUN0176
FEEDER #028.0 % TONS RUN0244
FEEDER #019.8 % TONS RUN0172
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 173500
ACTUAL A/C PERCEN04.85
MIX TEMP. 0333
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0359
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1300

PRODUCTION RATE	0169	TPH
ASPHALT	008.7	
AGGREGATE	0160	
RECYCLE	0000	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0045	
FEEDER #2	0035	
FEEDER #3	0048	
FEEDER #4	0034	
FEEDER #5	0000	
AGG. TONS	00001118	
ASPHALT GAL.	00012989	
RECYCLE TONS	00000000	
MIX RUNBER RUNNIN	0005	
FEEDER #027.0 %	TONS RUN	0305
FEEDER #020.2 %	TONS RUN	0228
FEEDER #028.0 %	TONS RUN	0316
FEEDER #019.8 %	TONS RUN	0224
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 000.0 %	TONS RUN	0000
ASPHALT 005.0 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	173800	
ACTUAL A/C PERCEN	04.98	
MIX TEMP.	0328	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0333	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

1230

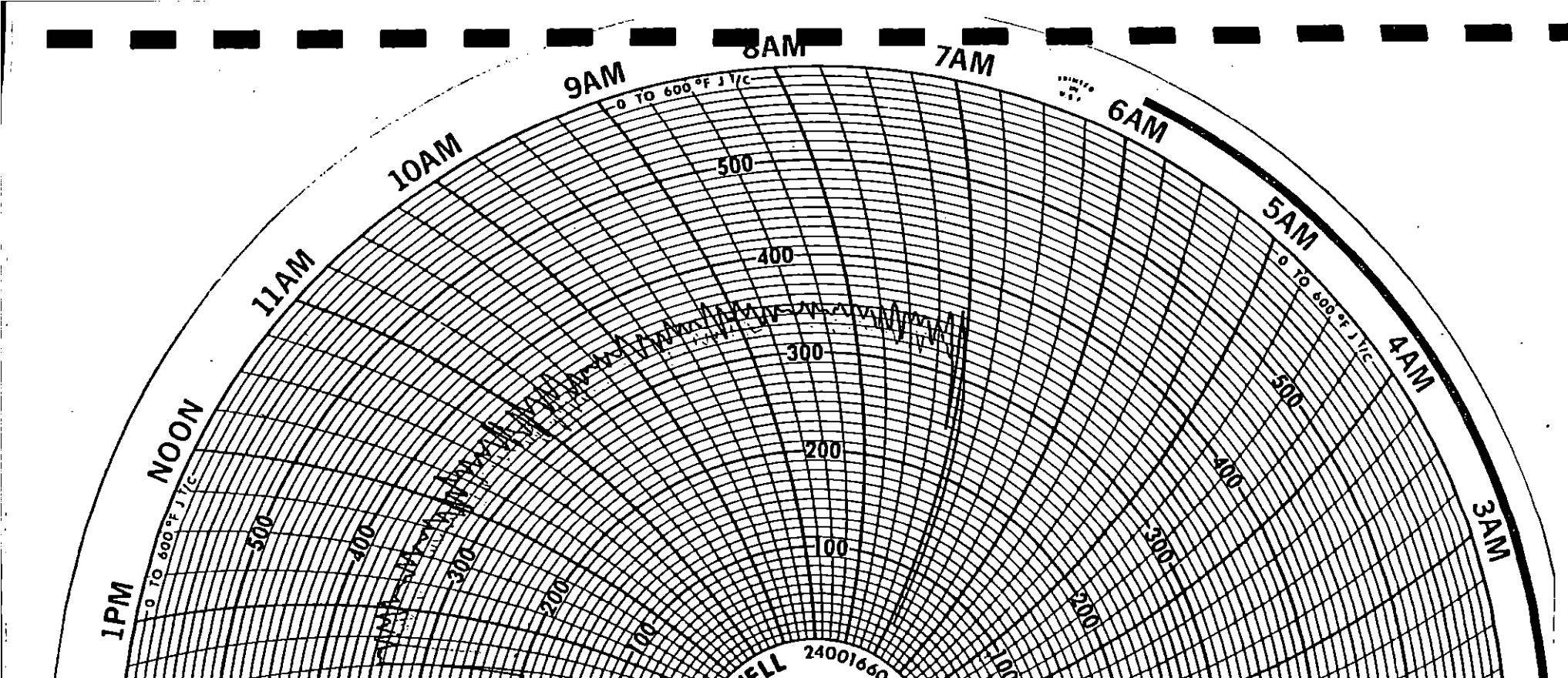
PRODUCTION RATE	0172	TPH
ASPHALT	008.7	
AGGREGATE	0163	
RECYCLE	0000	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0045	
FEEDER #2	0036	
FEEDER #3	0049	
FEEDER #4	0034	
FEEDER #5	0000	
AGG. TONS	00001085	
ASPHALT GAL.	00012612	
RECYCLE TONS	00000000	
MIX RUNBER RUNNIN	0005	
FEEDER #027.0 %	TONS RUN	0296
FEEDER #020.2 %	TONS RUN	0221
FEEDER #028.0 %	TONS RUN	0307
FEEDER #019.8 %	TONS RUN	0217
FEEDER #000.0 %	TONS RUN	0000
RECYCLE 000.0 %	TONS RUN	0000
ASPHALT 005.0 %		
FILLER 000.0 %		
ADDITIVE00.00 %		
TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	173800	
ACTUAL A/C PERCEN	05.01	
MIX TEMP.	0330	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0347	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

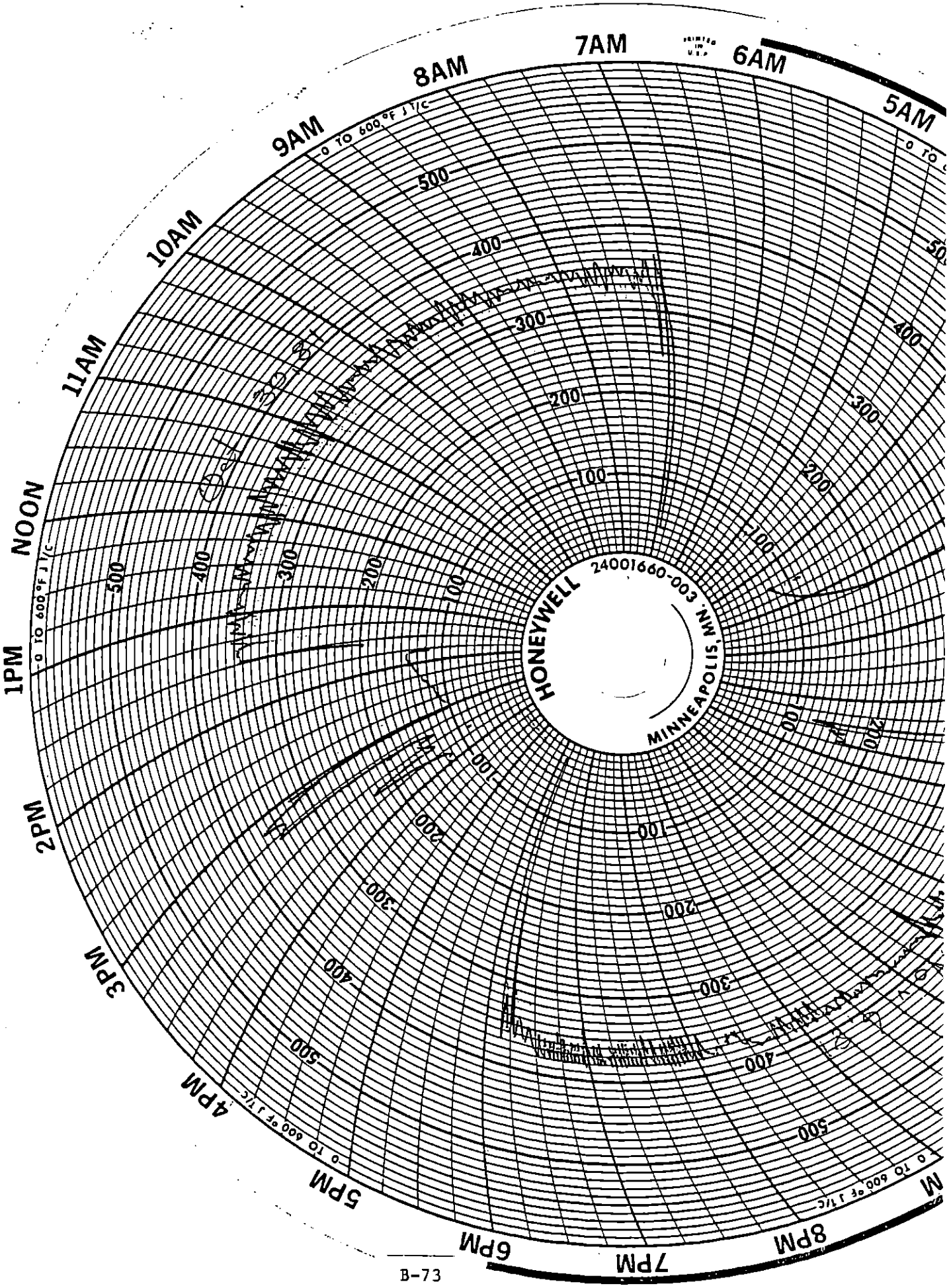
PLANT SEQUENTIAL STOP

1330

PRODUCTION RATE 0151 TPH
ASPHALT 007.8
AGGREGATE 0143
RECYCLE 0000
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0039
FEEDER #2 0031
FEEDER #3 0042
FEEDER #4 0030
FEEDER #5 0000
AGG. TONS 00001191
ASPHALT GAL. 00013848
RECYCLE TONS 00000000
MIX RUNBER RUNNIN0005
FEEDER #027.0 % TONS RUN0326
FEEDER #020.2 % TONS RUN0244
FEEDER #028.0 % TONS RUN0338
FEEDER #019.8 % TONS RUN0239
FEEDER #000.0 % TONS RUN0000
RECYCLE 000.0 % TONS RUN0000
ASPHALT 005.0 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 173900
ACTUAL A/C PERCEN05.06
MIX TEMP. 0332
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0342
FUEL USAGE 0000 GPI
GAS USAE 0000 CF/I
FUEL GALLONS 00000000
GAS CU. FT. 00000000

ASPHALT DEVIATION


8AM
7AM
6AM
5AM
4AM
3AM
2AM
9AM
10AM
11AM
NOON
1PM
0 TO 600 °F J T/C
500
400
300
200
100
HONEYWELL
24001660-003


7AM
6AM
8AM
5AM
9AM
10AM
11AM
NOON
1PM
2PM
3PM
4PM
5PM
6PM
7PM
8PM
0 TO 600 °F J T/C
500
400
300
200
100
HONEYWELL
24001660-003
MINNEAPOLIS, MN

NOV 6 1981

1030

PRODUCTION RATE	0277	TPH
ASPHALT	008.8	
AGGREGATE	0187	
RECYCLE	0081	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0000	
FEEDER #2	0052	
FEEDER #3	0051	
FEEDER #4	0077	
FEEDER #5	0000	
AGG. TONS	00000761	
ASPHALT GAL.	00007775	
RECYCLE TONS	00000344	

MIX RUNBER RUNNIN0010

FEEDER #000.0 %	TONS	RUN0000
FEEDER #019.0 %	TONS	RUN0216
FEEDER #018.9 %	TONS	RUN0215
FEEDER #028.5 %	TONS	RUN0324
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 028.5 %	TONS	RUN0343
ASPHALT 005.1 %		
FILLER 000.0 %		
ADDITIVE00.00 %		

TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	175000	
ACTUAL A/C PERCEN	04.45	
MIX TEMP.	0303	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0372	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

Nov. 6, 1981

1000

PRODUCTION RATE	0272	TPH
ASPHALT	008.4	
AGGREGATE	0185	
RECYCLE	0079	
FILLER	000.0	
ADDITIVE	0000	PPH
FEEDER #1	0000	
FEEDER #2	0052	
FEEDER #3	0051	
FEEDER #4	0077	
FEEDER #5	0000	
AGG. TONS	00000596	
ASPHALT GAL.	00006075	
RECYCLE TONS	00000271	

MIX RUNBER RUNNIN0010

FEEDER #000.0 %	TONS	RUN0000
FEEDER #019.0 %	TONS	RUN0169
FEEDER #018.9 %	TONS	RUN0168
FEEDER #028.5 %	TONS	RUN0254
FEEDER #000.0 %	TONS	RUN0000
RECYCLE 028.5 %	TONS	RUN0270
ASPHALT 005.1 %		
FILLER 000.0 %		
ADDITIVE00.00 %		

TARGET TONS	0000	
TARGET TONS RUN	0000	
TONS TO GO	0000	
TONS TO DATE	174700	
ACTUAL A/C PERCEN	04.21	
MIX TEMP.	0308	
ASPHALT TEMP.	0000	
BAGHOUSE INLET TEMP	0367	
FUEL USAGE	0000	GPT
GAS USAE	0000	CF/T
FUEL GALLONS	00000000	
GAS CU. FT.	00000000	

1130

PRODUCTION RATE 0270 TPH
ASPHALT 008.7
AGGREGATE 0183
RECYCLE 0078
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0000
FEEDER #2 0050
FEEDER #3 0049
FEEDER #4 0074
FEEDER #5 0000
AGG. TONS 00000903
ASPHALT GAL. 00009278
RECYCLE TONS 00000406
MIX RUNBER RUNNIN0010
FEEDER #000.0 % TONS RUN0000
FEEDER #019.0 % TONS RUN0256
FEEDER #018.9 % TONS RUN0255
FEEDER #028.5 % TONS RUN0384
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.5 % TONS RUN0406
ASPHALT 005.1 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 175200
ACTUAL A/C PERCEN04.42
MIX TEMP. 0310
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0360
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

1100

PRODUCTION RATE 0274 TPH
ASPHALT 008.8
AGGREGATE 0186
RECYCLE 0079
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0000
FEEDER #2 0052
FEEDER #3 0050
FEEDER #4 0076
FEEDER #5 0000
AGG. TONS 00000846
ASPHALT GAL. 00008670
RECYCLE TONS 00000381
MIX RUNBER RUNNIN0010
FEEDER #000.0 % TONS RUN0000
FEEDER #019.0 % TONS RUN0240
FEEDER #018.9 % TONS RUN0239
FEEDER #028.5 % TONS RUN0360
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.5 % TONS RUN0381
ASPHALT 005.1 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 175200
ACTUAL A/C PERCEN04.45
MIX TEMP. 0309
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0378
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

11/6/31

NOV 6 1981 11/6/31

PLANT SYSTEM STOP

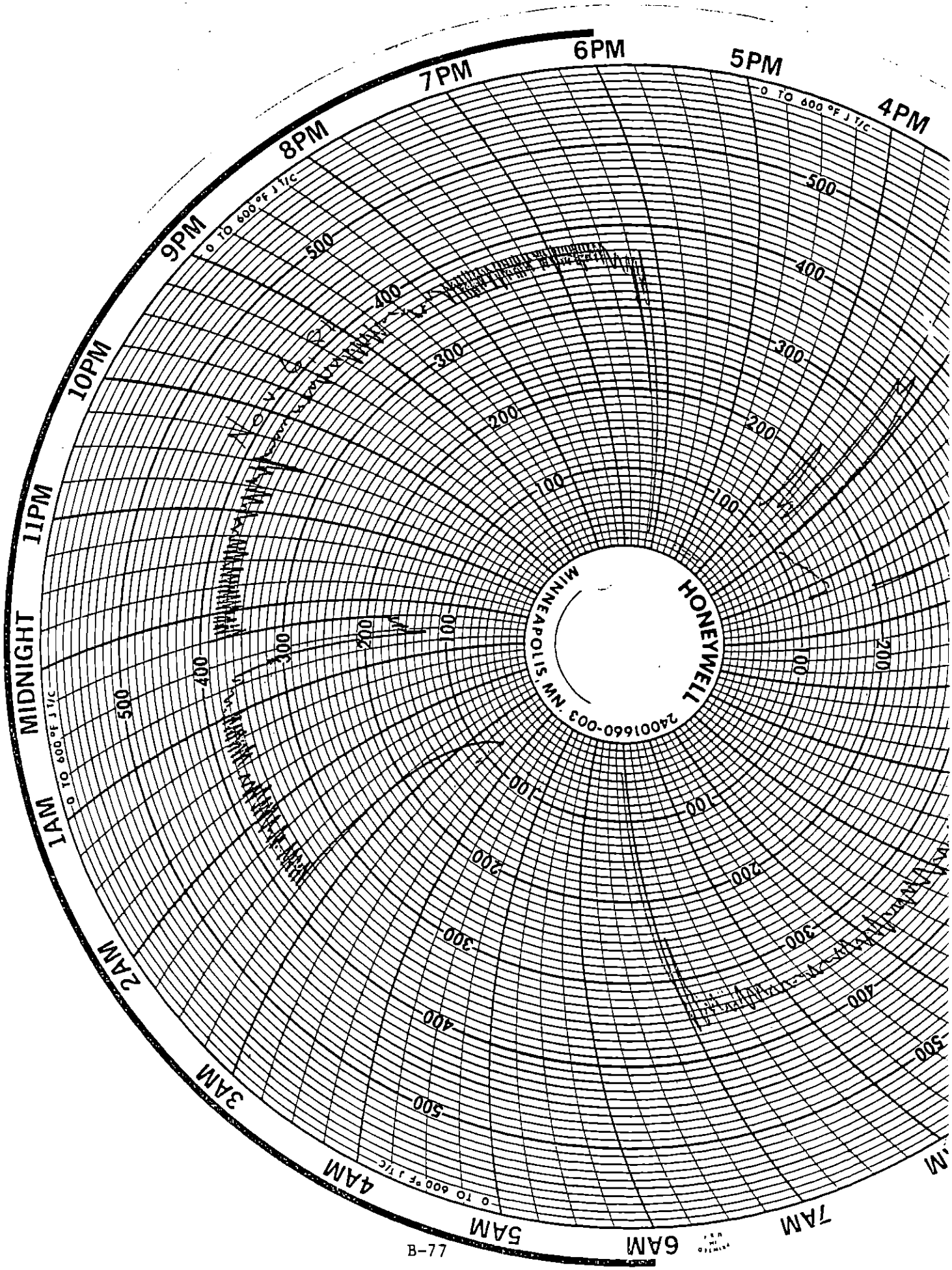
1230

PRODUCTION RATE 5360 TPH
ASPHALT 007.2
AGGREGATE 7802
RECYCLE 0077
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0000
FEEDER #2 0033
FEEDER #3 0032
FEEDER #4 0049
FEEDER #5 0000
AGG. TONS 00001057
ASPHALT GAL. 00010915
RECYCLE TONS 00000477
MIX NUMBER RUNNIN0010
FEEDER #000.0 % TONS RUN0000
FEEDER #019.0 % TONS RUN0292
FEEDER #018.9 % TONS RUN0290
FEEDER #028.5 % TONS RUN0438
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.5 % TONS RUN0477
ASPHALT 005.1 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 175400
ACTUAL A/C PERCEN04.38
MIX TEMP. 0301
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0386
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000

BIN # 2 HIGH

1200

PRODUCTION RATE 0256 TPH
ASPHALT 008.0
AGGREGATE 0172
RECYCLE 0076
FILLER 000.0
ADDITIVE 0000 PPH
FEEDER #1 0000
FEEDER #2 0047
FEEDER #3 0047
FEEDER #4 0071
FEEDER #5 0000
AGG. TONS 00000991
ASPHALT GAL. 00010209
RECYCLE TONS 00000446
MIX NUMBER RUNNIN0010
FEEDER #000.0 % TONS RUN0000
FEEDER #019.0 % TONS RUN0273
FEEDER #018.9 % TONS RUN0271
FEEDER #028.5 % TONS RUN0409
FEEDER #000.0 % TONS RUN0000
RECYCLE 028.5 % TONS RUN0445
ASPHALT 005.1 %
FILLER 000.0 %
ADDITIVE00.00 %
TARGET TONS 0000
TARGET TONS RUN 0000
TONS TO GO 0000
TONS TO DATE 175300
ACTUAL A/C PERCEN04.45
MIX TEMP. 0312
ASPHALT TEMP. 0000
BAGHOUSE INLET TEMP0354
FUEL USAGE 0000 GPT
GAS USAE 0000 CF/T
FUEL GALLONS 00000000
GAS CU. FT. 00000000


HONEYWELL
MINNEAPOLIS, MN.
24001660-003
0 TO 600 °F J T/C
MIDNIGHT
1AM
2AM
3AM
4AM
5AM
6AM
7AM
8PM
9PM
10PM
11PM
4PM
5PM
6PM
7PM
100
200
300
400
500

APPENDIX C

MOISTURE ANALYSIS

MIDWEST RESEARCH INSTITUTE

Moisture Analysis

Run No. _____ Date 10/8/81

MRI Project No. 4891 L83 Recorded By SLC

Sample No: #1 10/7/81
Material: Recycle Mat.

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: 719.4 g
(Excl. Container)
Number of Splits: 0

Split Sample Weight (before drying)
Pan + Sample: 738.1 g
Pan: ~~18.7~~ g 18.7 g
Wet Sample: 719.4 g

Oven Temperature: 110°C
Date In 10/8/81 Date Out 10/8/81
Time In 1:21 Time Out 3:33
Drying Time 2 hours 12 min

Material Weight (after drying)
Pan + Material: 731.7 g
Pan: 18.7 g
Dry Sample: 713.0 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 719.4
(B) Dry Sample Wt. 713.0 g
(C) Difference Wt. 6.44 g

$\frac{C \times 100}{A}$ = 0.90 % Moisture

Sample No: #1 10/7/81
Material: Aggregate Mix

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: 971.5 g
(Excl. Container)
Number of Splits: 0

Split Pan Weight (before drying)
Pan + Sample: 989.9
Pan: 18.4 g
Wet Sample: 971.5 g

Oven Temperature: 110°C
Date In 10/8/81 Date Out 10/8/81
Time In 1:27 Time Out 5:00
Drying Time 3 hours 33 min

Material Weight (after drying)
Pan + Material: 969.1 g
Pan: 18.4
Dry Sample: 950.7 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 971.5 g
(B) Dry Sample Wt. 950.7 g
(C) Difference Wt. 20.8 g

$\frac{C \times 100}{A}$ = 2.14 % Moisture

Comments:

Weighed at 2 hrs. & 4 hrs

	Recycle	Agg Mix.
2 hrs	731.7 g 3:33 pm	969.2 g 3:32 pm
4 hrs	731.5 ✓ 5:00 pm	969.1 g 5:00

C-2

7/80

MIDWEST RESEARCH INSTITUTE
Moisture Analysis

Run No. #3
RI Project No. 2911.83
Date 10/9/81
Recorded By G.P.

Sample No: #3 10/9/81
Material: Virgin Aggregate

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: 1336.4 g
(Excl. Container)
Number of Splits: 0

Split Sample Weight (before drying)
Pan + Sample: 1354.2 g
Pan: 18.4 g
Wet Sample: 1336.4 g

Oven Temperature: 110 °C
Date In 10/9 Date Out 10/12
Time In 14:00 Time Out 10:00
Drying Time 68 hours

Material Weight (after drying)
Pan + Material: 1335.6 g
Pan: 18.4 g
Dry Sample: 1317.2 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1336.4 g
(B) Dry Sample Wt. 1317.2 g
(C) Difference Wt. 19.2 g

C X 100 / A = 1.44 % Moisture

Sample No: #3 10/9/81
Material: Recycled Asphalt

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: 997.1 g
(Excl. Container)
Number of Splits: 0

Split Pan Weight (before drying)
Pan + Sample: 1006.3 g
Pan: 19.2 g
Wet Sample: 997.1 g

Oven Temperature: 110 °C
Date In 10/9 Date Out 10/9
Time In 14:00 Time Out 15:30
Drying Time 1 hour 30 min

Material Weight (after drying)
Pan + Material: 997.0 g
Pan: 19.2 g
Dry Sample: 977.8 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 997.1 g
(B) Dry Sample Wt. 977.8 g
(C) Difference Wt. 19.3 g

C X 100 / A = 0.94 % Moisture

Comments: Sample was kept covered at room temperature

Sample	1½ hour Wt.	1½ hour % Moisture	3 hours Wt.	3 hours % Moisture	68 hours Wt.	68 hours % Moisture
Virgin aggregate	1336.6	1.36	1335.6	1.44	1335.6	1.44
Recycled Asphalt	997.0	0.94	996.6	0.98	996.3	1.01

MIDWEST RESEARCH INSTITUTE
Moisture Analysis

Run No. _____
RI Project No. 4891-L83

Date 10/9/81
Recorded By J.P

Sample No: #4
Material: Aggregate 3:30 pm 10/9

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: 1419.5 g
(Excl. Container)
Number of Splits: 0

Split Sample Weight (before drying)
Pan + Sample: 1436.1 g
Pan: 16.6 g
Wet Sample: 1419.5 g

Oven Temperature: 110 °C
Date In 10/9 Date Out 10/12
Time In 12:30 Time Out 10:00
Drying Time 64½ hours

Material Weight (after drying)
Pan + Material: 1418.4 g
Pan: 16.6 g
Dry Sample: 1401.8 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1419.5 g
(B) Dry Sample Wt. 1401.8 g
(C) Difference Wt. 18.1 g

$\frac{C \times 100}{A}$ = 1.27 % Moisture

Sample No: #4
Material: Recycle 3:30 pm 10/9

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: 1253.5 g
(Excl. Container)
Number of Splits: 0

Split Pan Weight (before drying)
Pan + Sample: 1270.2 g
Pan: 16.7 g
Wet Sample: 1253.5 g

Oven Temperature: 110 °C
Date In 10/9 Date Out 10/9
Time In 12:30 Time Out 19:00
Drying Time 1½ hours

Material Weight (after drying)
Pan + Material: 1259.7 g
Pan: 16.7 g
Dry Sample: 1243.0 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1253.5 g
(B) Dry Sample Wt. 1243.0 g
(C) Difference Wt. 10.5 g

$\frac{C \times 100}{A}$ = 0.84 % Moisture

Comments:

Sample	1½ hours wt	1½ hours %moisture	64½ hours wt	64½ hours %moisture
aggregate	1422.2	0.98	1418.4	1.27
recycle	1259.7	0.84	1251.7	1.48

MIDWEST RESEARCH INSTITUTE
Moisture Analysis

Run No. _____ Date 10/26/81
MRI Project No. 4891.683 Recorded By S/C

Sample No: 1330
Material: Virgin Mat. Collected 10/19/81

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Sample Weight (before drying)
Pan + Sample: 1365.9 g
Pan: 16.9 g
Wet Sample: 1349.0 g

Oven Temperature: 110° c
Date In 10/26/81 Date Out 10/27/81
Time In 9:36 Time Out 9:16
Drying Time _____

Material Weight (after drying)
Pan + Material: 1332.8 g
Pan: 16.9 g
Dry Sample: 1315.9 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1349.0 g
(B) Dry Sample Wt. 1315.9 g
(C) Difference Wt. 33.1 g

$\frac{C \times 100}{A}$ = 2.45 % Moisture

Sample No: 0815
Material: Virgin mat Collected 10/20/81

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Pan Weight (before drying)
Pan + Sample: 1205.9 g
Pan: 17.0 g
Wet Sample: 1189.9 g

Oven Temperature: 110° c
Date In 10/26/81 Date Out 10/27/81
Time In 9:44 Time Out 9:24
Drying Time _____

Material Weight (after drying)
Pan + Material: 1177.1 g
Pan: 17.0 g
Dry Sample: 1160.1 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1189.9 g
(B) Dry Sample Wt. 1160.1 g
(C) Difference Wt. 29.8 g

$\frac{C \times 100}{A}$ = 2.50 % Moisture

Comments:

MIDWEST RESEARCH INSTITUTE

Moisture Analysis

Run No. _____
MRI Project No. 4891L 83

Date 10/27/81
Recorded By STC

Sample No: 0815
Material: Recycle Mat 10/20/81

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Sample Weight (before drying)
Pan + Sample: 1,281.0g
Pan: 18.3g
Wet Sample: 1262.7 g

Oven Temperature: 110° C
Date In 10/27/81 Date Out 10/27/81
Time In 12:00 Time Out 1:35
Drying Time ≙ 1.5 hr

Material Weight (after drying)
Pan + Material: 1259.8g
Pan: 18.3g
Dry Sample: 1241.5

MOISTURE CONTENT:
(A) Wet Sample Wt. 1262.7
(B) Dry Sample Wt. 1241.5
(C) Difference Wt. 21.2

$\frac{C \times 100}{A}$ = 1.68 % Moisture

Sample No: 1330
Material: Recycle 10/19/81

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Pan Weight (before drying)
Pan + Sample: 1219.8g
Pan: 18.3g
Wet Sample: 1201.5

Oven Temperature: 110° C
Date In 10/27/81 Date Out 10/27/81
Time In 3:36 Time Out 3:08
Drying Time ≙ 1.5 hr

Material Weight (after drying)
Pan + Material: 1201.6g
Pan: 18.3g
Dry Sample: 1183.3g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1201.5g
(B) Dry Sample Wt. 1183.3g
(C) Difference Wt. 18.2g

$\frac{C \times 100}{A}$ = 1.51 % Moisture

Comments:

MIDWEST RESEARCH INSTITUTE
Moisture Analysis

Run No. _____
MRI Project No. 4891 C83

Date 10/26/81
Recorded By SJC

Sample No: 1330
Material: Virgin Mat Collected 10/20/81

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Sample Weight (before drying)
Pan + Sample: 1,305.8 g
Pan: 17.0 g
Wet Sample: 1,288.8 g

Oven Temperature: 110° C
Date In 10/26/81 Date Out 10/27/81
Time In 9:50 Time Out 10:35
Drying Time _____

Material Weight (after drying)
Pan + Material: 1274.7 g
Pan: 17.0 g
Dry Sample: 1257.7 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1288.8
(B) Dry Sample Wt. 1257.7 g
(C) Difference Wt. 31.1 g

$\frac{C \times 100}{A}$ = 2.41 % Moisture

Sample No: 0900
Material: Virgin Mat Collected 10/21/81

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Pan Weight (before drying)
Pan + Sample: 1248.0 g
Pan: 16.9 g
Wet Sample: 1231.1 g

Oven Temperature: 110° C
Date In 10/26/81 Date Out 10/27/81
Time In 9:54 Time Out 9:35
Drying Time _____

Material Weight (after drying)
Pan + Material: 1216.7 g
Pan: 16.9 g
Dry Sample: 1,199.8 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1231.1 g
(B) Dry Sample Wt. 1199.8 g
(C) Difference Wt. 31.3 g

$\frac{C \times 100}{A}$ = 2.54 % Moisture

Comments:

MIDWEST RESEARCH INSTITUTE
Moisture Analysis

Run No. _____
RI Project No. 4891283

Date 10/26/81
Recorded By SLC

Sample No: 12:00
Material: Virgin mat. Collected 10/22/81

Split Sample Balance:
Make OHAUS-
Capacity 2610 g
Smallest Division 0.1 g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Sample Weight (before drying)
Pan + Sample: 1115.2 g
Pan: 17.0 g
Wet Sample: 1098.2 g

Oven Temperature: 110° C
Date In 10/26/81 Date Out 10/27/81
Time In 10:00 Time Out 10:36
Drying Time _____

Material Weight (after drying)
Pan + Material: 1056.4 g
Pan: 17.0 g
Dry Sample: 1039.4 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1098.2 g
(B) Dry Sample Wt. 1039.4 g
(C) Difference Wt. 58.8 g

$\frac{C \times 100}{A}$ = 5.35 % Moisture

Sample No: 0830
Material: Virgin mat. 10/22/81

Split Sample Balance:
Make OHAUS.
Capacity 2610g
Smallest Division 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Pan Weight (before drying)
Pan + Sample: 1126.9 g
Pan: 17.0 g
Wet Sample: 1109.9

Oven Temperature: 110° C
Date In 10/26/81 Date Out 10/27/81
Time In 10:04 Time Out 11:29
Drying Time _____

Material Weight (after drying)
Pan + Material: 1083.0 g
Pan: 17.0 g
Dry Sample: 1066.0 g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1109.9 g
(B) Dry Sample Wt. 1066.0 g
(C) Difference Wt. 43.9 g

$\frac{C \times 100}{A}$ = 3.96 % Moisture

Comments:

4.66 %

C-8

MIDWEST RESEARCH INSTITUTE
Moisture Analysis

Run No. _____
MRI Project No. 4891283

Date 10/27/81
Recorded By SLR

Sample No: 1330
Material: Recycle 10/20/81

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division ✓ 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Sample Weight (before drying)
Pan + Sample: 1342.9g
Pan: 18.4g
Wet Sample: ✓ 1324.5g

Oven Temperature: 110°C
Date In 10/27/81 Date Out 10/27/81
Time In 1248 Time Out 3:45
Drying Time ≅ 2.5 hrs

Material Weight (after drying)
Pan + Material: 1322.6g
Pan: 18.4g ✓
Dry Sample: ✓ 1304.2g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1324.5 g
(B) Dry Sample Wt. 1304.2 g
(C) Difference Wt. 20.3

$\frac{C \times 100}{A}$ = 1.53 % Moisture

Sample No: 1315 hvo
Material: Virgin Agg 10/26/81

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division ✓ 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Pan Weight (before drying)
Pan + Sample: 1398.3g
Pan: 18.3g ✓
Wet Sample: ✓ 1380.0g

Oven Temperature: 110°C
Date In 10/29/81 Date Out 10/30/81
Time In 9:00 Time Out 9:09
Drying Time ≅ 24 hrs

Material Weight (after drying)
Pan + Material: 1355.8g
Pan: 18.3g
Dry Sample: ✓ 1332.5

MOISTURE CONTENT:
(A) Wet Sample Wt. 1380.0 g
(B) Dry Sample Wt. 1337.5 g
(C) Difference Wt. 42.5g ✓

$\frac{C \times 100}{A}$ = 3.07 % Moisture

Comments:

MIDWEST RESEARCH INSTITUTE

Moisture Analysis

Run No. _____

MRI Project No. 4891L.83

Date 10/26/81

Recorded By S/C

Sample No: 11:00 hrs

Material: Virgin Dye Collected 10/26/81

Split Sample Balance:

Make Ohaus

Capacity 2610 g

Smallest Division 0.1 g

Total Sample Weight: _____

(Excl. Container)

Number of Splits: _____

Split Sample Weight (before drying)

Pan + Sample: 1552.9 g

Pan: 18.3 g

Wet Sample: 1534.6 g

Oven Temperature: 110 °C

Date In 10/26/81 Date Out 10/27/81

Time In 1:21 Time Out 19:30

Drying Time _____

Material Weight (after drying)

Pan + Material: 1478.1 g

Pan: 18.3 g

Dry Sample: 1459.8 g

MOISTURE CONTENT:

(A) Wet Sample Wt. 1534.6 g

(B) Dry Sample Wt. 1459.8 g

(C) Difference Wt. 74.8 g

$\frac{C \times 100}{A}$ = 4.87 % Moisture

Sample No: _____

Material: _____

Split Sample Balance:

Make _____

Capacity _____

Smallest Division _____

Total Sample Weight: _____

(Excl. Container)

Number of Splits: _____

Split Pan Weight (before drying)

Pan + Sample: _____

Pan: _____

Wet Sample: _____

Oven Temperature: _____

Date In _____ Date Out _____

Time In _____ Time Out _____

Drying Time _____

Material Weight (after drying)

Pan + Material: _____

Pan: _____

Dry Sample: _____

MOISTURE CONTENT:

(A) Wet Sample Wt. _____

(B) Dry Sample Wt. _____

(C) Difference Wt. _____

$\frac{C \times 100}{A}$ = _____ % Moisture

Comments:

MIDWEST RESEARCH INSTITUTE

Moisture Analysis

Run No. _____

MRI Project No. 4891L 83

Date 10/29/81

Recorded By SLC

Sample No: #0840

Material: Virgin mat. 10/27/81

Split Sample Balance:

Make Ohaus.

Capacity 2610g

Smallest Division 0.1g

Total Sample Weight: _____

(Excl. Container)

Number of Splits: _____

Split Sample Weight (before drying)

Pan + Sample: 1544.7g

Pan: 18.3g

Wet Sample: 1526.4

Oven Temperature: 110°C

Date In 10/29/81 Date Out 10/30/81

Time In 9:04 Time Out 9:16

Drying Time ≅ 24 hrs

Material Weight (after drying)

Pan + Material: 1497.7g

Pan: 18.3g

Dry Sample: 1479.4g

MOISTURE CONTENT:

(A) Wet Sample Wt. 1526.4g

(B) Dry Sample Wt. 1479.4g

(C) Difference Wt. 47.0g

$\frac{C \times 100}{A}$ = 3.07 % Moisture

Sample No: 1420

Material: Virgin Mat. 10/27/81

Split Sample Balance:

Make Ohaus.

Capacity 2610g

Smallest Division 0.1g

Total Sample Weight: _____

(Excl. Container)

Number of Splits: _____

Split Pan Weight (before drying)

Pan + Sample: 1522.1g

Pan: 18.7g

Wet Sample: 1503.4

Oven Temperature: 110°C

Date In 10/29/81 Date Out 10/30/81

Time In 9:09 Time Out 9:10

Drying Time ≅ 24 hrs

Material Weight (after drying)

Pan + Material: 1476.1g

Pan: 18.7g

Dry Sample: 1457.4g

MOISTURE CONTENT:

(A) Wet Sample Wt. 1503.4g

(B) Dry Sample Wt. 1457.4g

(C) Difference Wt. 46.0g

$\frac{C \times 100}{A}$ = 3.05 % Moisture

Comments:

MIDWEST RESEARCH INSTITUTE

Moisture Analysis

Run No. Recycle Material 11/6/81
MRI Project No. 4891C 83

Date 11/18/81
Recorded By SLC

Sample No: Recycle Mat. 11/6/81
Material: 1015

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Sample Weight (before drying)
Pan + Sample: 1,295.9g
Pan: 18.2g
Wet Sample: 1277.7

Oven Temperature: 110°C
Date In 11/18/81 Date Out 11/19/81
Time In 1:57 Time Out 4:50
Drying Time ≈ 3 hrs

Material Weight (after drying)
Pan + Material: 1,255.2g
Pan: 18.2g
Dry Sample: 1,237.0g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1277.7g
(B) Dry Sample Wt. 1,237.0g
(C) Difference Wt. 40.7g

$\frac{C \times 100}{A}$ = 3.18 % Moisture

Sample No: Virgin Material 10/30/81
Material: D850 hm.

Split Sample Balance:
Make Ohaus.
Capacity 2610g
Smallest Division 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Pan Weight (before drying)
Pan + Sample: 1,542.7g
Pan: 18.7g
Wet Sample: 1524.0g

Oven Temperature: 110°C
Date In 11/19/81 Date Out 11/19/81
Time In 2:04 Time Out 2:08
Drying Time ≈ 24 hrs

Material Weight (after drying)
Pan + Material: 1,508.1g
Pan: 18.7g
Dry Sample: 1,489.4g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1524.0g
(B) Dry Sample Wt. 1489.4g
(C) Difference Wt. 34.6g

$\frac{C \times 100}{A}$ = 2.27 % Moisture

Comments:

MIDWEST RESEARCH INSTITUTE
Moisture Analysis

Run No. Virgin Material
MRI Project No. 4891L83

Date 11/18/81
Recorded By SL

Sample No: Virgin Mat. 11/6/81
Material: 1015 Mo.

Split Sample Balance:
Make Ohaus
Capacity 2610g
Smallest Division 0.1g

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Sample Weight (before drying)
Pan + Sample: 1,171.5g
Pan: 18.7g
Wet Sample: 1,152.8g

Oven Temperature: 110°C
Date In 11/18/81 Date Out 11/19/81
Time In 2:09 Time Out 2:04
Drying Time ≈ 24 hrs

Material Weight (after drying)
Pan + Material: 1,147.9g
Pan: 18.7g
Dry Sample: 1,129.2g

MOISTURE CONTENT:
(A) Wet Sample Wt. 1,152.8
(B) Dry Sample Wt. 1,129.2g
(C) Difference Wt. _____

$\frac{C \times 100}{A}$ = 2.04 % Moisture

Sample No: _____
Material: _____

Split Sample Balance:
Make _____
Capacity _____
Smallest Division _____

Total Sample Weight: _____
(Excl. Container)
Number of Splits: _____

Split Pan Weight (before drying)
Pan + Sample: _____
Pan: _____
Wet Sample: _____

Oven Temperature: _____
Date In _____ Date Out _____
Time In _____ Time Out _____
Drying Time _____

Material Weight (after drying)
Pan + Material: _____
Pan: _____
Dry Sample: _____

MOISTURE CONTENT:
(A) Wet Sample Wt. _____
(B) Dry Sample Wt. _____
(C) Difference Wt. _____

$\frac{C \times 100}{A}$ = _____ % Moisture

Comments:

APPENDIX D

RAW MATERIAL ANALYSIS

MIDWEST RESEARCH INSTITUTE

Run No. Virgin Aggregate 10/7/81 Silt Analysis

MRI Project No. 4894 C 83

Date 11/17/81

Recorded By SC

Sample No: Virgin Agg - 10/7/81

Material:

Split Sample Balance:

Make Ohaus

Capacity 2610 g

Smallest Division 0.1 g

Material Weight (after drying)

Pan + Material: 969.0 g

Pan: 18.2 g

Dry Sample: 950.8 g

Final Weight:

$$\% \text{ Silt} = \frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 = 5.4\%$$

#2

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.1 g
10 min:	396.0 g
20 min:	406.8 g
30 min:	409.9 g
40 min:	411.5 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	550.1 g	689.8 g	139.7 g	14.65
4 mesh	534.8 g	712.6 g	177.8 g	18.64 33.3
10 mesh	467.7 g	662.2 g	194.5 g	20.40 53
20 mesh	438.8 g	576.1 g	137.3 g	14.40 68.1
60 mesh	347.8 g	516.9 g	169.1 g	17.73 85
80 mesh	361.0 g	392.9 g	31.9 g	3.34 89.1
100 mesh	352.4 g	369.5 g	17.1 g	1.79 90
200 mesh	350.0 g	384.6 g	34.6 g	3.62 94
Pan	360.1 g	411.5 g	51.4 g	5.39

$\frac{51.4 \text{ g}}{953.4 \text{ g}} \times 100$

Comments:

Virgin Agg. 10/7/81

% < D_1 = 16 %
where $D_1 = \frac{mmD}{GSD} = 279.67$

1,820.716915 mmD
6.510175914 GSD
.9942860875 r
.5568504557 F(18m)

Weight % Greater than Stated Size

100.0
10,000
100010.0
1001.0
10 0.1
0.01

Particle Diameter (Microns)

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Recycle Mix
MRI Project No. 4891 C 83

Date 11/24/81
Recorded By SC

Sample No: Recycle 10/7/81
Material:

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 730.4g
Pan: 18.1g
Dry Sample: 712.3g

Final Weight: 711.6g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 =$ 0.09%

#1 #

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.5g
10 min:	360.0g
20 min:	360.2g
30 min:	360.2g
40 min:	

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	550.7g	705.5g	154.7g	21.73	
4 mesh	533.8g	788.5g	254.7g	35.79	57.5
10 mesh	470.0	665.9g	195.9g	27.52	85
20 mesh	419.8g	491.1g	71.3g	10.01	95.0
60 mesh	374.4g	405.0g	30.6g	4.30	99
80 mesh	368.5g	370.1g	1.6g	0.22	99.3
100 mesh	354.7g	355.5g	0.8g	0.11	99.
200 mesh	328.9g	330.2g	1.3g	0.18	99.
Pan	359.5g	360.2g	0.7g	0.09	

711.6g

Comments:

Recycle Mix

10/7/81

Weight % Greater than Stated Size

10,000 100.0

1,000 ~~10.0~~

100 ~~1.0~~

10 ~~0.1~~

0.01

Particle Diameter (Microns)

5249.783789 mmd
3.700760793 GSD
0.982952413 R
.0000037942 F (< 15um)
.2727365502 F (< 8 mBh)

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Run #3
MRI Project No. 4891 C 83

Date 11/16/81
Recorded By SLC

Sample No: Run #3 10/9/81
Material: Virgin Agg.

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 1,335.2 g
Pan: 18.0 g
Dry Sample: 1317.2 g

Final Weight: 1318.3 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 = 1.4$ %

SIEVING #2

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.2 g
10 min:	372.9 g
20 min:	376.2 g
30 min:	377.5 g
40 min:	378.1 g

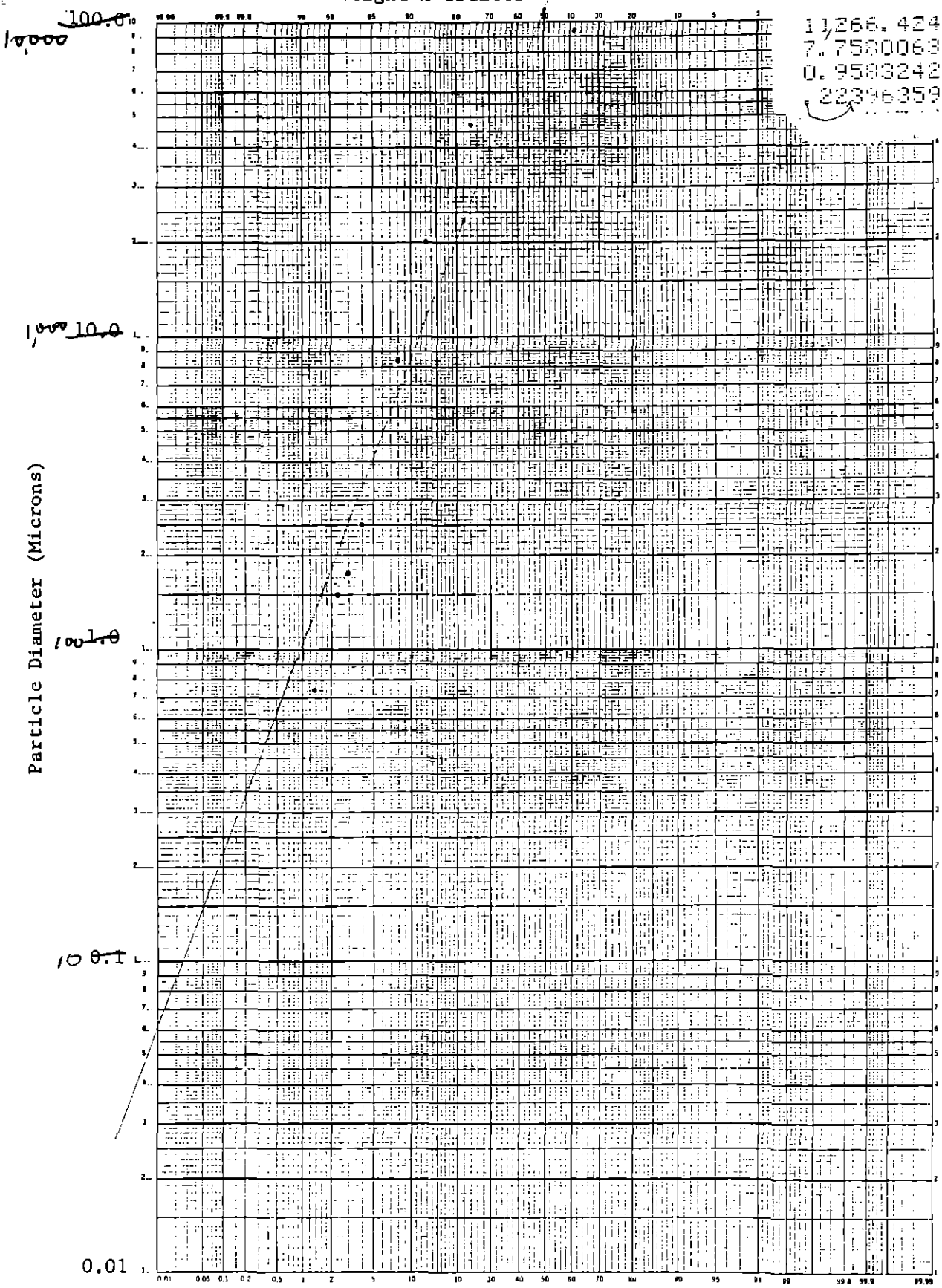
SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	549.9 g	1,070.5 g	520.6 g	39.49	
4 mesh	534.7 g	1,017.3 g	482.6 g	36.60	96.1
10 mesh	467.6 g	621.9 g	154.3 g	11.70	97.
20 mesh	439.0 g	505.0 g	66.0 g	5.00	92.9
60 mesh	347.7 g	399.6 g	51.9 g	3.93	96.
80 mesh	361.0 g	369.7 g	8.7 g	0.65	97.4
100 mesh	352.3 g	357.8 g	5.5 g	0.41	97.
200 mesh	350.4 g	361.2 g	10.8 g	0.81	98.
Pan	360.2 g	378.1 g	17.9 g	x100=1.35	
			1318.3 g		

Comments:

Virgin Agg Rem #3 10/9/81

Weight % Greater than Stated Size



11266.42405 MMD
7.758006336 GSD
0.958324272
2239635935 F(<9m)

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Recycle #3
MRI Project No. 4891 C 83

Date 11/23/81
Recorded By SC

Sample No: Recycle Mix Run #3
Material: 10/9/81

Split Sample Balance:
Make Ohaus
Capacity 2610g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 995.2g
Pan: 18.2g
Dry Sample: 977.0g

Final Weight: 977.7g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 =$ 0.05%

#1 ✱

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.5g
10 min:	360.0g
20 min:	360.0g
30 min:	
40 min:	

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	550.5g	1,094.3g	~~55~~ 543.8g	55.62	
4 mesh	533.8g	775.5g	241.7g	24.72	80.3
10 mesh	469.8g	591.1g	121.3g	12.40	92.
20 mesh	419.8g	458.3g	38.5g	3.93	96.6
60 mesh	374.3g	399.7g	25.4g	2.59	99
80 mesh	368.5g	371.6g	3.1g	0.31	99.3
100 mesh	354.9g	356.2g	1.3g	0.13	99.4
200 mesh	328.9g	331.0g	2.1g	0.21	99.
Pan	359.5g	360.0g	0.5g	=0.05	
			977.9g		

Comments:

Length mix #3 10/9/81

Weight % Greater than Stated Size

18534.05315 mmD
6.061550651 GSD
.9883254949 R
.0000389522 FC(15 um)
.1273434817 FC(8 mesh)

100.0 10,000

1,000 10.0

Particle Diameter (Microns)

100 1.0

10 0.1

0.01

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Agg
MRI Project No. 4891 C 83

Date 11/16/81
Recorded By 9/C

Sample No: Virgin Aggregate 3:30 pm
Material: 10/9/81

Split Sample Balance:
Make Ohaus-
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 1,414.9 g
Pan: 18.2 g
Dry Sample: 1396.7 g

Final Weight: 1397.8 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 2.2 %

#1 #

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.3 g
10 min:	385.5 g
20 min:	389.2 g
30 min:	389.6 g
40 min:	

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	551.3 g	951.2 g	399.9 g	28.60
4 mesh	534.3 g	1025.4 g	491.1 g	35.13
10 mesh	470.1 g	732.9 g	262.8 g	18.80
20 mesh	419.6 g	524.6 g	105.0 g	7.51
60 mesh	374.3 g	446.4 g	72.1 g	5.15
80 mesh	368.6 g	380.7 g	12.1 g	0.86
100 mesh	354.8 g	362.1 g	7.3 g	0.52
200 mesh	329.0 g	346.2 g	17.2 g	1.23
Pan	359.3 g	389.6 g	30.3 g	2.16

1,397.8 g

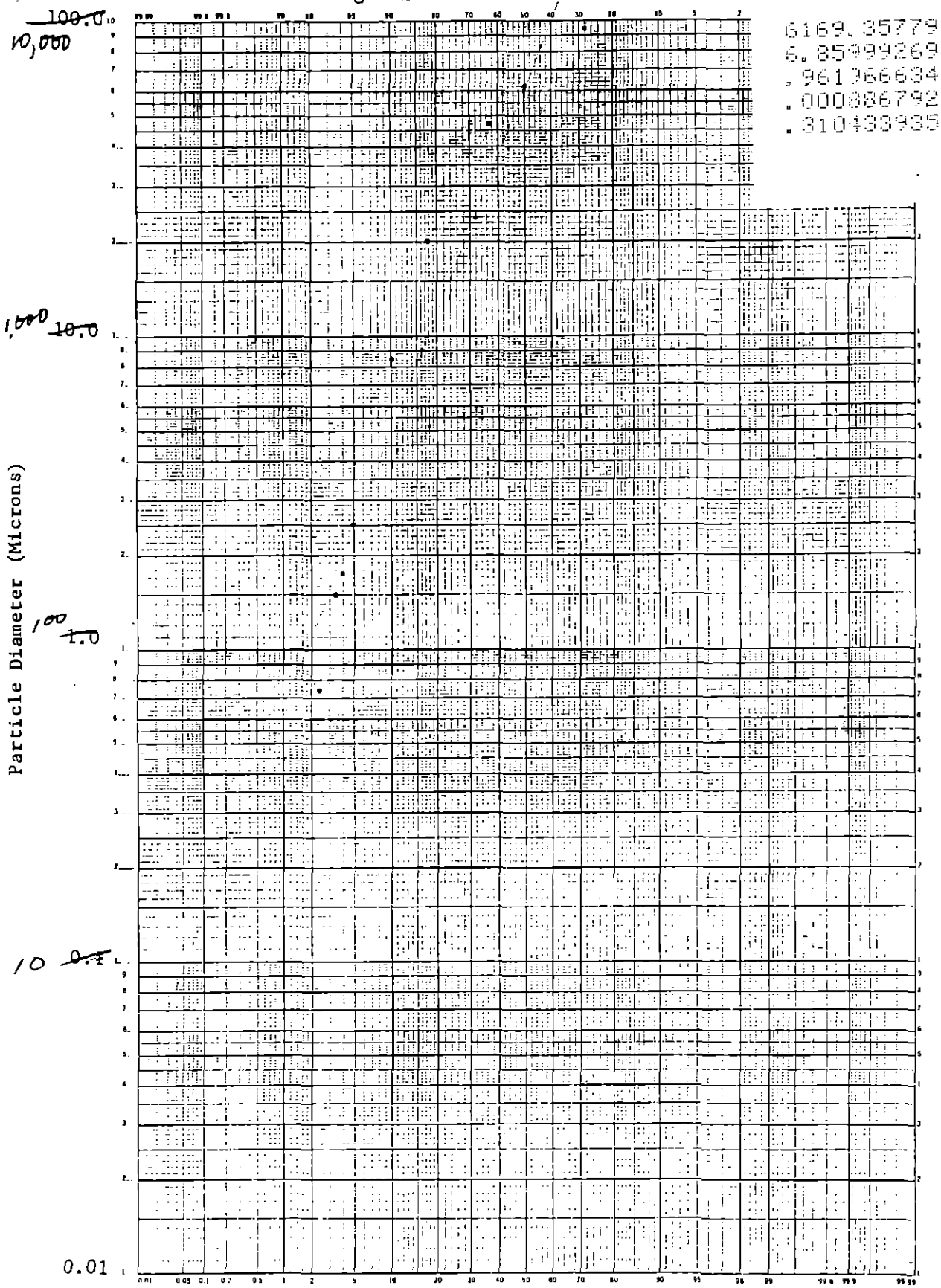
Comments:

11/81

Virgin Agg. 10/9/81
3:30 pm.

Weight % Greater than Stated Size

6169.357796 mm D
6.859992692 GSD
.9619666344 R
.000386792 FC(15 um)
.3104339358 FC(8mesh)



Weight % Less than Stated Size

D-11

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Recycle Mix 10/9/81
MRI Project No. 4891 C 83

Date 11/23/81
Recorded By SLC

Sample No: Recycle Mix 10/9/81
Material:

Split Sample Balance:
Make Sauer
Capacity 2610g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 1,242.3g
Pan: 18.2g
Dry Sample: 1,224.1g

Final Weight: 1,224.1g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 0.82%

#2 ★

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.0g
10 min:	369.7g
20 min:	370.0g
30 min:	370.1g
40 min:	

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	549.8g	818.2g	268.4g	21.92
4 mesh	534.6g	850.7g	316.1g	25.82 47.7
10 mesh	467.1g	739.6g	272.5g	22.26
20 mesh	439.0g	596.5g	157.5g	12.86 82.1
60 mesh	347.7g	507.1g	159.4g	13.02 95.9
80 mesh	361.2g	379.0g	17.8g	1.45 97.
100 mesh	352.2g	360.4g	8.2g	0.66 98.
200 mesh	350.0g	364.1g	14.1g	1.15 99.
Pan	360.0g	370.1g	10.1g x 100	0.82
			1224.1g	

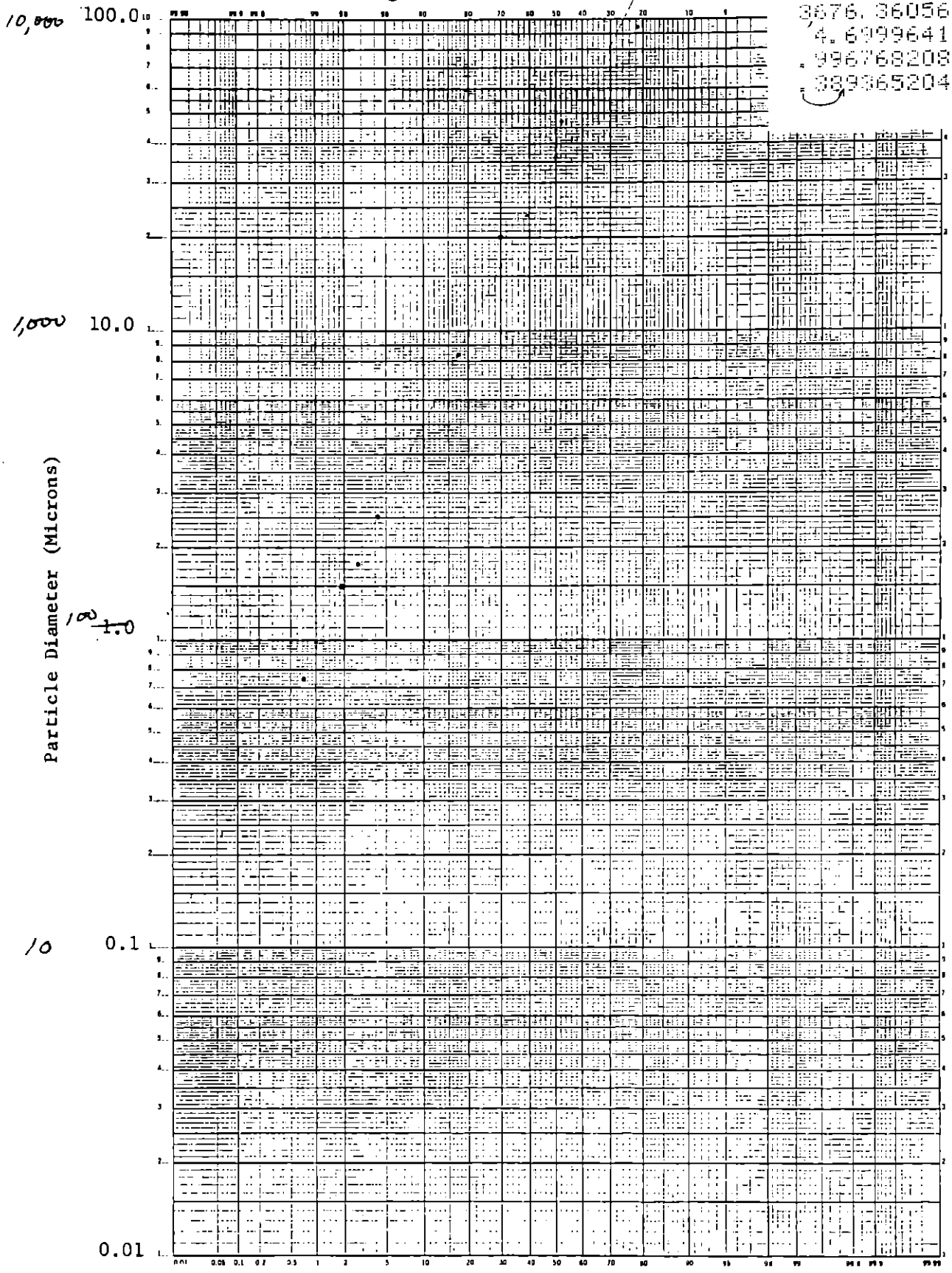
Comments:

11/81

Recycle mix 10/9/81

Weight % Greater than Stated Size

3676.360565
4.69996419
.9967682089
.3893652048



Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE

Silt Analysis

Run No. Virgin Material 10/19/81 Date 11/19/81

MRI Project No. 4891 C 83 Recorded By SLC

Sample No: Virgin Mat 10/19/81

Material: 1330 lbs.

Split Sample Balance:

Make Ohaus.

Capacity 2610g

Smallest Division 0.1g

Material Weight (after drying)

Pan + Material: 1,333.9g

Pan: 18.1g

Dry Sample: 1,315.8g

Final Weight: 1,314.8g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 4.2%

#1 ✱

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.3g
10 min:	382.6g
20 min:	400.8g
30 min:	411.4g
40 min:	414.7g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	550.5g	884.4g	333.9g	25.39	
4 mesh	533.6g	931.5g	397.9g	30.26	55.7
10 mesh	470.1g	726.3g	256.2g	19.48	75
20 mesh	419.6g	523.4g	103.8g	7.89	83.1
60 mesh	374.3g	478.4g	104.1g	7.91	91
80 mesh	368.4g	390.1g	21.7g	1.65	92.7
100 mesh	354.5g	370.0g	15.5g	1.17	93.9
200 mesh	329.0g	355.3g	26.3g	2.00	95
Pan	359.3g	414.7g	55.4g	4.21	

$\frac{55.4g}{1,314.8g} \times 100$

Comments:

Virgin Agg. 10/19/81
1330 hrs.

Weight % Greater than Stated Size

4390.416421 MMD
8.173142823 GSD
.9701682232 R
.3853482227 R(c fm)

$1/3 < D_1 = 16$

where $D_1 = \frac{MMD}{GSD} = 537.38$

~~100.0~~ 10,000

~~1.000~~ ~~10.0~~

Particle Diameter (Microns)

~~100~~ ~~1.0~~

10 ~~0.1~~

0.01

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Recycle Mix 10/19/81
MRI Project No. 4891 L 83

Date 11/20/81
Recorded By SLC

Sample No: Recycle 10/19/81
Material: 1330 hrs.

Split Sample Balance:
Make Ohaus.
Capacity 2610g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 1,199.8g
Pan: 18.1g
Dry Sample 1,181.7g

Final Weight: 1,181.0g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 0.23%

#2

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.3g
10 min:	362.1g
20 min:	362.6g
30 min:	362.9
40 min:	363.1g

SIZE DISTRIBUTION

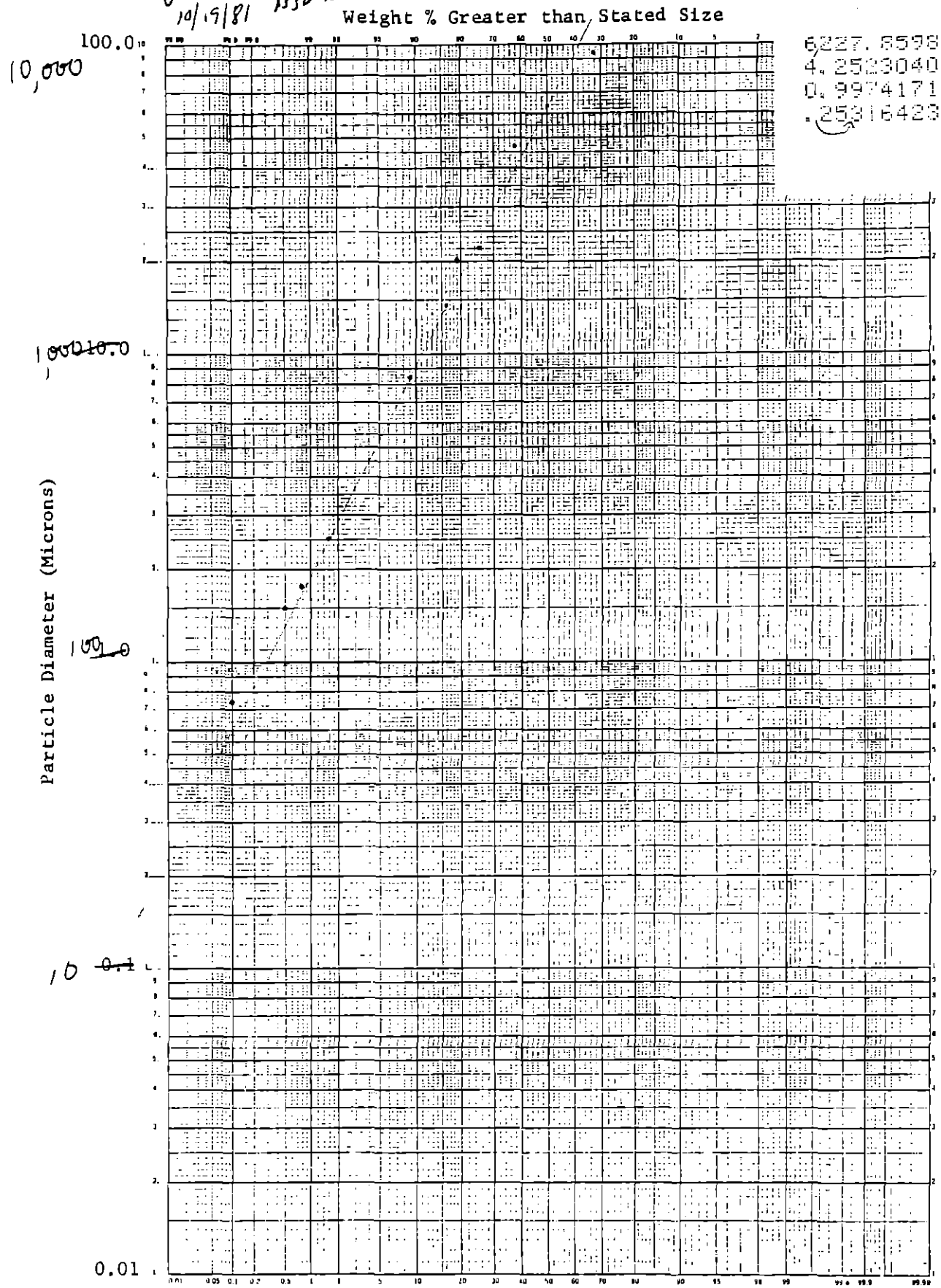
Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	549.6g	946.0g	396.4g	33.56
4 mesh	534.4g	871.6g	337.2g	28.55
10 mesh	467.6g	698.4g	230.8g	19.54
20 mesh	433.9g	549.9g	111.0g	9.399
60 mesh	347.8g	435.3g	87.5g	7.409
80 mesh	361.0g	368.7g	7.7g	0.659
100 mesh	352.4g	355.4g	3.0g	0.259
200 mesh	350.4g	355.0g	4.6g	0.389
Pan	360.3g	363.1g	2.8g x 200 =	0.23

1,181.0g

Comments:

11/81

Recycle Mix 1330 hrs.
10/19/81



6227.859814 mmD
4.252304029 GSD
0.997417113 R
.2531642302 r (< 8m)

D-17

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Material 10/20/81
MRI Project No. 4891 C 83

Date 11/19/81
Recorded by SLC

Sample No Virgin Mat. 10/20/81
Material: 0815 Mo.

Split Sample Balance:
Make Ohaus.
Capacity 2610g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 1,178.2 g
Pan: 18.1 g
Dry Sample: 1,160.1 g

Final Weight: 1,161.2 g

% Silt = $\frac{\text{Net Weight -200 Mesh}}{\text{Total Net Weight}} \times 100$ 2.7 %

#2 X

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.1 g
10 min:	377.8 g
20 min:	384.2 g
30 min:	389.1 g
40 min:	391.3 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	549.7 g	896.4 g	346.7 g	29.85
4 mesh	534.5 g	872.5 g	338.0 g	29.10 59.0
10 mesh	467.7 g	658.9 g	191.5 g	16.49
20 mesh	438.8 g	534.6 g	95.8 g	8.25 73.8
60 mesh	347.6 g	450.8 g	103.2 g	8.88
80 mesh	361.1 g	380.8 g	19.7 g	1.69 94.4
100 mesh	352.1 g	364.2 g	12.1 g	1.04 96.4
200 mesh	350.1 g	373.1 g	23.0 g	1.98
Pan	360.1 g	391.3 g	31.2 g x100	2.68

1,161.2 g

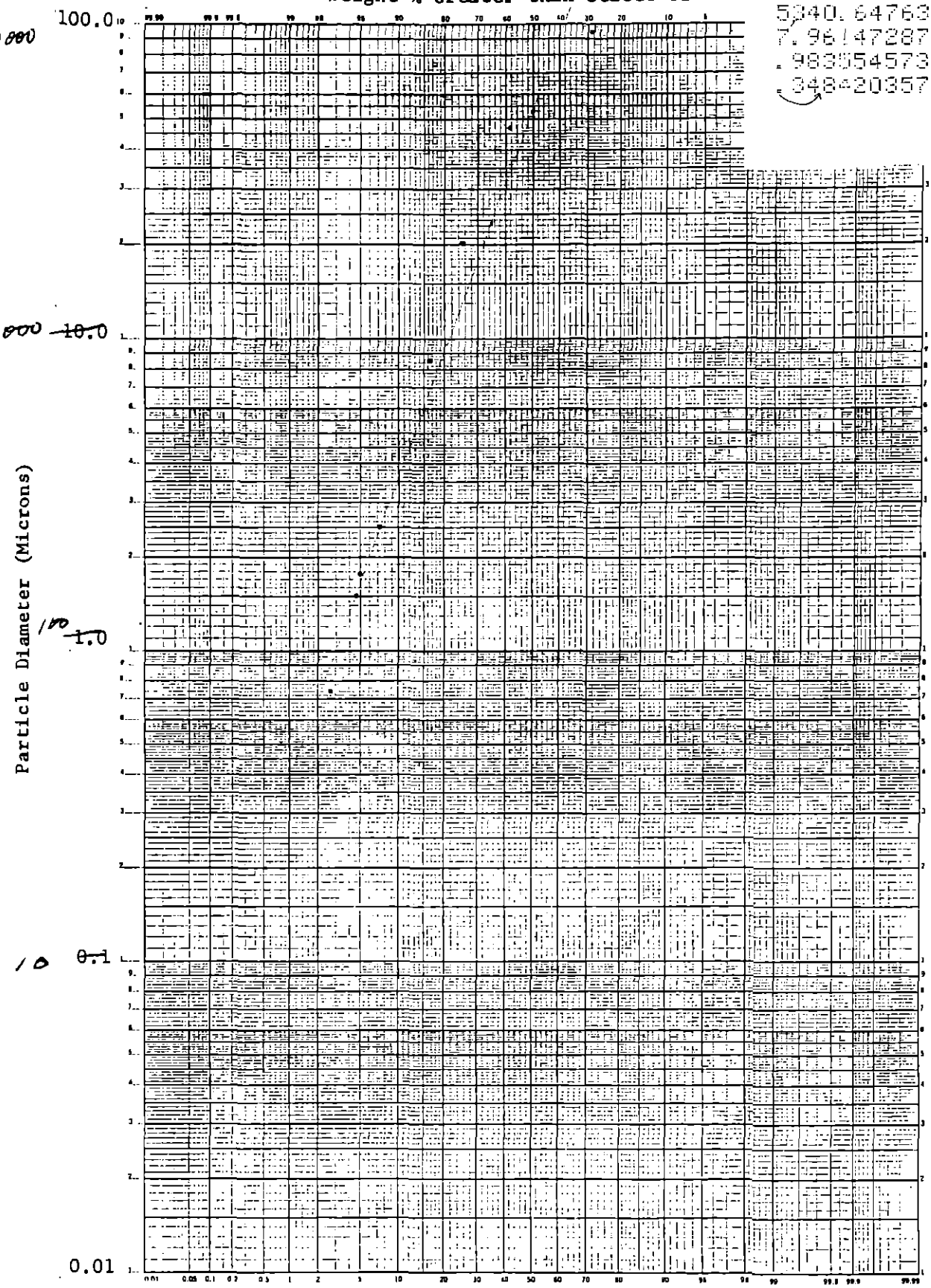
Comments:

11/81

Virgin mat. 10/20/81
0815 hrs

Weight % Greater than Stated Size

5340.647632
7.961472873
.9835545738
.3484203571



Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE

Run No. Recycle Material 10/20/81 Silt Analysis
MRI Project No. 4891 L 83

Date 11/23/81
Recorded By SLC

Sample No: Recycle Mat. 10/20/81
Material: 0815 hrs

Split Sample Balance:
Make Ohaus.
Capacity 2610g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 1,258.0g
Pan: 18.1g
Dry Sample: 1,239.9g

Final Weight: 1,238.9g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 0.21 %

#2 ✱

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.1g
10 min:	361.8g
20 min:	362.2g
30 min:	362.5g
40 min:	362.8g

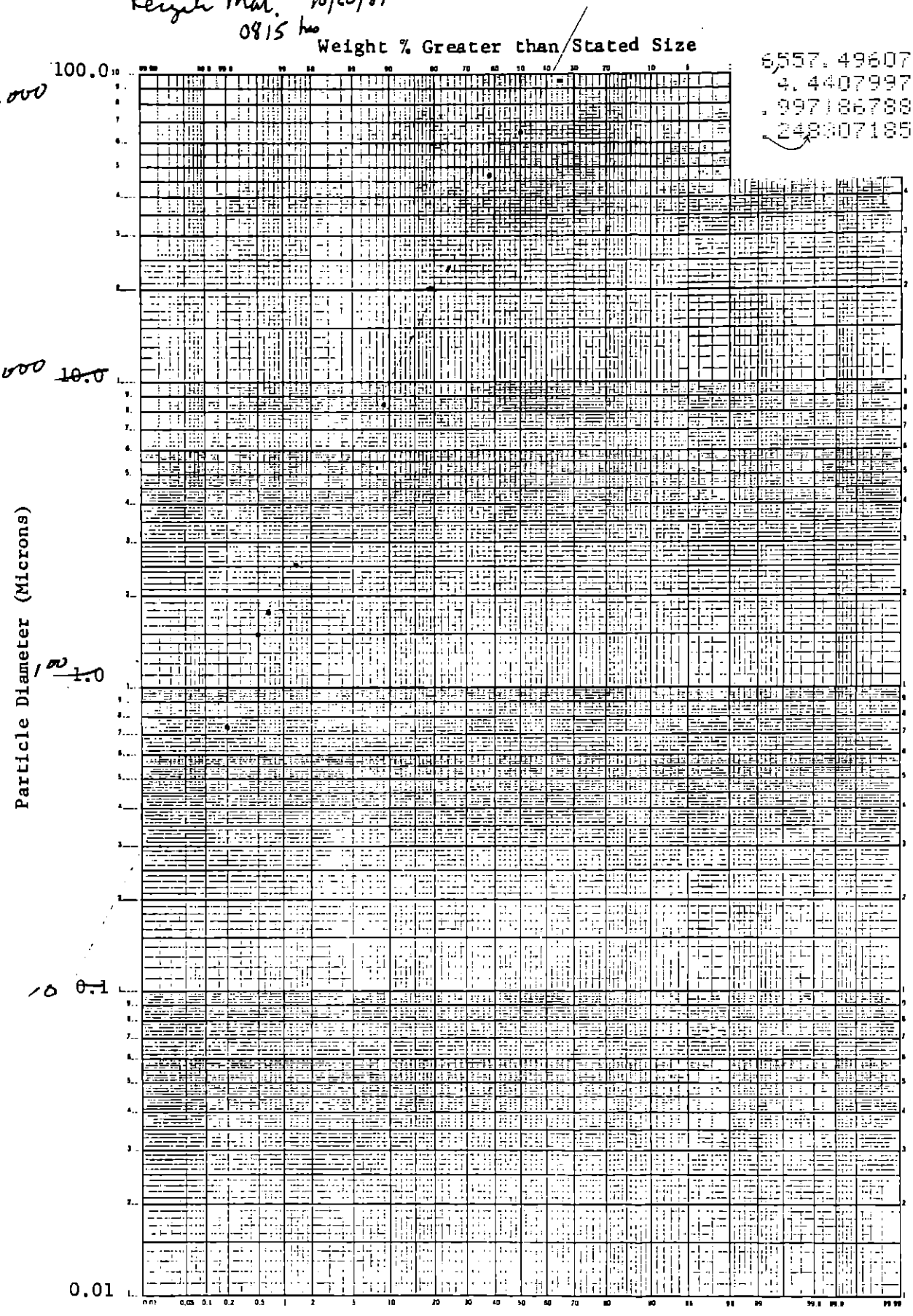
SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	549.6g	986.7g	437.1g	35.28
4 mesh	534.3g	865.4g	331.1g	26.72
10 mesh	467.1g	707.7g	240.6g	19.42
20 mesh	438.8g	557.6g	118.8g	9.58
60 mesh	347.7g	442.5g	94.8g	7.65
80 mesh	361.0g	367.9g	6.9g	0.55
100 mesh	352.3g	355.0g	2.7g	0.21
200 mesh	350.2g	354.4g	4.2g	0.33
Pan	360.1g	362.8g	2.7g	0.21
			1,238.9g	

Comments:

11/81

Rough mat. 10/20/81
0815 hrs



6,557.496073 mmU
4.44079978 650
.9971867886 R
.2483071853 F(C8m)

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Material Date 11/18/81
MRI Project No. 4891 C 83 Recorded By SIC

Sample No: Virgin mat 10/20/81
Material: U 1330

Split Sample Balance:
Make OHAUS-
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 1,275.9 g
Pan: 18.2 g
Dry Sample: 1,257.7 g

Final Weight: 1,258.2 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 3.5 %

#2 X

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.3 g
10 min:	380.0 g
20 min:	398.1 g
30 min:	404.2 g
40 min:	404.8 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	549.9 g	769.2 g	219.5 g	17.44	
4 mesh	534.6 g	977.8 g	443.2 g	35.22	52.6
10 mesh	467.3 g	754.1 g	286.8 g	22.79	75
20 mesh	439.0 g	546.0 g	107.0 g	8.50	83.7
60 mesh	347.9 g	452.3 g	104.4 g	8.29	92.0
80 mesh	361.1 g	379.5 g	18.4 g	1.46	93
100 mesh	352.2 g	365.0 g	12.8 g	1.01	94.7
200 mesh	350.3 g	371.9 g	21.6 g	1.71	96
Pan	360.3 g	404.8 g	44.5 g	3.53	

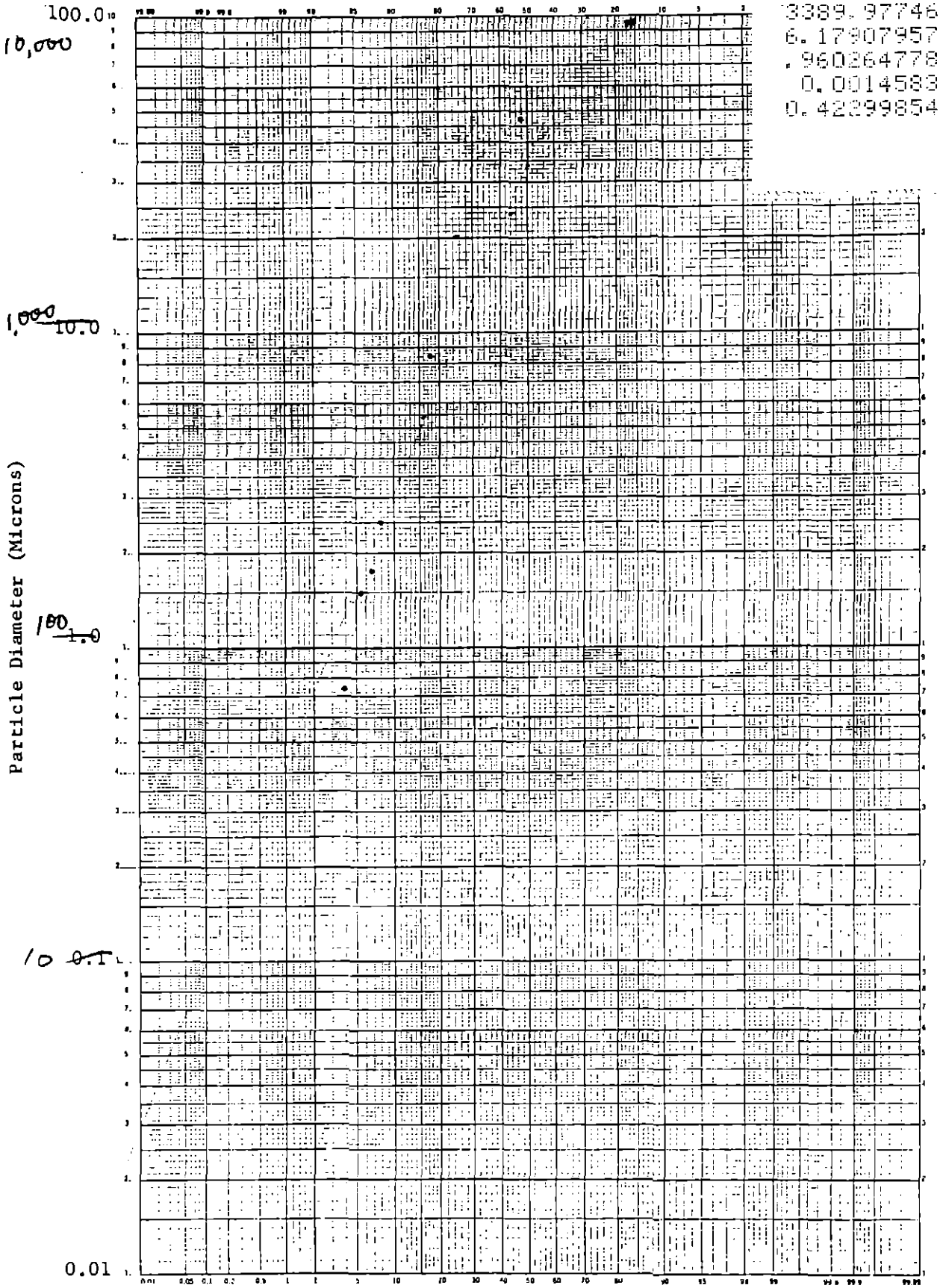
$\frac{44.5 \text{ g}}{1,258.2 \text{ g}} \times 100 =$

Comments:

Virgin Mat. 10/20/81
1330

Weight % Greater than Stated Size

3389.977469 mmD
6.179079575 GSD
.9602647782 R
0.00145834 FC (154m)
0.422998544 FC (8mesh)



Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Recycle 10/20/81
MRI Project No. 4891 C 83

Date 11/23/81
Recorded By SC

Sample No: Recycle 10/20/81
Material: 1330 hr

Split Sample Balance:
Make Ohaus
Capacity 2610g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 1,321.5g
Pan: 18.1g
Dry Sample: 1,303.4g

Final Weight: 1,302.7g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 0.69%

#1 ✱

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.2g
10 min:	363.7g
20 min:	365.5g
30 min:	367.3g
40 min:	368.2g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	551.0g	1,148.9g	597.9g	45.58
4 mesh	533.5g	883.6g	350.1g	26.87 72.5
10 mesh	470.0g	641.4g	171.4g	13.15
20 mesh	419.7g	502.8g	83.1g	6.37 92.1
60 mesh	374.4g	445.5g	71.1g	5.45
80 mesh	368.4g	377.4g	9.0g	0.69 98.8
100 mesh	354.8g	358.7g	3.9g	0.29 98.4
200 mesh	328.7g	335.9g	7.2g	0.55 99
Pan	359.2g	368.2g	9.0g	

$\frac{9.0\text{g}}{1,302.7\text{g}} \times 100 = 0.69$

Comments:

11/81

Recycle 10/20/81 1330 hrs MMD

Weight % Greater than Stated Size

11796.51889 MMD
7.197377958 GSD
.9886656618 R
.2086799105 r(<3m)

100.0 / 10,000

10.0 / 1,000

1.0 / 100

0.1 / 10

0.01 / 1

Particle Diameter (Microns)

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE

Run No. Virgin Material 10/21/81 — Silt Analysis — Date 11/19/81

MRI Project No. 4891 C 83 — Recorded By SLC

Sample No: Virgin Mat 10/21/81

Material: 0900 hrs

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 1,218.3 g
Pan: 18.2 g
Dry Sample: 1,200.1 g

Final Weight: 1,198.2 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 3.1 %

#1 ✱

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.4 g
10 min:	381.7 g
20 min:	391.2 g
30 min:	394.9 g
40 min:	397.1 g

SIZE DISTRIBUTION

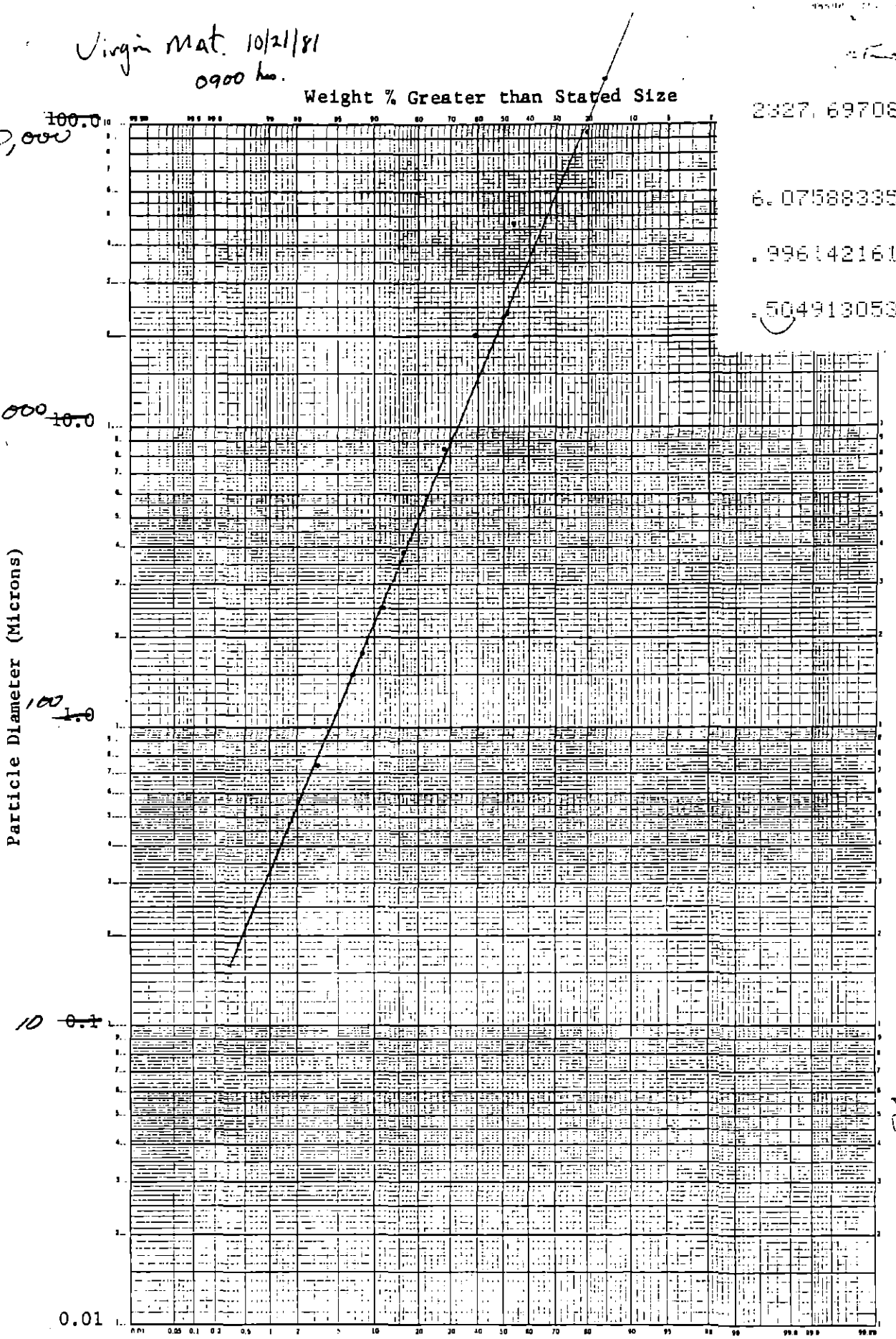
Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	551.1 g	792.5 g	241.4 g	20.14
4 mesh	533.8 g	850.0 g	316.2 g	26.384
10 mesh	470.4 g	645.3 g	174.9 g	14.59
20 mesh	419.9 g	551.6 g	131.7 g	10.99
60 mesh	374.3 g	575.7 g	201.4 g	16.80
80 mesh	368.6 g	405.9 g	37.3 g	3.11
100 mesh	354.8 g	375.4 g	20.6 g	1.71
200 mesh	328.8 g	365.8 g	37.0 g	3.08
Pan	359.4 g	397.1 g	37.7 g	3.14

1,198.2 g

Comments:

11/81

Virgin Mat. 10/21/81
0900 hrs.



2327.697081 mmD

6.075883354 GSD

.9961421612 R

.5049130534 F(<8m)

$\% < D_1 = 16$ $D_1 = \frac{MMD}{GSD}$

$\% < D_2 = 84$ $D_2 = (GSD)(MMD)$

MIDWEST RESEARCH INSTITUTE

Silt Analysis

Run No. Virgin Mat. 10/22/81
MRI Project No. 4891 C 83

Date 11/19/81
Recorded By SLC

Sample No: Virgin Material 10/22/81
Material: J 0830

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division J 0.1g

Material Weight (after drying)
Pan + Material: 1084.3 g
Pan: 18.2g
Dry Sample: J 1066.1 g

Final Weight: 1066.6 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 2.30%

#1 A

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.6 g
10 min:	374.2 g
20 min:	378.6 g
30 min:	382.3 g
40 min:	384.2 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	551.1 g	579.5 g	28.4 g	2.66	
4 mesh	533.9 g	641.4 g	107.5 g	10.07	12.8
10 mesh	470.6 g	710.5 g	239.9 g	22.49	35
20 mesh	420.0 g	573.1 g	153.1 g	14.35	49.7
60 mesh	374.4 g	770.1 g	395.7 g	37.09	86.8
80 mesh	368.5 g	423.4 g	54.9 g	5.14	91.9
100 mesh	354.9 g	376.2 g	21.3 g	1.99	93.9
200 mesh	329.1 g	370.3 g	41.2 g	3.86	97.8
Pan	359.6 g	384.2 g	24.6 g	2.30	

$\frac{24.6 \text{ g}}{1,066.6 \text{ g}} \times 100$

Comments:

Virgin Mat.
10/22/81
0830

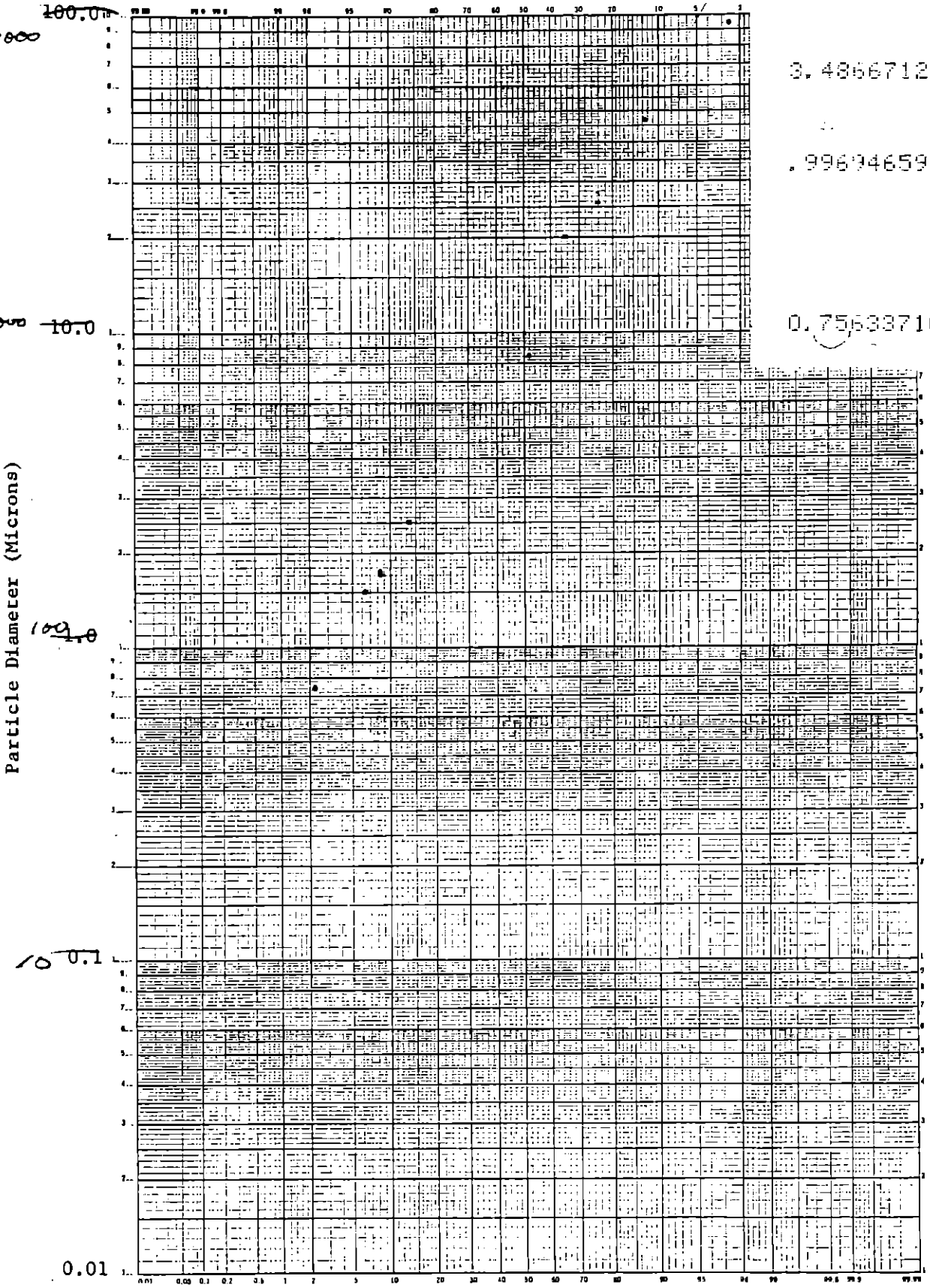
Weight % Greater than Stated Size

999.621322 MMD

3.486671234 GSD

.9969465927 Correlation Coeff

0.756337109 F(x) Basis



Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Aggregate
MRI Project No. 4891-C-83

Date 11/17/81
Recorded By SLC

Sample No: Virgin Aggregate 10/22/81
Material: 1200 hrs

Split Sample Balance:
Make Chaus.
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 1057.8 g
Pan: 18.0 g
Dry Sample: 1039.8 g

Final Weight: 1040.8 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 =$ 2.9%

#2 ✱

SIEVING

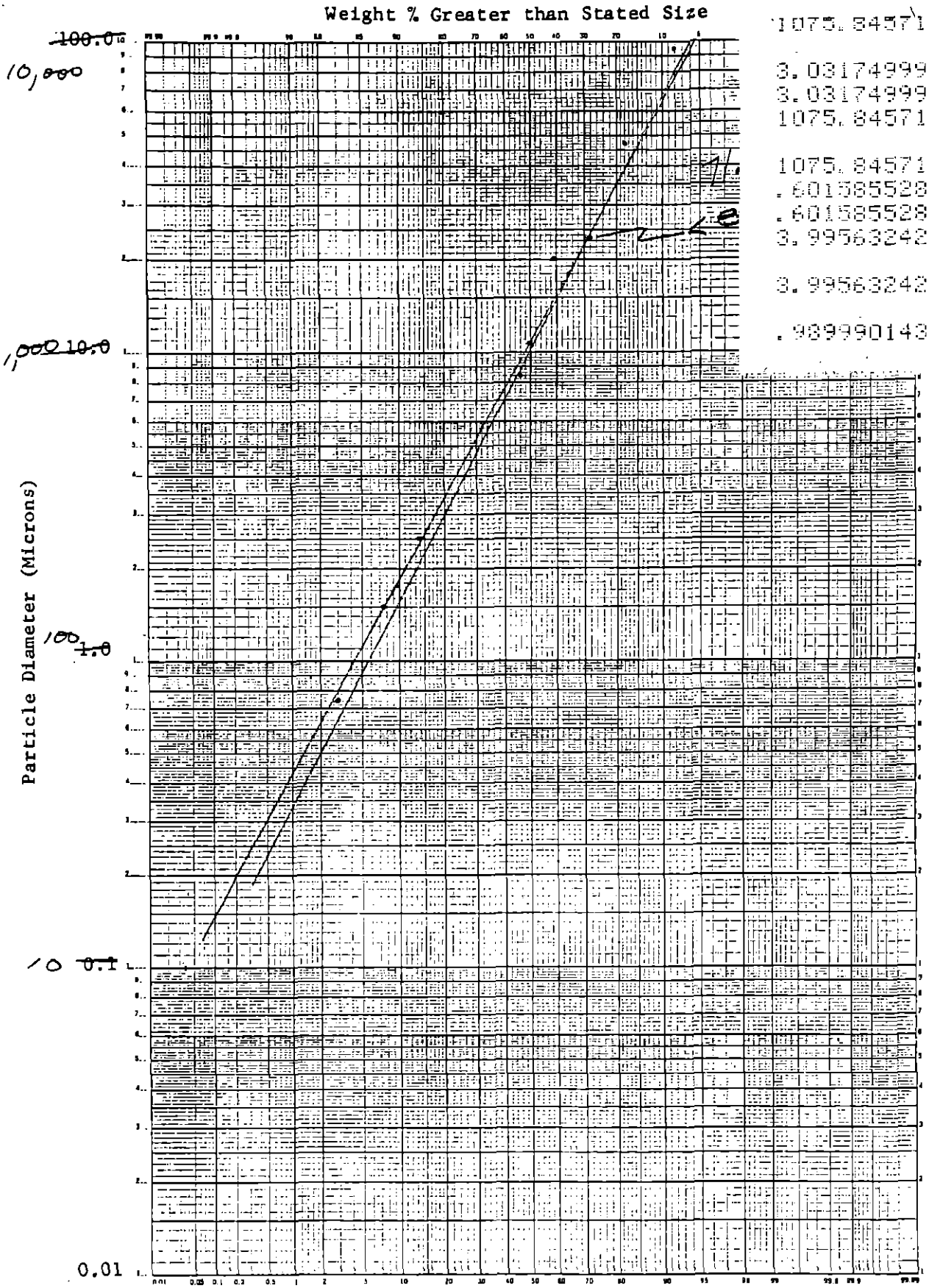
Time: Start:	Weight (Pan Only)
Initial (Tare):	360.0 g
10 min:	375.3 g
20 min:	383.3 g
30 min:	388.6 g
40 min:	390.4 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	550.0 g	634.0 g	84.0 g	8.07	
4 mesh	534.6 g	637.8 g	103.2 g	9.91	18.0
10 mesh	467.7 g	706.6 g	238.7 g	22.93	
20 mesh	439.2 g	580.1 g	140.9 g	13.53	54.4
60 mesh	347.8 g	680.4 g	332.6 g	31.95	
80 mesh	361.1 g	406.3 g	45.2 g	4.34	90.2
100 mesh	352.5 g	375.5 g	23.0 g	2.20	
200 mesh	350.4 g	393.2 g	42.8 g	4.11	9[illegible]
Pan	360.0 g	390.4 g	30.4 g	2.92	
			1,040.8 g		

Comments:

Virgin Agg. 10/22/81
1200 hrs



1075.845719 MMD DP
12
3.031749996
3.031749996 ILOG
1075.845719
R/S
1075.845719 X:T
.6015855286
.6015855286 ILOG
3.995632423
R/S
3.995632423 GSD DP
13
.9899901433 ρ
R/S

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Agg 10/26/81
MRI Project No. 4891 C 83

Date 11/17/81
Recorded By SLC

Sample No: Virgin Aggregate 10/26/81
Material: " " 11:00 hrs

Split Sample Balance:
Make OHAUS.
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 1,478.0 g
Pan: 18.2 g
Dry Sample: 1,459.8 g

Final Weight: 1,461.0 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 =$ 4.5 %

#14

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.5 g
10 min:	392.1 g
20 min:	413.2 g
30 min:	422.7 g
40 min:	425.9 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	551.0 g	748.5 g	197.5 g	13.51
4 mesh	533.8 g	774.9 g	241.1 g	16.50 30.0
10 mesh	470.2 g	740.0 g	269.8 g	18.46 48
20 mesh	419.8 g	588.7 g	168.9 g	11.56 60.1
60 mesh	374.3 g	753.6 g	379.3 g	25.96 86
80 mesh	368.6 g	417.8 g	49.2 g	3.36 89
100 mesh	354.9 g	383.7 g	28.8 g	1.97 91.5
200 mesh	329.0 g	389.0 g	60.0 g	4.10 95
Pan	359.5 g	425.9 g	66.4 g	x100 = 4.54

1,461.0 g

Comments:

Virgin Aggregate
1100hm 10/26/81

Weight % Greater than Stated Size

1597.185678 mmO
5.788440593 650
.9971551969 K
.0039245996 F(L15 um)
.5898493067 F(L8 mol)

ϕ_D L D_1 = 16
where D_1 = mmO / 650 = 3.75.9

~~100.0~~ 10
10,000
1,000 ~~100.0~~
100 ~~1.0~~
10 ~~0.1~~
0.01

Particle Diameter (Microns)

0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Material 10/26/81
MRI Project No. 4891 C 83

Date 11/19/81
Recorded By SLC

Sample No: Virgin Mat. 10/26/81
Material: U 1315 No.

Split Sample Balance:
Make Ohaus
Capacity 2610g
Smallest Division 0.1g

Material Weight (after drying)
Pan + Material: 1,355.7g
Pan: 18.2g
Dry Sample:

Final Weight: 1337.5g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ = 3.9%

#1 #

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.2g
10 min:	376.2g
20 min:	400.1g
30 min:	409.0g
40 min:	411.3g

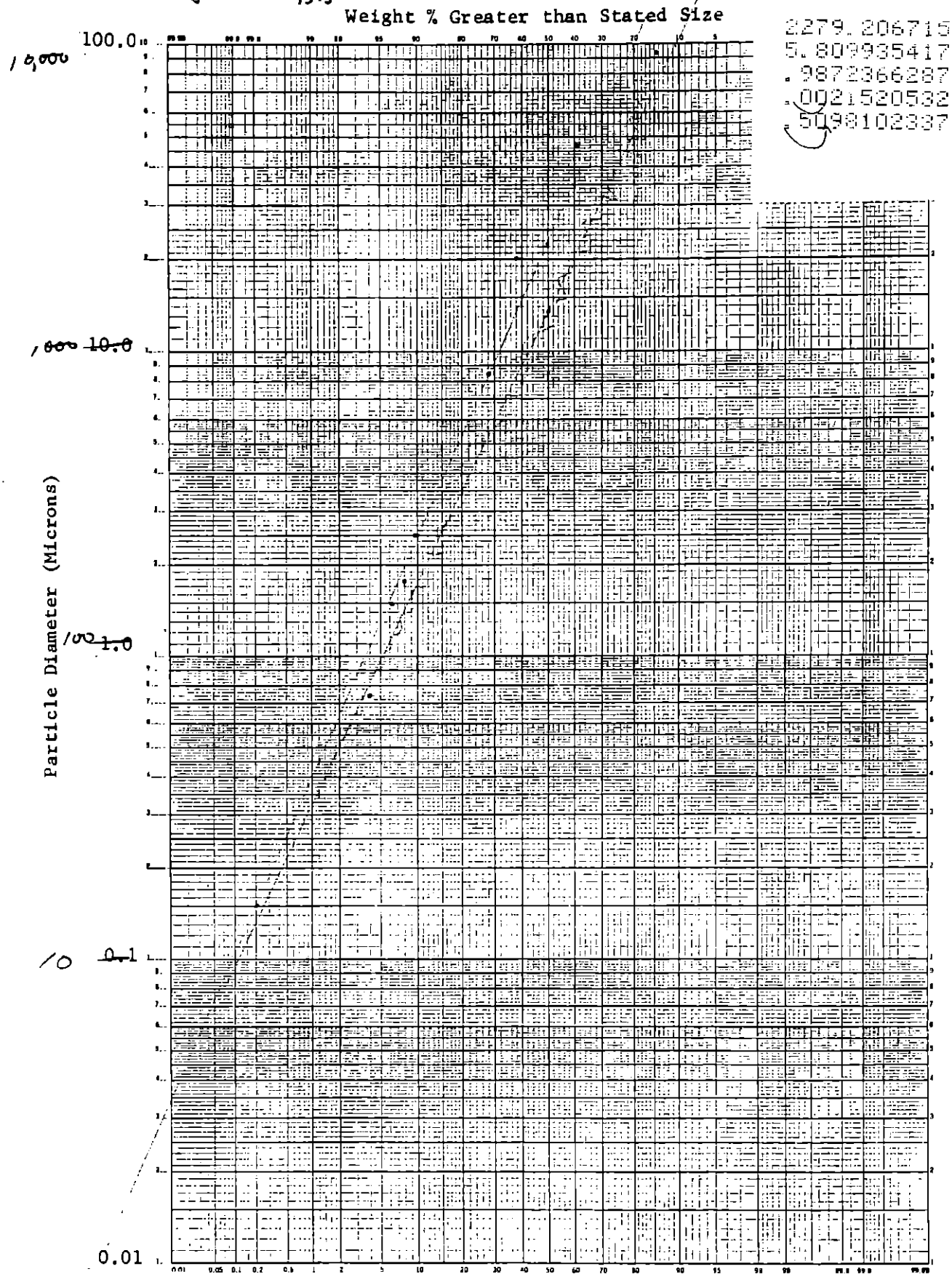
SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	550.7g	744.6g	193.8g	14.49
4 mesh	533.5g	869.7g	336.2g	25.13 39.6
10 mesh	470.3g	768.6g	298.3g	22.30 61.9
20 mesh	419.7g	559.2g	139.5g	10.42 72.3
60 mesh	374.3g	619.7g	245.4g	18.34 90.6
80 mesh	368.4g	395.8g	27.4g	2.04 92.6
100 mesh	354.9g	369.5g	14.6g	1.09 93.7
200 mesh	328.7g	358.8g	30.1g	2.25 96.0
Pan	359.2g	411.3g	52.1g	3.89

1,337.5g

Comments:

Virgin Mat. 10/26/81
1315 hrs



2279.206715 mmo
5.809935417 GSD
.9872366287 R
.0021520532 F<(15 μm)
.5098102337 F<(8 mesh)

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Baghouse Sample
MRI Project No. 4891C83

Date 11/24/81
Recorded By S/C

Sample No: Baghouse 10/26/81
Material: 1530 hrs

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 45.8 g including 0.5 g $3CaPO_4$
Pan: 18.2 g
Dry Sample: 27.1 g

Final Weight: 28.0 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 = 77.5\%$

#2 ✗

Pan + material = 45.3 g + 0.5 g $3CaPO_4$
= 45.8 g H/l wt.

SIEVING

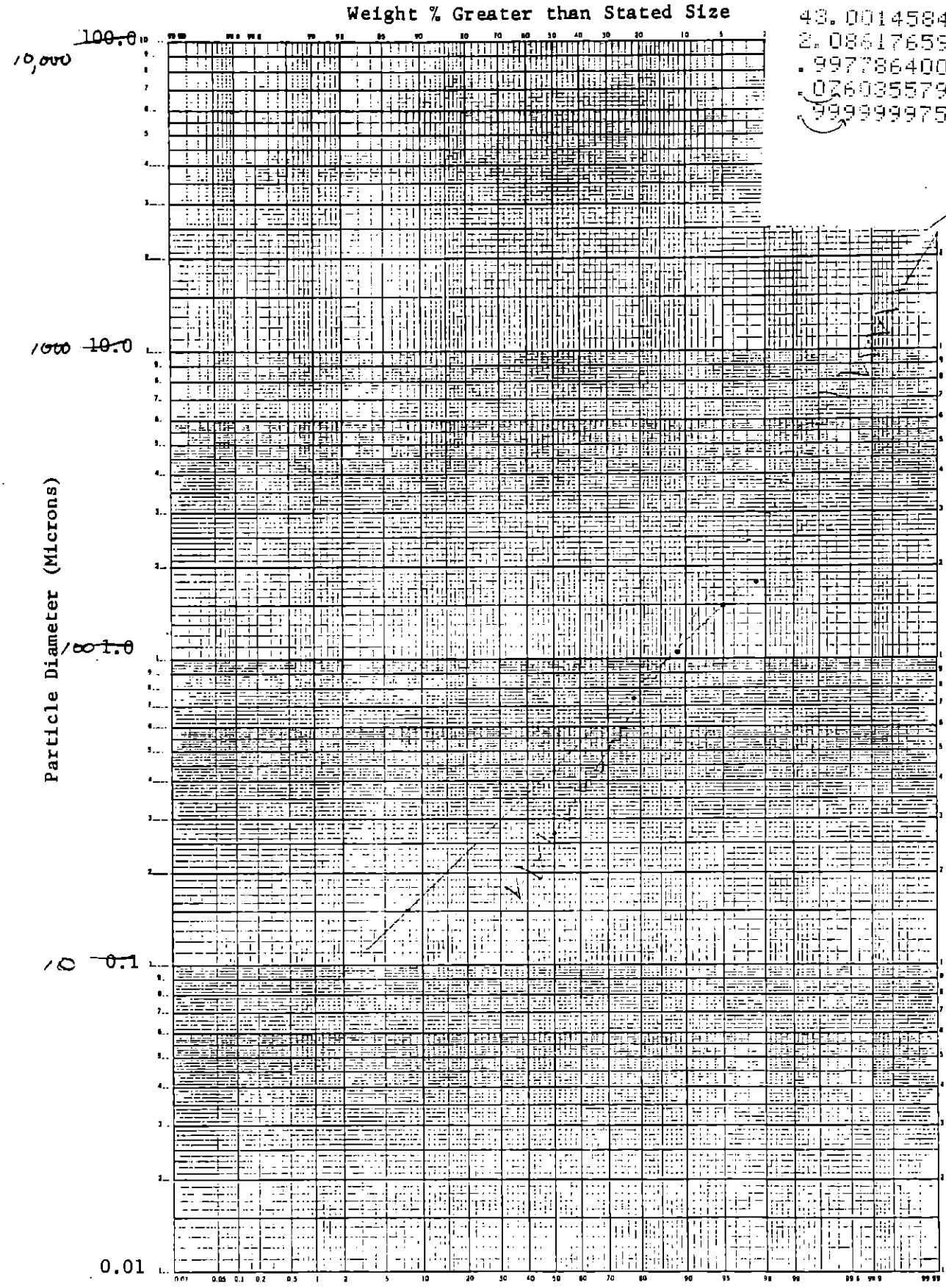
Time: Start:	Weight (Pan Only)
Initial (Tare):	360.0 g
10 min:	~~360.7 g~~ 362.3 g
20 min:	381.1 g
30 min:	382.0 g
40 min:	382.2 g −0.5 g $3CaPO_4$ = 381.7 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
10 mesh				
20 mesh				
40 mesh				
60 mesh				
80 mesh	360.9 g	361.6 g	0.7 g	0.025 2.5
100 mesh	352.3 g	353.0 g	0.7 g	0.025 5.0
140 mesh	354.6 g	356.4 g	1.8 g	6.42 11.4
200 mesh	350.3 g	353.4 g	3.1 g	11.07 22.5
Pan	360.0 g	382.2 g − 0.5 g $3CaPO_4$ = 381.7 g	21.7 g × 100 / 28.0 g	77.5 %

Comments:

Baghouse Sample 10/26/81
1530 hrs.



43.00145847 mmo
2.086176592 GSD
.9977864006 R
.0260355795 FC(15um)
.9999999759 FC(8mesh)

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Material 10/27/81
MRI Project No. 4891 C 83

Date 11/18/81
Recorded By S/C

Sample No: Virgin Mat. 10/27/81
Material: 0840 bm.

Split Sample Balance:
Make Ohaus.
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 1,497.5 g
Pan: 18.2 g
Dry Sample: 1479.3 g

Final Weight: 1480.2 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 2.5 %

#2 ✱

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	~~360.5~~ g 360.2 g
10 min:	374.0 g
20 min:	387.4 g
30 min:	394.7 g
40 min:	397.4 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%	
3/8 in.	549.8 g	858.2 g	308.4 g	20.83	
4 mesh	534.5 g	861.4 g	326.9 g	22.08	42.9
10 mesh	467.4 g	738.8 g	271.4 g	18.33	61
20 mesh	439.0 g	586.1 g	147.1 g	9.93	71.1
60 mesh	347.9 g	649.2 g	301.3 g	20.35	91.6
80 mesh	361.0 g	400.0 g	39.0 g	2.63	94
100 mesh	352.4 g	369.9 g	17.5 g	1.18	95.3
200 mesh	350.3 g	381.7 g	31.4 g	2.12	97
Pan	360.2 g	397.4 g	37.2 g	2.5	

$\frac{37.2 \text{ g}}{1,480.2 \text{ g}} \times 100 = 2.5$

Comments:

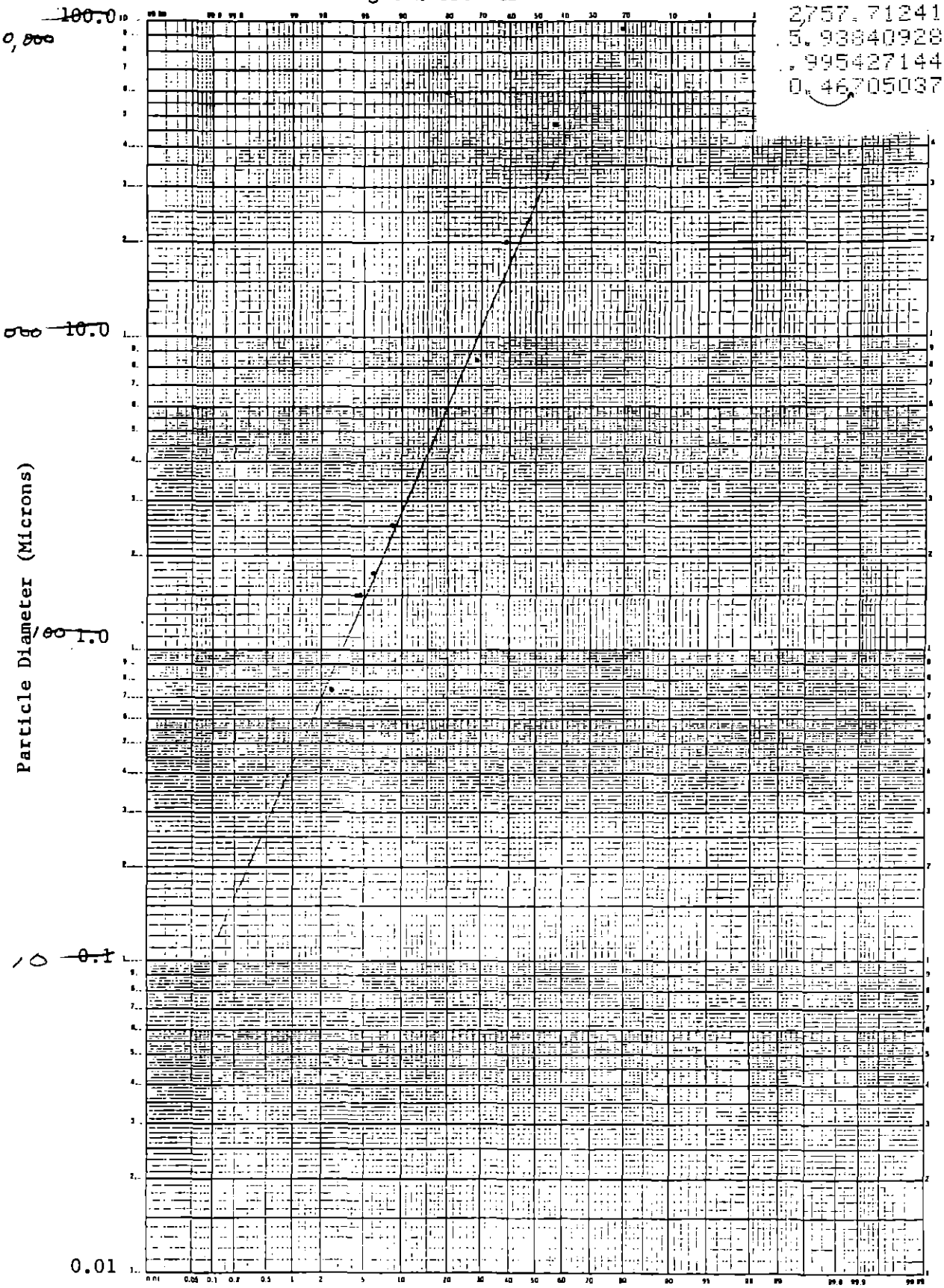
11/81

Virgin Mat. 10/27/81
0840 hrs

$q_D < D_1 = 16$
where $D_1 = \frac{mm}{650} = 464.4$

2757.712415
5.938409285
.9954271448
0.46705037 2

Weight % Greater than Stated Size



Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE

Silt Analysis

Run No. Virgin Material 10/27/81 Date 11/18/81

MRI Project No. 4891 C 93 Recorded By SLC

Sample No: Virgin Material 10/27/81

Material: 1420 hrs.

Split Sample Balance:

Make Ohaus.

Capacity 2610 g

Smallest Division 0.1 g

Material Weight (after drying)

Pan + Material: 1,476.2 g

Pan: 18.1 g

Dry Sample: 1458.1 g

Final Weight: 1456.6 g

% Silt = $\frac{\text{Net Weight} < 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100 =$ 2.2 %

#1 ✗

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.6 g
10 min:	374.3 g
20 min:	383.6 g
30 min:	389.1 g
40 min:	391.5 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	551.0 g	908.2 g	357.2 g	24.52
4 mesh	533.8 g	846.7 g	312.9 g	21.48 46.0
10 mesh	470.2 g	752.2 g	282.0 g	19.36 69
20 mesh	419.9 g	560.0 g	140.1 g	9.61 79.6
60 mesh	374.4 g	626.6 g	252.2 g	17.31 92.9
80 mesh	368.4 g	403.0 g	34.6 g	2.37 94.3
100 mesh	354.8 g	370.3 g	15.5 g	1.06 95.8
200 mesh	328.8 g	359.0 g	30.2 g	2.07 97.9
Pan	359.6 g	391.5 g	31.9 g	2.19

1,456.6 g

Comments:

Virgin mat. 1420 hrs
10/27/81

Weight % Greater than Stated Size

%<D, = 16
where D, = mm/mD / G50 = 538.07
3321.35232 mmD
6.172658611 G50
.9965452337 R
.4273585361 F(L Sm)

100.0 — 10,000
10.0 — 1,000
1.0 — 100
0.1 — 10
0.01

Particle Diameter (Microns)

Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE

Run No. Virgin Material 10/30/81 Silt Analysis Date 11/20/81

MRI Project No. 4891 C 83 Recorded By S/C

Sample No: Virgin Mat. 10/30/81

Material: -0850 Mu.

Split Sample Balance:

Make Ohaus

Capacity 2610g

Smallest Division 0.1g

Material Weight (after drying)

Pan + Material: 1,507.7g

Pan: 18.1g

Dry Sample: 1489.6g

Final Weight: 1489.5g

% Silt = $\frac{\text{Net Weight -200 Mesh}}{\text{Total Net Weight}} \times 100$ 1.45%

#1 #

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	359.4g
10 min:	371.2g
20 min:	375.9g
30 min:	378.9g
40 min:	381.1g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	551.0g	906.3g	355.3g	23.85
4 mesh	533.7g	918.9g	385.2g	25.86
10 mesh	470.0g	757.4g	287.4g	19.29
20 mesh	419.6g	561.8g	142.2g	9.54
60 mesh	374.2g	589.2g	215.0g	14.43
80 mesh	368.4g	406.1g	37.7g	2.53
100 mesh	364.6g	371.1g	16.5g	1.10
200 mesh	328.8g	357.3g	28.5g	1.91
Pan	359.4g	381.1g	21.7g x100	1.45

1,489.5g

Comments:

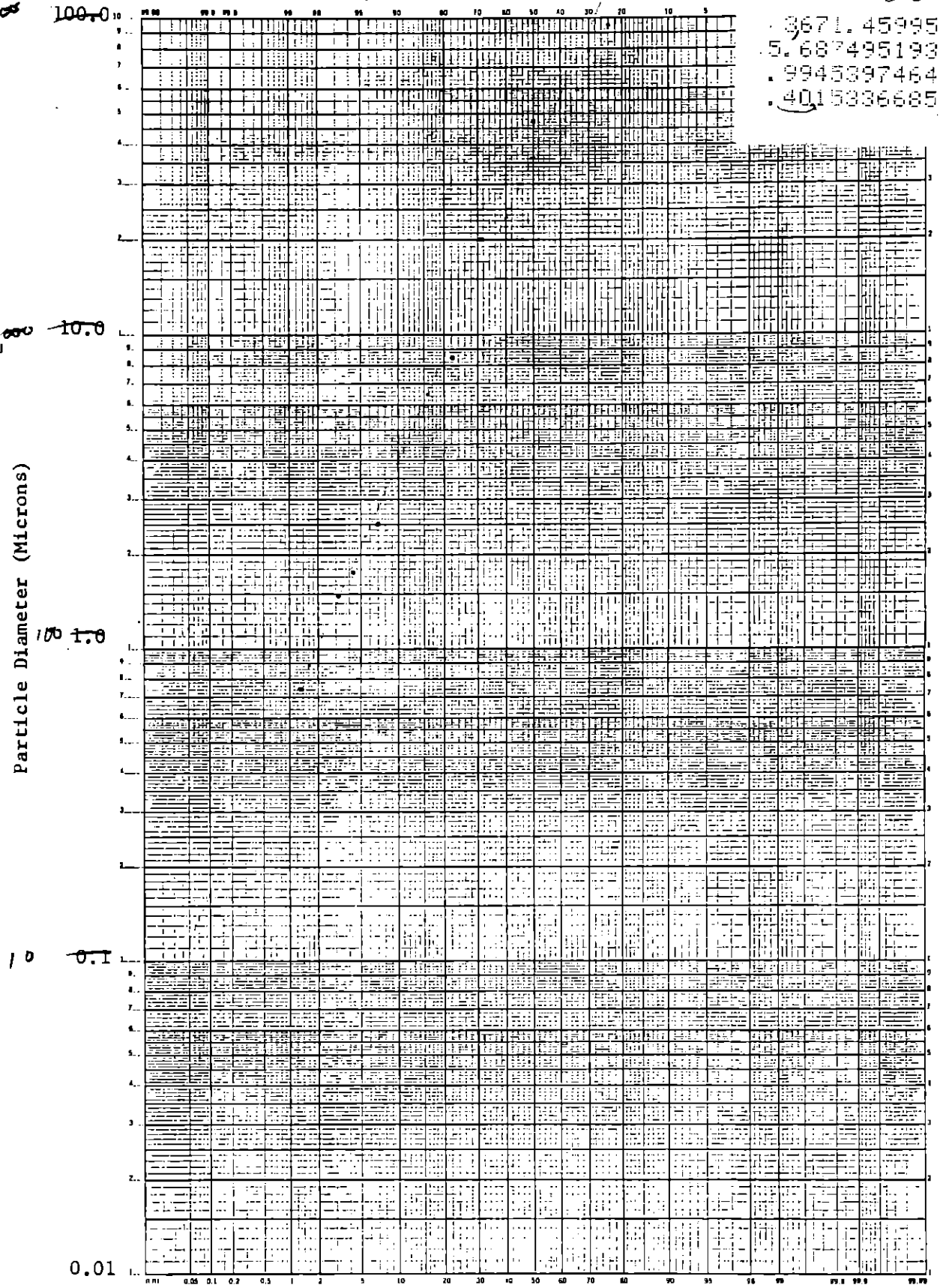
11/81

Virgin mat. 10/30/81
0850 hrs

$D/D_{50} = 16$
where $D_1 = \frac{mm D}{650} = 645.58$

3671.45995
5.687495193
.9945397464
.4015336685

Weight % Greater than Stated Size



Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE
Silt Analysis

Run No. Virgin Material 11/6/81
MRI Project No. 4891-L-83

Date 11/19/81
Recorded By SLU

Sample No: Virgin Mat. 11/6/81
Material: J 1015 Aro

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division J 0.1 g

Material Weight (after drying)
Pan + Material: 1,147.5 g
Pan: 18.1 g
Dry Sample: 1,129.4 g

Final Weight: 1,128.9 g

% Silt = $\frac{\text{Net Weight \#200 Mesh}}{\text{Total Net Weight}} \times 100$ 4.1 %

#2 ★

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.2 g
10 min:	392.3 g
20 min:	401.9 g
30 min:	405.1 g
40 min:	~~406.9 g~~ 407.0 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	550.1 g	1026.9 g	476.8 g	42.23
4 mesh	534.4 g	853.5 g	319.1 g	28.26
10 mesh	467.6 g	587.2 g	119.6 g	10.59
20 mesh	439.0 g	507.0 g	68.0 g	6.02
60 mesh	347.9 g	402.8 g	54.9 g	4.86
80 mesh	361.2 g	373.3 g	12.1 g	1.07
100 mesh	352.4 g	361.6 g	9.2 g	0.81
200 mesh	350.1 g	372.5 g	22.4 g	1.98
Pan	360.2 g	~~406.9 g~~ 407.0 g	46.3 g	4.14

1,128.9 g

Comments:

Virgin mat. 11/6/81
1015 hrs.

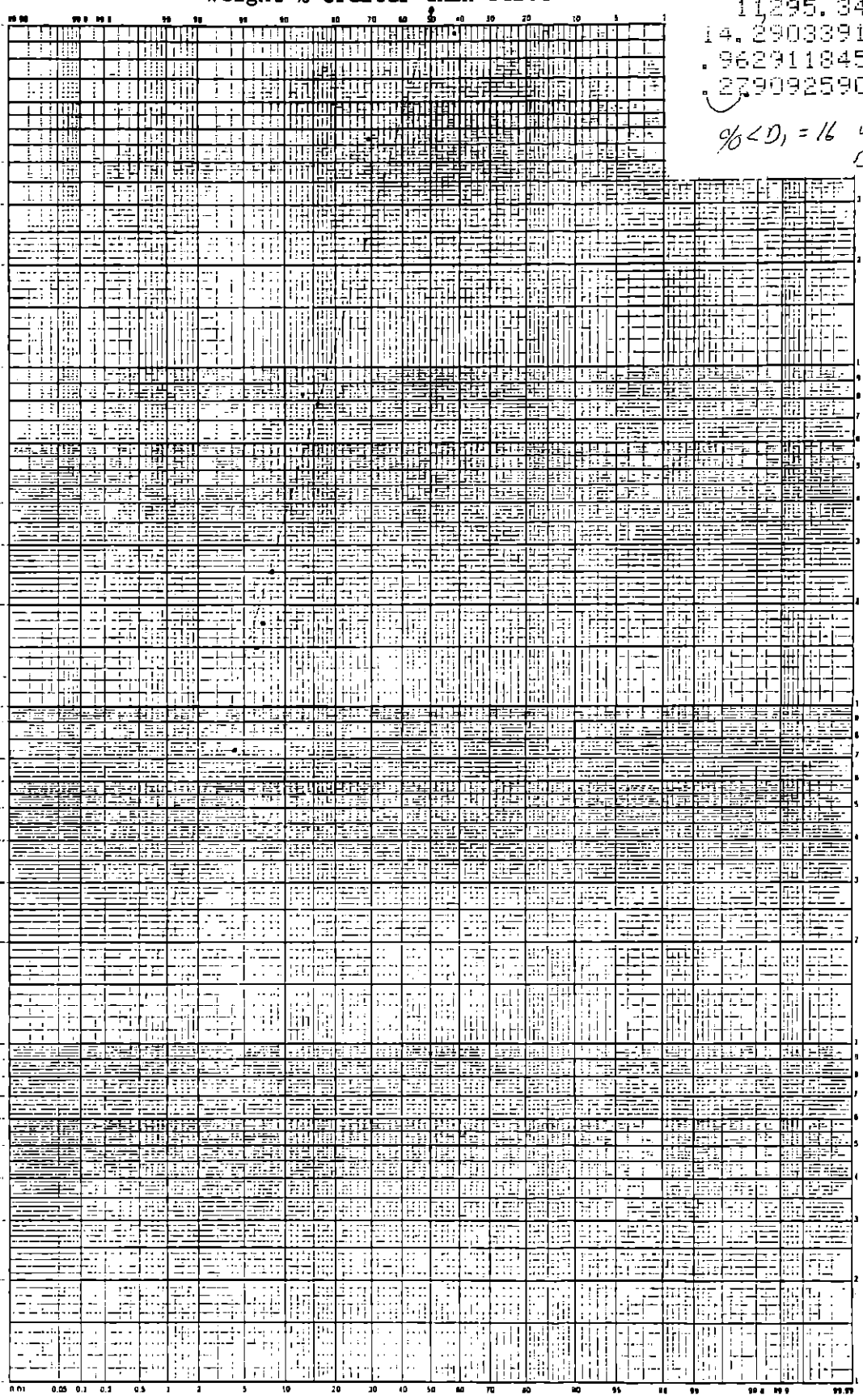
Weight % Greater than Stated Size

11295.346 mmD'
14.290339186 50'
.9629118457 R'
.2790925901 F(< 2mm)

%<D_1 = 16 when $D_1 = \frac{mmD}{650} = 79\mu$

10,000 100.0
1,000 10.0
100 1.0
10 0.1
0.01

Particle Diameter (Microns)



Weight % Less than Stated Size

MIDWEST RESEARCH INSTITUTE

Run No. Recycle Material 11/6/81 — Silt Analysis — Date 11/20/81

MRI Project No. 4891 C 83 — Recorded By SLC

Sample No: Recycle Mat. 11/6/81

Material: 1015

Split Sample Balance:
Make Ohaus
Capacity 2610 g
Smallest Division 0.1 g

Material Weight (after drying)
Pan + Material: 1,255.8 g
Pan: 18.0 g
Dry Sample: 1,237.8 g

Final Weight: 1,237.2 g

% Silt = $\frac{\text{Net Weight} : 200 \text{ Mesh}}{\text{Total Net Weight}} \times 100$ 0.7 %

#2 ✗

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	360.3 g
10 min:	364.9 g
20 min:	366.8 g
30 min:	368.3 g
40 min:	369.3 g

SIZE DISTRIBUTION

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	549.8 g	904.0 g	354.2 g	28.62
4 mesh	534.7 g	825.6 g	290.9 g	23.51 52.1
10 mesh	467.1 g	736.7 g	269.6 g	21.79
20 mesh	438.8 g	595.8 g	157.0 g	12.68
60 mesh	347.9 g	481.8 g	133.9 g	10.82
80 mesh	361.2 g	371.6 g	10.4 g	0.84
100 mesh	352.5 g	356.9 g	4.4 g	0.35
200 mesh	350.0 g	357.8 g	7.8 g	0.63
Pan	360.3 g	369.3 g	9.0 g x 200 = 72	

1,237.2 g

Comments:

11/81

Recycle 11/6/81 1015

$\%<D_1 = 16$

$D_1 = \frac{MMD}{GSD} = 961.35$

4760.46131 MMD
4.951897869 GSD
.9951412322 R
0.332384065 F(28m)

Weight % Greater than Stated Size

10,000 100.0

1000 10.0

100 1.0

10 0.1

0.01

Particle Diameter (Microns)

Weight % Less than Stated Size

APPENDIX E

CALIBRATION DATA

CALIBRATION DATA

This section includes calibration information on consoles, thermocouples, pyrometers, and a barometer. The posttest thermocouple calibrations were not performed at actual test conditions, i.e., 300 $\pm$ 50°C. The thermocouples were used to conduct other tests before they could be calibrated, therefore, they were calibrated at the last encountered conditions. All calibrations were noted to be well within specifications.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

4891-L (83) Preliminary Calibration

Date 10-2-81 Thermocouple number See T.C. No.

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass Yes

other _____

T.C. No. ~~Reference point number~~[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
83-1	Ice Bath	31.8°F	30°F	-0.4%
83-2	"	"	30°F	"
83-3	"	"	30°F	"
83-4	"	"	30°F	"
83-5	"	"	30°F	"
		ASTM 63F No. A06620		
83-1	Oil Bath	~~300~~ 400	~~295~~ 395	
83-2	"	400	~~295~~ 398	
83-3	"	401	~~296~~ 398	
83-4	"	401	398	
83-5	"	402	~~296~~ 399	
		ASTM 69F #566098		

[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

Date 10-13-81 Thermocouple number 6-(83-1)

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator _____ Reference: mercury-in-glass ~~ASTM 63F~~ See Below

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~ °F	Thermocouple potentiometer temperature, ~~°C~~ °F	Temperature difference,[c] %
	Ice Bath	32 ASTM 63F # 06620	31	
	Boiling H_2O	211.5 ASTM 67F # 579382	212	

[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

Date 10-13-81 Thermocouple number 6-(83-2)

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ~~ASTM 63F #06620~~

other See Below

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~ °F	Thermocouple potentiometer temperature, ~~°C~~ °F	Temperature difference,[c] %
	Ice Bath	32 ASTM 63F #06620	31	
	Boiling H_2O	211.5 ASTM 67F #579382	213	

[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
Long Traverse Pitot

Date 11-19-81 Thermocouple number 63-3

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator 1205 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] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM
Stack 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

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 64F #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] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

Pyrometer

STACK ~~TEMPERATURE SENSOR~~ CALIBRATION DATA FORM

Date 11-9-81 Thermocouple number _____

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other _____

Temp. Meter ~~Reference point~~ number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, ~~°C~~	Temperature difference,[c] %
9318	Ice Bath	31.9 °F	31	− 0.2 %
9319	"	"	31	− 0.2 %
	Ref Thermometer =	ASTM 63F		# 066.20
9318	Boiling H_2O	212.2 °F	212	± 0 %
9319	"	"	212	± 0 %
	Ref. Thermometer =	ASTM 67F		# 5-74382

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

[b] Type of calibration system used.

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

Potentiometer - Pyrometer

STACK ~~TEMPERATURE SENSOR~~ CALIBRATION DATA FORM

Date 11-4-81 Thermocouple number _____

Ambient temperature _____°C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other _____

Temp. Meter ~~Reference point~~ number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~ °F	Thermocouple potentiometer temperature, ~~°C~~ °F	Temperature difference,[c] %
8024	Ice Bath	31.9	~~25~~ 30	- 0.4 %
8025		|	~~30~~ 26	- 1.2 %
8026		|	25	- 1.4 %
9516		|	32	± 0
9517		|	32	± 0
X-6028		|	32	± 0
	Ref. Thermometer = ASTM 63F, No. 06620			
8024	Boiling H_2O	212	211	- 0.1 %
8025		|	206	- 0.9 %
8026		|	208	- 0.6 %
9516		|	212	± 0
9517		|	212	± 0
X-6028		|	224	+ 1.8 %
	Ref Thermometer = ASTM 67F, No. 579382			

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

[b] Type of calibration system used.

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

POSTTEST CALIBRATION CHECKS

(Method 5, Figure 5.1)

Plant Bowen Calibrated by KCS

Meter box number 2 Date 11-13-81

Dry Gas Meter

Pretest calibration factor, Y 1.037 (within ±2%)
Posttest check, Y* 1.030 (within ±5% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 1.030 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 Ref = 68.1°F In = 68 Out = 68

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 Bowen Calibrated by RCS

Meter box number 10 Date 11-13-81

Dry Gas Meter

Pretest calibration factor, Y 1.032 (within ±2%)
Posttest check, Y* 1.077 (within ±5% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 1.032 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 65F Ref. = 67.3°F
IN = 66.5
OUT = 66.5

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 Bowen Calibrated by RCS

Meter box number 4 Date 11-16-81

Dry Gas Meter

Pretest calibration factor, Y 1.001 (within ±2%)
Posttest check, Y* 1.007 (within ±5% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 1.001 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 Ref = 66.8°F
In = 67
Out = 67

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 Bowen Calibrated by RSS

Meter box number 3 Date 11-16 81

Dry Gas Meter

Pretest calibration factor, Y 1.038 (within ±2%)
Posttest check, Y* 1.053 (within ±5% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 1.038 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 = ASTM 63F Ref = 67.2 °F
In = 66
Out = 66

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)

(continued)

Barometer

Was the pretest field barometer reading correct? ✓ yes ____ no
Posttest comparison?* -.01 mm (in.) Hg (±2.5 mm (0.1 in.) Hg)
Was calibration required? ____ yes ✓ no
If yes, no correction necessary for calculations when the field barometer has a lower reading; if the mercury-in-glass reading is lower, subtract the difference from the field data readings for the calculation

Calibrated 10-8-81
RCS
Ref. = 29.09" Hg
Read in Vert. Pos. | 11-6-81 Reads .01" low

*Most significant items/parameters to be checked.

APPENDIX F

PRELIMINARY TEST DATA

	Page
Preliminary Inlet Test Data.	F-3
Preliminary Outlet Test Data	F-17
Dry Molecular Weight Determinations.	F-25

PRELIMINARY INLET TEST DATA

MIDWEST RESEARCH INSTITUTE

RUN Preliminary Traverse & M-17

MRI Project Number 4891-L(83)
Field Dates 10-9-81 to
Plant Bowen
Sampling Location Baghouse Inlet
Sampling Date 10-9-81

FIELD CREW

Crew Chief Walker

Testing Engineer 1 SULTZ
2
3

Engr. Technician 1
2
3

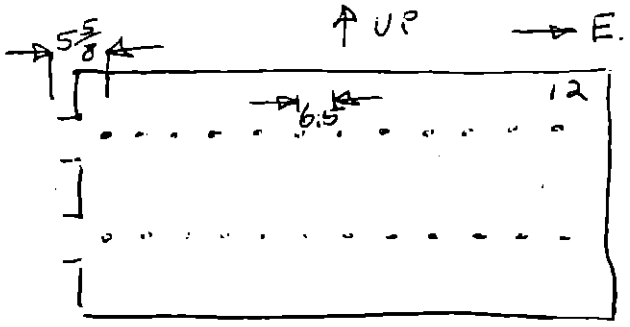
Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Bowen
DATE 10-9-81
SAMPLING LOCATION Baghouse Inlet
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 80 3/8
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 2 3/8
STACK I.D., (DISTANCE A - DISTANCE B) 78
NEAREST UPSTREAM DISTURBANCE 12 ±
NEAREST DOWNSTREAM DISTURBANCE 6
CALCULATOR RCS

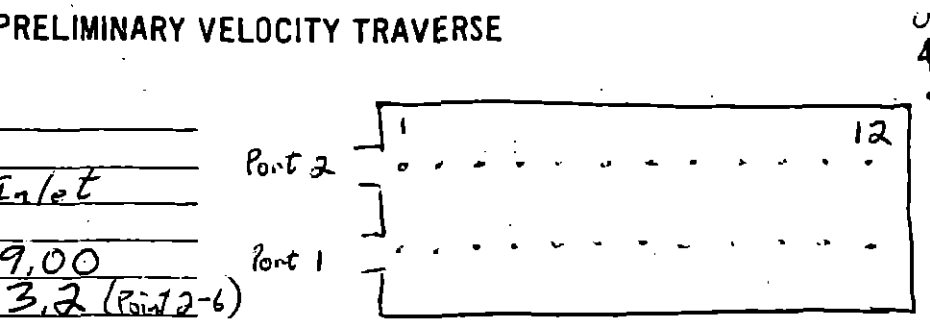


SCHEMATIC OF SAMPLING LOCATION

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		78		2 3/8	5 5/8
2					12 1/8
3					18 5/8
4					25 1/8
5					31 5/8
6					38 1/8
7					44 5/8
8					51 1/8
9					57 5/8
10					64 1/8
11					70 5/8
12					77 1/8

PRELIMINARY VELOCITY TRAVERSE

PLANT Bowen
DATE 10-9-81
LOCATION Baghouse Inlet
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.00
STACK GAUGE PRESSURE, in. H_2O -3.2 (Point 2-6)
OPERATORS RCS, TW,



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F	Zero ΔP Angle
1-1	~~.32~~ .40	346	+75°
1-2	.53	352	+74°
1-3	.72	350	+85°
1-4	.95	348	+75°
1-5	.96	348	+65°
1-6	.94	346	+65°
1-7	.81	342	+70°
1-8	.87	336	+76°
1-9	.86	332	+70°
1-10	.98	328	+65°
1-11	1.10	326	+70°
1-12	.52	314	+50°
$\sqrt{\Delta p}$ ave	0.888		
AVERAGE	0.803	3.39	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F	Zero ΔP Angle
2-1	.22	304	90°
2-2	.36	315	78°
2-3	.36	330	-81°
2-4	.51	342	-70°
2-5	.65	347	-65°
2-6	.76	355	-65°
2-7	.80	362	-65°
2-8	.86	363	-65°
2-9	.96	367	-65°
2-10	.94	374	-70°
2-11	1.05	365	-52°
2-12	.90	358	-70°
	$\sqrt{\Delta p}$ ave	0.817	
AVERAGE	0.698	348.5	

$\Delta p_{ave} = 0.751$
$T_{s\,ave} = 343.75$

MIDWEST RESEARCH INSTITUTE

Run Number Preliminary - Bag. Inlet PRELIMINARY — Recorded by RCS

Date 10-9-81 — MOISTURE DETERMINATION — Assisted by _____

NOTE: Same as Run No. _____

A. Condensor and/or Silica Gel Method

Barometric Pressure, P_B = 28.97 in. Hg

☐ Barometer Location Lab Trailer

Reading Time 12:00 by RCS

☐ Elevation _____

	Clock Time	Dry Gas Meter Reading(cf)	Flowmeter Setting	Dry Gas Meter Temp (°F)	Impinger Water Volume (ml)
Final		1.00		102.9 avg	25
Initial		Zero			20
Difference		Vm = 1.00			Wc = 5

Tube No.	Weight (Grams)		
	Final	Initial	Difference
	89.3	89.0	.3
Total Moisture Adsorbed:			Wa = .3

Meter Pressure, $P_B \approx Pm$ = 28.97 in. Hg

Average Meter Temperature, Tm = 102.9 °F

Total Weight of Moisture Collected, Wc + Wa = Wm = 5.3 gm

$$\text{Moisture Content} = \frac{100}{1 + \left[375 \dfrac{Pm\,Vm}{(Tm+460)\,Wm}\right]} = 21.5 \text{ \% by Volume}$$

B. Wet/Dry Bulb Method

Dry Bulb Temperature = _____ °F

Wet Bulb Temperature = _____ °F

Moisture Content (from Ref. Table) = _____ % by Volume

C. Predetermined Value

% Moisture _____ Basis _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen
DATE 10-9-81
SAMPLING TIME (24-hr CLOCK) 11:45 AM
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 85
OPERATOR DL + RCS

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	5.5		5.5		5.0		5.33	44/100	2.35
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	16.4		15.2		16.0		15.87	32/100	5.08
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	Zero
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.8	28/100	22.06
								TOTAL	29.49

EPA (Dur) 230
4/72

NOMOGRAPH DATA

PLANT Bowen

DATE 10-9-81

SAMPLING LOCATION Baghouse Inlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	~ 95
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	21.5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.97
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	28.73
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	344
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.75
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.10
C FACTOR		.74
CALCULATED NOZZLE DIAMETER, in.		.262
ACTUAL NOZZLE DIAMETER, in.		.250
REFERENCE Δp, in. H_2O		.88

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Exit
Test Number

Date 10-9-81
Initial RCS

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

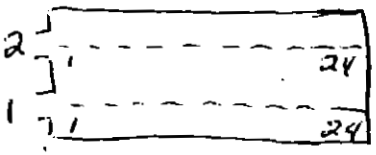
Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	95
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	2
Mole fraction dry gas	Mf	.785
Nozzle diameter, inches	Dn	.250
Barometric pressure, inches Hg	Pb	28.97
$\frac{5.168\ (95 + 460)\ (.84)\ (2)\ (.785)\ (.25^2)}{\sqrt{28.97}}$	K	43.92

for Nozzle # 30 $(.247^2)$ 43.92

FIELD DATA

PLANT Bowen
DATE 10-9-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Particulate
RUN NUMBER
OPERATOR RCS
AMBIENT TEMPERATURE 85
BAROMETRIC PRESSURE 28.97
STATIC PRESSURE, (P_s) -3.2" H_2O
FILTER NUMBER (s) 17-1, 17-2



PROBE LENGTH AND TYPE
NOZZLE I.D. .250, #10 (.247, #30)
ASSUMED MOISTURE, % 21.5
SAMPLE BOX NUMBER
METER BOX NUMBER 2
METER $\Delta H_@$ 1.84
C FACTOR .74
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp .88

Leak CK: Initial at 15" Hg, CFM .001
Final at Hg, CFM
SCHEMATIC OF TRAVERSE POINT LAYOUT
READ AND RECORD ALL DATA EVERY 2 MINUTES

$VM = 43.92 \times \sqrt{\frac{Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m, ft³) Desired	GAS METER READING 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
	0	1410		698.322									
2-1	2	1412	698.87	6	.12	.27	.27	293	74	75	3		
2-2	4	1414	699.56	69959	.22	.47		347	75	76	10		
2-3					.36	.76							
2-4													
2-5				699.990									
	0	1417	~~700.084~~	~~700.089~~	~~.53~~	~~1.12~~		~~334~~	~~77~~	~~78~~	~~25~~		
2-24	2	1449	700.89	700.89	.53	1.12		334	77	78	25		

F-11

COMMENTS

Stop 1414:50 Too High Vacuum. Final Vol. 699.800 Leak ck @ 20" = .002
Leak CK Filter 17-2 : @ 15" Hg = .001 (inital)
2nd nozzle = #30 .247" dia.
Stop 1449 Final Vol = 700.890

EPA-Durh-235

PARTICULATE SAMPLE RECOVERY AND INTEGRITY

Plant Bowen
Sample Location Inlet
Sample Box No. _____
Sample Type _____

Run No. Preliminary
Sample Date 10-9-81
Recovery Date _____
Cleanup Person _____

Filter No.	17-1	17-2	
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]					
Initial Volume (wt)[b]					
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 _____

SILICA GEL

	456.5
	456.4
	0.0
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

METHOD 17 RUN WAS ABORTED DUE TO HIGH LOADING, SHORT SAMPLING TIME, & HIGH VACUUM

MIDWEST RESEARCH INSTITUTE

~~Pesticide Sampling Assessment~~

RUN PRELIMINARY

MRI Project Number 4811-83
Field Dates
Plant BOWEN CONSTRUCTION
Sampling Location INLET
Sampling Date 10/19/81

FIELD CREW

Crew Chief Tom WALKER

Testing Engineer 1 Bob STUTZ
2
3

Engr. Technician 1
2
3

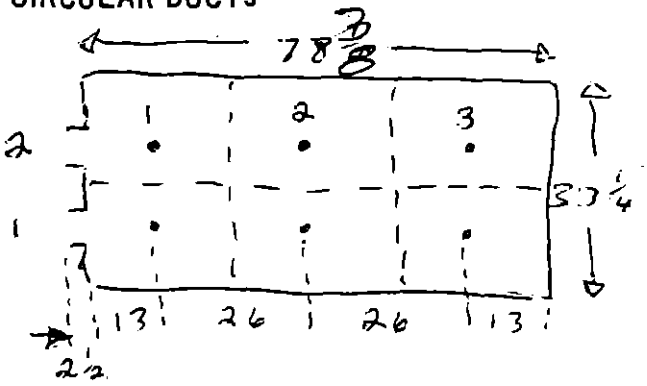
Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Bowen
DATE 10-19-81
SAMPLING LOCATION Baghouse Inlet
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 80 1/2
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 2 1/2
STACK I.D., (DISTANCE A - DISTANCE B) 78
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR RCS

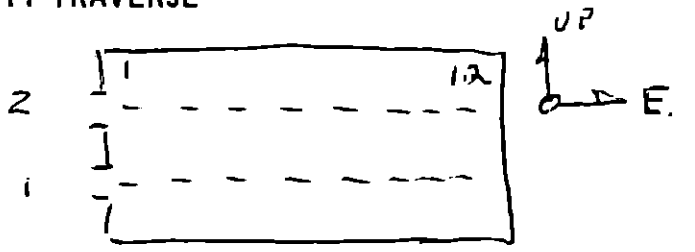


SCHEMATIC OF SAMPLING LOCATION

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			13	2 1/2	15 1/2
2			39	"	41 1/2
3			65	"	67 1/2

PRELIMINARY VELOCITY TRAVERSE

PLANT Bowen
DATE 10-19-81
LOCATION Baghouse Inlet
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O −3.05
OPERATORS RCS − DL



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1-1	.40	335
1-2	.45	350
1-3	.67	355
1-4	1.25	356
1-5	1.40	356
1-6	1.30	360
1-7	1.20	362
1-8	1.20	361
1-9	1.15	357
1-10	1.15	355
1-11	1.30	352
1-12	.58	344
AVERAGE	1.004	353.6

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
2-1	~~.20~~ .46	~~350~~ 348
2-2	.53	351
2-3	.62	354
2-4	.74	354
2-5	.77	353
2-6	.79	352
2-7	.87	354
2-8	.89	352
2-9	1.05	353
2-10	.95	358
2-11	1.00	358
2-12	1.20	353
2-1	.42	350
2-2	.56	352
2-3	.56	354
2-4	.69	353
2-5	.80	353
2-6	.84	354
2-7	.85	357
2-8	.92	356
2-9	.95	353
2-10	1.05	350
2-11	1.15	346
2-12 ~~AVERAGE~~	1.05	344
Avg.	.870	351.8

Stk. Avg. = .912 ΔP
" " = 352.7°

Run Number I-1
Date 10-19-81

MIDWEST RESEARCH INSTITUTE
PRELIMINARY
MOISTURE DETERMINATION

Recorded by RCS
Assisted by BW

NOTE: Same as Run No. Preliminary

A. Condensor and/or Silica Gel Method

Barometric Pressure, P_B = _____ in. Hg

☐ Barometer Location _____

Reading Time _____ by _____

☐ Elevation _____

	Clock Time	Dry Gas Meter Reading(cf)	Flowmeter Setting	Dry Gas Meter Temp (°F)	Impinger Water Volume (ml)
Final					
Initial					
Difference		Vm =			Wc =

Tube No.	Weight (Grams)		
	Final	Initial	Difference
Total Moisture Adsorbed:			Wa =

Meter Pressure, $P_B \approx Pm$ = _____ in. Hg

Average Meter Temperature, Tm = _____ °F

Total Weight of Moisture Collected, Wc + Wa = Wm = _____ gm

$$\text{Moisture Content} = \frac{100}{1 + \left[375 \frac{Pm\,Vm}{(Tm+460)\,Wm}\right]} = \text{_____ \% by Volume}$$

B. Wet/Dry Bulb Method

Dry Bulb Temperature = _____ °F

Wet Bulb Temperature = _____ °F

Moisture Content (from Ref. Table) = _____ % by Volume

C. Predetermined Value

% Moisture 21 Basis Preliminary Test

PRELIMINARY OUTLET TEST DATA

MIDWEST RESEARCH INSTITUTE

RUN Pre.

MRI Project Number 4891-L83
Field Dates
Plant Bowen Const. Co.
Sampling Location Outlet
Sampling Date 10-16-81

FIELD CREW

Crew Chief Walker

Testing Engineer 1 Whited
2 Cobb
3

Engr. Technician 1
2
3

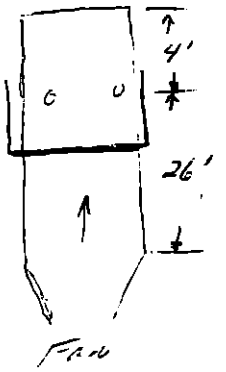
Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Bowen Const. Co.
DATE 10-16-81
SAMPLING LOCATION Outlet
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 50"
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 2"
STACK I.D., (DISTANCE A - DISTANCE B) 48"
NEAREST UPSTREAM DISTURBANCE 1 dia. / 4'
NEAREST DOWNSTREAM DISTURBANCE 6.5 dia / 26'
CALCULATOR Cobb / White

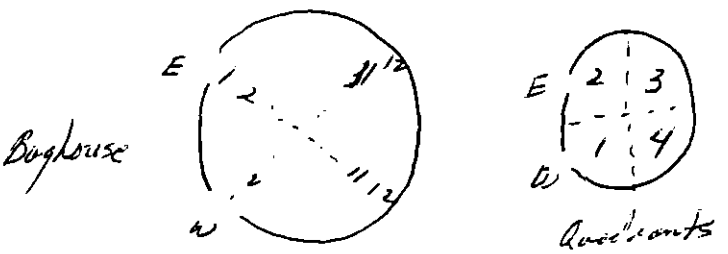


SCHEMATIC OF SAMPLING LOCATION

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	.021	48"	1.008 1"	2"	3"
2	.067		3.216 3 1/4"		5 1/4"
3	.116		5.664 5 5/8"		7 5/8"
4	.177		8.496 8 1/2"		10 1/2"
5	.25		12.0 12"		14"
6	.356		17.088 17 1/8"		19 1/8"
7	.644		30.912 30 7/8"		32 7/8"
8	.75		36.0 36"		38"
9	.823		39.504 39 1/2"		41 1/2"
10	.882		42.336 42 3/8"		44 3/8"
11	.933		44.784 44 3/4"		46 3/4"
12	.979		46.992 47"		49"

PRELIMINARY VELOCITY TRAVERSE

PLANT Bowen Const Co
DATE 10-16-81
LOCATION Outlet
STACK I.D. 48"
BAROMETRIC PRESSURE, in. Hg 27.3"
STACK GAUGE PRESSURE, in. H_2O -.7"
OPERATORS Cobb/Whitted



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
W - 1	0.575	279
2	0.635	289
3	0.84	290
4	0.85	293
5	0.915	295
6	0.98	296
7	1.3	297
8	1.35	298
9	1.35	296
10	1.3	295
11	1.1	293
12	0.97	290
E - 1	0.83	283
2	0.81	288
3	0.82	291
4	0.82	291
5	0.83	291
6	0.94	291
7	0.89	289
8	0.78	299
9	0.73	303
10	0.73	305
11	0.67	305
12	0.57	302
AVERAGE	.90	294

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Quad 1	0.78	—
2	1.0	—
3	1.45	311
4	0.80	311
AVERAGE		

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen Const. Co

DATE 10-16-81

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab

ANALYTICAL METHOD Fyrite

AMBIENT TEMPERATURE 60°

OPERATOR Cobb Initiated

COMMENTS:
Direct Readings

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	5	/	4	/	4	/	4.33	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	16	/	15.5	/	15.5	/	15.67	32/100	
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)	79	/	80.5	/	80.5		80	28/100	
								TOTAL	

EPA (Dun) 230
4-72

MIDWEST RESEARCH INSTITUTE

RUN PRELIMINARY

MRI Project Number 4791-L63
Field Dates 10-19-81
Plant Bowen Coat Co.
Sampling Location Outlet
Sampling Date 10-19-81

FIELD CREW

Crew Chief Walker, T.

Testing Engineer 1 Cobb, D.
2
3

Engr. Technician 1
2
3

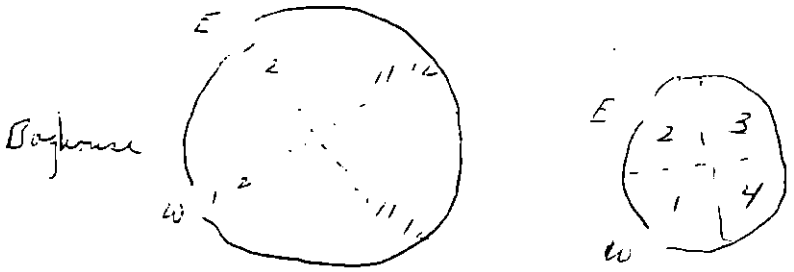
Lab Technician 1 Gabriel, M.
2
3

Process Engineer 1
2

Other 1
2

PRELIMINARY VELOCITY TRAVERSE

PLANT Brown Const. Co.
DATE 10-19-91
LOCATION Outlet
STACK I.D. 48"
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O -.94
OPERATORS Cobb



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
E-1	1.1	310
2	1.3	316
3	1.35	318
4	1.35	319
5	1.30	319
6	1.30	320
7	1.00	319
8	.94	318
9	.91	316
10	.93	316
11	.93	313
12	.75	310
W-1	.59	295
2	.73	311
[illegible]	[illegible]	[illegible]
3	.85	314
4	.85	314
5	.89	314
6	1.1	315
7	1.5	315
8	1.5	315
9	1.4	314
10	1.2	313
11	1.1	312
AVERAGE	1.08	314

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Quad 1	.81	314
2	1.4	319
3	1.1	312
4	.90	317
12	.93	304
AVERAGE		

Run Number PRELIM

Date 10/9/81

MIDWEST RESEARCH INSTITUTE
PRELIMINARY MOISTURE DETERMINATION

Recorded by CBB

Assisted by WHITED

NOTE: Same as Run No. _____

A. Condensor and/or Silica Gel Method

Barometric Pressure, P_B = _____ in. Hg

☐ Barometer Location _____

Reading Time _____ by _____

☐ Elevation _____

	Clock Time	Dry Gas Meter Reading(cf)	Flowmeter Setting	Dry Gas Meter Temp (°F)	Impinger Water Volume (ml)
Final					
Initial					
Difference		Vm =			Wc =

Tube No.	Weight (Grams)		
	Final	Initial	Difference
Total Moisture Adsorbed:			Wa =

Meter Pressure, $P_B \approx Pm$ = _____ in. Hg

Average Meter Temperature, Tm = _____ °F

Total Weight of Moisture Collected, Wc + Wa = Wm = _____ gm

$$\text{Moisture Content} = \frac{100}{1 + \left[375 \frac{Pm\,Vm}{(Tm+460)\,Wm}\right]} = \text{_____ \% by Volume}$$

B. Wet/Dry Bulb Method

Dry Bulb Temperature = _____ °F

Wet Bulb Temperature = _____ °F

Moisture Content (from Ref. Table) = _____ % by Volume

C. Predetermined Value

% Moisture 21 Basis ASSUMED FROM INLET

DRY MOLECULAR WEIGHT DETERMINATIONS

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen

DATE 10-19-81

SAMPLING TIME (24-hr CLOCK) _____

SAMPLING LOCATION Baghouse Inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) _____

ANALYTICAL METHOD _____

AMBIENT TEMPERATURE _____

OPERATOR _____

COMMENTS:

Estimate from preliminary test

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							~ 5.5	44/100	2.42
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)							~ 16	32/100	5.12
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.5	28/100	21.98
							TOTAL		29.52

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EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowater Carolina Co

DATE 10-19-91

SAMPLING TIME (24-hr CLOCK) 9:30

SAMPLING LOCATION W-7

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab

ANALYTICAL METHOD Fyrite

AMBIENT TEMPERATURE 52

OPERATOR Cobb

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	5	/	4	/	4	/	4.3	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	14.5	/	14.5	/	15.5	/	14.8	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	/	/	/	/	/	/		28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)	80.5		81.5		80.5			28/100	
								TOTAL	

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EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT BOWEN CONSTRUCTION

DATE 10/19/81

SAMPLING TIME (24-hr CLOCK) 1155

SAMPLING LOCATION INLET

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) GRAB

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 70

OPERATOR STOLTZ

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	5.0		5.0		5.0		5.0	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	15		14.5		14.5		14.7	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

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EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen

DATE 10-20-81

SAMPLING TIME (24-hr CLOCK) 0800

SAMPLING LOCATION STACK Center DUCT

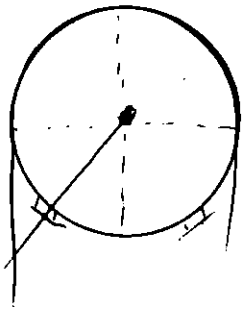
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab

ANALYTICAL METHOD Fyrite

AMBIENT TEMPERATURE 48

OPERATOR Whited

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	4		4		4		4	44/100	1.76
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17.5		16.5		16.5		16.83	32/100	5.39
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							79.17	28/100	22.17
								TOTAL	29.32

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Beaver Construction
DATE 10-21-81
SAMPLING TIME (24-hr CLOCK) 1030
SAMPLING LOCATION Inlet to Baghouse
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 50°
OPERATOR D. Lacy

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	5.5		5.0		4.5		5.0	44/100	2.2 ~~5.41~~
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	15.0		15.5 / 15.25		15.5		15.31	32/100	4.90
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	1						0	28/100	0
N_2 (NET IS 100 MINUS ACTUAL CO READING)							79.69	28/100	22.31
								TOTAL	29.41

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen Construction
DATE 10-22-81
SAMPLING TIME (24-hr CLOCK) 1000
SAMPLING LOCATION Inlet to Baghouse
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 40°
OPERATOR D. Lacy

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	3.0		3.0		4.0		3.33	44/100	1.46
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17.5		18.0		17.0		17.5	32/100	5.60
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		—		—		—	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							79.17	28/100	22.17
								TOTAL	29.23

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EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Baker Trust Co.
DATE 11-26-81
SAMPLING TIME (24-hr CLOCK) 0940
SAMPLING LOCATION outlet quad 1
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 60°
OPERATOR Cobb/Walker

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	3.5		3.0		3.0		3.2	44/100	1.41
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17.0		15.0		17.5		17.5	32/100	5.60
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)							79.3	28/100	22.20
								TOTAL	29.21

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen Const. Co.
DATE 10-24-81
SAMPLING TIME (24-hr CLOCK) 0930
SAMPLING LOCATION Inlet Quad 4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE 60°
OPERATOR Cobb/Walker

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	3.5		3.5		3.5		3.5	44/100	1.54
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17.0		16.5		16.5		16.7	32/100	5.34
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)							79.8	28/100	22.34
								TOTAL	29.22

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen Constr. Co.
DATE 10-27-81
SAMPLING TIME (24-hr CLOCK) 0800
SAMPLING LOCATION outlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE
OPERATOR

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	4.5		4.0		5.0		4.5	44/100	1.98
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	16.0		17.0		16.5		16.5	32/100	5.28
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)							79.0	28/100	22.12
								TOTAL	29.38

EPA (Dun 230
4-72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen Constr. Co.
DATE 10-27-81
SAMPLING TIME (24-hr CLOCK) 0800
SAMPLING LOCATION inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE
OPERATOR

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	4.0		4.0		4.0		4.0	44/100	1.76
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	16.5		16.5		17.0		16.7	32/100	5.34
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)							79.3	28/100	22.20
								TOTAL	29.30

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EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bowen

DATE 10/30/81

SAMPLING TIME (24-hr CLOCK) OUTLET AM

SAMPLING LOCATION OUTLET

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) GRAB

ANALYTICAL METHOD FYRITE

AMBIENT TEMPERATURE 50

OPERATOR ED 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	3		3		2.5		2.83	44/100	1.245
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17		17		16.5		16.83	32/100	5.386
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	17							28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)	80		80		81		80.33	28/100	22.492
							TOTAL		29.12

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EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT 3M Coal Prod. Co.
DATE 11-6-81
SAMPLING TIME (24-hr CLOCK) 0930
SAMPLING LOCATION Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Grab
ANALYTICAL METHOD Fyrite
AMBIENT TEMPERATURE
OPERATOR Walker

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	5.5		4.5		4.5		4.8	44/100	2.11
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	16.0		16.0		16.0		16.0	32/100	5.12
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)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

APPENDIX G

LABORATORY AND ANALYTICAL DATA

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METHOD 5 FILTER TARE WEIGHTS

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
MS-1	3.5845	MG	10-12-81	3.5846	MG	10-13-81				3.5846
2	3.5782			3.5780						3.5781
3	3.5493			3.5490						3.5492
4	3.5479			3.5476						3.5478
5	3.5387			3.5384						3.5386
6	3.5450			3.5444						3.5447
7	3.5563		10-12	3.5560		10-13				3.5562
108	3.7520		10-13-81	3.7518		10-14-81				3.7519
110	3.8307			3.8307						3.5307
189	3.7290			3.7295						3.7294
150	3.8891			3.8887						3.8889
195	3.7504			3.7509						3.7506
194	3.7639	MG	10-13	3.7637	MG	10-14				3.7638
181	3.7423			3.7423						3.7423
111	3.8048			3.8048						3.8048
193	3.7079			3.7078						3.7078
155	3.7807			3.7708						3.7708
185	3.7070			3.7071						3.7070
49	3.8298		10-13	3.8294	MG	10-14				3.8296
192	3.7486			3.7487						3.7486
180	3.7414			3.7410						3.7412
MS-8	3.8159			3.8157						3.8156
190	3.7838	MG	10-13	3.7836	MG	10-14				3.7837

Remarks

METHOD 17 FILTER TARE 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
17-1	1.5936	MG	10-5-81	1.5935	MG	10-6-81				1593.6
17-2	1.5941	↑	↑	1.5940	↑	↑				1594.0
17-3	1.5774			1.5774						1577.4
17-4	1.5298			1.5298						1529.8
17-5	1.5237			1.5239						1523.8
17-6	1.5326			1.5327						1532.6
17-7	1.5241			1.5242						1524.2
17-8	1.5263			1.5262						1526.2
17-9	1.5167			1.5169						1516.8
17-10	1.5201			1.5200						1520.0
17-11	1.5780			1.5780						1578.0
17-12	1.5913			1.5912						1591.2
17-13	1.5810			1.5812						1581.4
17-14	1.5287			1.5285						1528.6
17-15	1.5284			1.5282						1528.2
17-16	1.5261			1.5258						1526.0
17-17	1.5214			1.5209						1521.2
17-18	1.5358			1.5356						1535.7
17-19	1.5208			1.5208						1520.8
17-20	1.5208			1.5208						1520.8
17-21	1.5767			1.5763						1576.5
17-22	1.5894			1.5893						1589.4
17-23	1.5739			1.5739						1573.9
17-24	1.5255			1.5250						1525.2
17-25	1.5287			1.5287						1528.7
17-26	1.5243			1.5241						1524.2
17-27	1.5235			1.5235						1523.5
17-28	1.5368			1.5367						1536.8
17-29	1.5249	↓	↓	1.5248	↓	↓				1524.8
17-30	1.5258	MG	10-5-81	1.5258	MG	10-6-81				1525.8
17-31	1.5738	MG	10-6-81	1.5738	MG	10-7-81				1573.8

Remarks

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
17-32	1.5861	MG	10-6-81	1.5831 mg	MG	10-7-81				1586.0
17-33	1.5697	↑	↑	1.5695	MG	10-7				1569.6
17-34	1.5200			1.5202	MG	10-7				1520.1
17-35	1.5187			1.5187	MG	10-7				1518.7
17-36	1.5173			1.5173	MG	10-7				1517.3
17-37	1.5234			1.5234	MG	10-7				1523.4
17-38	1.5237			1.5238	MG	10-7				1523.8 ~~1521.0~~
17-39	1.5210	↓	↓	1.5210	MG	10-7				1521.0
17-40	1.5252	MG	10-6-81	1.5252	MG	10-7-81				1525.2
17-41	1.5829	MG	10-8-81	1.5826	MG	10-12-81				1582.8
17-42	1.5876	MG	10-8	1.5875	MG	10-12				1587.7
17-43	1.5805	MG	10-8-81	1.5806	MG	10-12-81				1580.6

Remarks 17-40 sori used in place of 2.5 in. back-up filter.
17-38, 17-39 SORI - 10-7-81
17-36, 17-37 SORI - 10-7-81

METHODS 17 AND 5 BEAKER TARE WEIGHTS

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
1	69.0982	MG	10-6-81	69.0980	MG	10-7-81				69.0981
2	68.4548	↑	↑	68.4546	MG	10-7				68.4547
3	68.0492			68.0490	MG	10-7				68.0491
4	68.0389			68.0389	MG	10-7				68.0389
5	66.0222			66.0222	MG	10-7				66.0222
12	69.4716			69.4716	MG	10-7				69.4716
10	68.1874			68.1873	MG	10-7				68.1874
29	68.3239			68.3237	MG	10-7				68.3238
14	68.6296			68.6295	MG	10-7				68.6296
13	69.0955			68.0958	MG	10-7				68.0956
7	68.7062			68.7065	MG	10-7				68.7064
18	68.2365			68.2370	MG	10-7				68.2368
40	67.0276	↓	↓	67.0276	MG	10-7				67.0276
8	67.9761	MG	10-6-81	67.9765	MG	10-7-81				67.9763
20	68.2500	MG	10-7-81	68.2505	MG	10-8-81				68.2502
19	69.4037	MG	↑	68.4038	MG	↑				68.4038
43	66.8414	MG		68.8420	MG					66.8417
28	67.8092	MG		67.8097	↑					67.8094
25	67.1779	MG		67.1785						67.1782
16	66.3083	MG		66.3098						66.3086
21	67.0687	MG		67.0693						67.0690
39	67.8945	MG		67.8952						67.8948
35	68.9463	MG		68.9463						68.9463
38	67.7191	MG	↓	67.7193						67.7192
30	67.4262	MG	10-7-81	67.4264						67.4263
9	67.4726	MG	10-7-81	67.4730						67.4728
45	67.2521	MG	↑	67.2525						67.2523
34	65.8616	MG		65.8622						65.8619
15	67.0938	MG		67.0942						67.0940
31	67.6422	MG	↓	67.6425	↓	↓				67.6424
37	67.8822	MG	10-7-81	67.8825	MG	10-8-81				67.8824

Remarks: beaker # 15, 37, 35 used as acetone blank
100ml acetone used 10-15-81

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
44	68.2233	MG	10-7-81	68.2235	MG	10-8-81				68.2234
46	66.0224	MG	10-7	66.0231	↑	↑				66.0228
33	69.0374	MG	10-7	69.0376						69.0375
41	67.8670	MG	10-7	67.8678						67.8674
22	67.9297	MG	10-7	67.9304						67.9230
27	69.6913	MG	10-7	69.6914						69.6914
42	67.4677	MG	10-7	67.4680						67.4678
17	68.2052	MG	10-7	68.2058						68.2055
47	67.6107	MG	10-7	67.6111						67.6109
23	67.4870	MG	10-7	67.4873						67.4872
32	65.8506	MG	10-7	65.8512						65.8509
11	67.6204	MG	10-7-81	67.6210						67.6207
26	68.5864	MG	10-7-81	68.5870						68.5867
31	65.7033	MG	10-7-81	65.7040	↓	↓				65.7036
24	67.7425	MG	10-7-81	67.7430	MG	10-8-81				67.7428

Remarks

ANDERSEN HCSS THIMBLE FILTER TARE 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
T-16	24082.5	MG	10-7-81	24082.9	MG	10-8-81				24082.7
T-13	24011.9		↑		↑	↑				~~24052.4~~
T-20	24052.4	MG		24052.4						24052.4
T-12	24588.3	MG		24588.8						24588.6
T-7	24196.0	↑		24196.1						24196.0
T-25	23695.3			23695.5						23695.4
T-2	24019.6			24020.0						24019.3
T-21	24334.1			24334.5						24334.3
T-14	24128.0			24127.4						~~24128.2412~~ 7.7
T-27	24328.1			24328.6						24325.4
T-4	24231.4			24231.6						24231.5
T-9	24156.7			24156.9						24156.8
T-22	24320.4			24320.4						24320.4
T-26	24133.4			24133.4						24133.4
T-15	24184.9			24184.8						24184.8
T-1	24409.2			24409.5						24409.4
T-11	24382.4			24382.6						24382.5
T-10	24544.7			24544.6						24544.6
T-16	23804.5			23804.8						23804.6
T-28	24082.2			24092.2						24082.2
T-29	23790.6			23790.8						23790.7
T-19	24331.5			24331.7						24331.6
T-24	24359.7			24359.7						24359.7
T-17	24389.2			24389.2						24389.2
T-30	24276.1			24276.8						24276.4
T-3	24005.0			24005.3						24005.2
T-23	23923.6			23924.1						23923.9
T-5	24255.0			24255.3						24255.2
T-9	24283.9	↓	↓	24284.2	↓	↓				24283.6
T-18	24466.8	MG	10-7-81	24467.2	MG	10-8-81				24466.5
T-13	23915.5	MG	10-8-81							

Remarks: T-13 - dropped, reloaded

METHOD 5 FINAL WEIGHT ANALYSIS

Page No. 1

Run No. ~~E-1-A~~ I-1-A

Method 5

Date of Run 10-19-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-8-81 By: MG First Weigh (g)	Date: 10-9-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-2	95.2360	95.2356		95.2358

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-2	~~97.8685~~	98.7747		98.7750
	98.7752			

FILTER TARE WEIGHTS

Filter No.	Date: 10-12-81 By: MG First Weigh (g)	Date: 10-12-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
108	3.7520	3.7518		3.7519

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
108	13.3179	13.3183		13.3181

Page No. 2

Run No. ~~I-1-81~~ I-1

Date of Run ~~-~~
10-19-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: By: First Weigh (g)	Date: By: Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights
#2				

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: By: First Weigh (g)	Date: By: Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights

Filter Blank Correction 0.8019

COMMENTS

Page No. 3

Run No. ~~I-1-B~~ I-1-B

Date of Run 10-19-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-8-81 By: MG First Weigh (g)	Date: 10-9-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-1	95.0423	95.0414		95.0418

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-1	97.8085	97.8089		97.8087

FILTER TARE WEIGHTS

Filter No.	Date: 10-12-81 By: MG First Weigh (g)	Date: 10-13-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-2	3.5782	3.5780		3.5781

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-2	5.2293	5.2291		5.2292

Page No. 4

Run No. ~~I-1-6~~ I-1-

Date of Run 10-19-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

Page No. 5

Run No. I-3

Date of Run 10-20-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-8-81 By: MG First Weigh (g)	Date: 10-9-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-3	108.9424	108.9428		108.9426

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-3	116.7369	116.7374		116.7372

FILTER TARE WEIGHTS

Filter No.	Date: 10-12-81 By: MG First Weigh (g)	Date: 10-13-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-4	3.5479	3.5476		3.5478

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-4	10.1590	10.1589		10.1590

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Run No. I-3

Date of Run 10-20-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

Page No. 7 Run No. I-4

Date of Run 10-20-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-8-81 By: MG First Weigh (g)	Date: 10-9-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-4	95.8922	95.8926		95.8924

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-4	97.8030	97.8024		97.8027

FILTER TARE WEIGHTS

Filter No.	Date: 10-12-81 By: MG First Weigh (g)	Date: 10-13-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-5	3.5387	3.5384		3.5386

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: M Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-5	7.1731	7.1730		7.1730

Page No. 8

Run No. I-4

Date of Run 10-20-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

Page No. 9

Run No. ~~I-1-C~~ I-1-C

Date of Run 10-21-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-8-81 By: MG First Weigh (g)	Date: 10-9-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-5	96.9654	96.9647		96.9650

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-5	105.5999	105.5999		105.5999

FILTER TARE WEIGHTS

Filter No.	Date: 10-12-81 By: MG First Weigh (g)	Date: 10-13-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-3	3.5493	3.5490		3.5492

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: 11-4-81 By: Gabriel Third Weigh (g)	Average Weight
MS-3	13.1064	13.1053	13.1058	13.1056

Page No. 10

Run No. ~~5-1-CJ-1~~

Date of Run 10-21-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.1

COMMENTS

Page No. 11 Run No. I-2

Date of Run 10-22-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-8-81 By: MG First Weigh (g)	Date: 10-9-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-6	97.4919	97.4919		97.4919

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-6	105.2636	105.2638		105.2637

FILTER TARE WEIGHTS

Filter No.	Date: 10-12-81 By: MG First Weigh (g)	Date: 10-13-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-6	3.5450	3.5444		3.5447

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-6	14.1953	14.1950		14.1952

Page No. 13

Run No. I-2

Date of Run 10-22-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

Page No. 13

Run No. I-5

Date of Run 10-22-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-8-81 By: MG First Weigh (g)	Date: 10-9-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-7	99.0565	99.0574		99.0570

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-7	108.3880	108.3884		108.3882

FILTER TARE WEIGHTS

Filter No.	Date: 10-12-81 By: MG First Weigh (g)	Date: 10-13-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-7	3.5563	3.5560		3.5562

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
MS-7	14.0482	14.0481		14.0482

Page No. 14

Run No. E-5

Date of Run 10-22-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

Page No. 15

Run No. I-6A

Date of Run 10-26-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-23-81 By: MG First Weigh (g)	Date: 10-24-81 By: MG Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
1	94.7986	94.7992		94.7989

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
1	100.4792	100.4784		100.4788

FILTER TARE WEIGHTS

Filter No.	Date: 10-13-81 By: MG First Weigh (g)	Date: 10-14 By: ~~10-14~~ MG Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
189	3.7290	3.7295		3.7294

FILTER FINAL WEIGHTS

Filter No.	Date: 10-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
189	9.4009	9.4004		9.4006

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Run No. I-6A

Date of Run 10/26/68

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

Page No. 17

Run No. I-7

Date of Run 10-26-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-23-81 By: MG First Weigh (g)	Date: 10-24-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
22	96.7221	96.7229		96.7225

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
22	106.9260	106.9266		106.9263

FILTER TARE WEIGHTS

Filter No.	Date: 10-13-81 By: MG First Weigh (g)	Date: 10-14-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
195	3.7504	3.7509		3.7506

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
195	13.7618	13.7612		13.7615

Page No. 18

Run No. I-7

Date of Run 10-26-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

Page No. 19

Run No. I-8

Date of Run 10-27-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-23-81 By: MG First Weigh (g)	Date: 10-24-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	93.0003	93.0005		93.0004

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
6	101.8030	101.7926	11-4-81 101.8019 11-5-81 101.8023	101.8021

FILTER TARE WEIGHTS

Filter No.	Date: 10-13-81 By: MG First Weigh (g)	Date: 10-22-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
193	3.7079	3.7078		3.7078

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
193	10.7370	10.7225	11-4 10.7345 11-5 10.7348	10.7346

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Run No. I-8

Date of Run 10-27-81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: By: First Weigh (g)	Date: By: Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: By: First Weigh (g)	Date: By: Second Weigh (g)	Date: By: Third Weigh (g)	Average Weights

Filter Blank Correction 0.1

COMMENTS

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Run No. I-6 B

Date of Run 10-27-81

250 ml BEAKERS - TARE WEIGHTS

Beaker No.	Date: 10-23-81 By: MG First Weigh (g)	Date: 10-24-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
64	110.6769	110.6763		110.6766

250 ml BEAKERS - FINAL WEIGHTS

Beaker No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: 11-4-81 By: Gabriel Third Weigh (g)	Average Weight
64	118.2505	118.2494	118.2491	118.2493

FILTER TARE WEIGHTS

Filter No.	Date: 10-13-81 By: MG First Weigh (g)	Date: 10-22-81 By: MG Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
111	3.5048	3.8048		3.5048

FILTER FINAL WEIGHTS

Filter No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: By: Third Weigh (g)	Average Weight
111	11.6250	11.6242		11.6246

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Run No. I-6-B

Date of Run 10/27/81

DRY CATCH BEAKER - TARE WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

DRY CATCH BEAKER - FINAL WEIGHT

Beaker No.	Date: ____ By: ____ First Weigh (g)	Date: ____ By: ____ Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weights

Filter Blank Correction 0.8

COMMENTS

METHOD 17 FINAL WEIGHT ANALYSIS

METHOD 17

Run Number: Preliminary
Date of Run: 10-9-81

FILTER ANALYSIS

Filter No. 17-1	Date: 10-29-81 By: JOHNSON First Weigh (mg)	Date: 11-2-81 By: MG Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	8.5087	8.5090		8.5088

Tare Weight: 1593.1e mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 2	Date: 11-29-81 By: JOHNSON First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	69.1015	69.1005		69.1010

Tare Weight: 69.0985g Vol. of Probe Rinse: 15 ml

Acetone Blank Correction: .125 mg

Remarks: Acetone Blank Volume = 60 ml

METHOD 17

Run Number: Preliminary
Date of Run: 10-9-81

FILTER ANALYSIS

Filter No. 17-2	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: MG Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	6 3463	6.3472		6.3468

Tare Weight: 1594.0 mg Blank Correction: ____ mg

PROBE RINSE ANALYSIS

Beaker No. 2	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.4685	68.4678		68.4682

Tare Weight: 68.4547 g Vol. of Probe Rinse: 15 ml

Acetone Blank Correction: .125 mg

Remarks

METHOD 17

Run Number: O-1-3A
Date of Run: 10-19-81

FILTER ANALYSIS

Filter No. 17-3	Date: 10-29-81 By: JOHNSON First Weigh (mg)	Date: 11-2-81 By: MG Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1857.0 ~~1.0570~~	1856.8 ~~1.8568~~		1.8569

Tare Weight: 1577.4 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 38	Date: 10-29-81 By: JOHNSON First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: 11-3-81 By: Gabriel Third Weigh (g)	Average Weight
Final Weight	67.7255	67.7242	67.7249	67.7246

Tare Weight: 67.7192 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .1607 mg

Remarks

METHOD 17

Run Number: 0-1-38
Date of Run: 10-19-81

FILTER ANALYSIS

Filter No 17-4	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Galusha Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1734.7 ~~1.7347~~	1734.5 ~~1.7345~~		1.73420

Tare Weight: 1529.8 mg Blank Correction: ____ mg

PROBE RINSE ANALYSIS

Beaker No. 19	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Galusha Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.4081	68.4081		68.4081

Tare Weight: 68.4038 g Vol. of Probe Rinse: 70 ml

Acetone Blank Correction: .107 mg

Remarks

METHOD 17

Run Number: 0-1-2
Date of Run: 10-20-81

FILTER ANALYSIS

Filter No. 17-5	Date: 10-29-81 By: JOHNSON First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.6223	1.6219		~~1.6221~~ 1622.1

Tare Weight: 1523.8 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 43	Date: 10-29-81 By: JOHNSON First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	66.9454	66.8449		66.8452

Tare Weight: 66.8417 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .167 mg

Remarks

METHOD 17

Run Number: 0-1-4
Date of Run: 10-20-81

FILTER ANALYSIS

Filter No. 17-7	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.5809	1.5809		1.5809

Tare Weight: 1524.2 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 31	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	67.6452	67.6445		67.6448

Tare Weight: 67.6424 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .167 mg

Remarks

METHOD 17

Run Number: 0-2-2(A)
Date of Run: 10-21-81

FILTER ANALYSIS

Filter No. 17-8	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.7139	1.7141		~~1.7140~~ 1714.0

Tare Weight: 1526.2 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 29	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.3303	68.3298		68.3300

Tare Weight: 68.3238 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .107 mg

Remarks

METHOD 17

Run Number: 0-2-4(1)
Date of Run: 10-21-81

FILTER ANALYSIS

Filter No. 17-9	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.5884	1.5879		1.5880

Tare Weight: 1516.8 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 30	Date: 10-29-81 By: JOHNSON First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	67.4287	67.4280		67.4284

Tare Weight: 67.4263 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: 1167 mg

Remarks

METHOD 17

Run Number: D-1-1
Date of Run: 10-22-81

FILTER ANALYSIS

Filter No. 7-10	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.7721	1.7723		~~1.7722~~ 1772.2

Tare Weight: 1520.0 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 17	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.2168	68.2159		68.2164

Tare Weight: 68.2055 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .107 mg

Remarks

METHOD 17

Run Number: 0-2-3
Date of Run: 10-22-81

FILTER ANALYSIS

Filter No. 17-11	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	~~1.7808~~ 1780.8	~~1.7809~~ 1780.9		~~1.7808~~ 1780.8

Tare Weight: 1578.0 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 27	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	69.6956	69.6949		69.6952

Tare Weight: 69.6914 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .167 mg

Remarks

METHOD 17

Run Number: 6-2-1
Date of Run: 10-26-81

FILTER ANALYSIS

Filter No. 13	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.8460	1.84602		1846.1 ~~1.8461~~

Tare Weight: 1591.2 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 47	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	67.6218	67.6212		67.6215

Tare Weight: 67.6109 g Vol. of Probe Rinse: 25 ml

Acetone Blank Correction: .208 mg

Remarks

METHOD 17

Run Number: 0-2-2B
Date of Run: 10-27-81

FILTER ANALYSIS

Filter No. 17-13	Date: 10-29-81 By: Johnson First Weigh (mg)	Date: 11-2-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	1.67201	1.67118		1.67220

Tare Weight: 1581.4 mg Blank Correction: 0.0 mg

PROBE RINSE ANALYSIS

Beaker No. 7	Date: 10.29.81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	68.7091	68.7091		68.7091

Tare Weight: 68.7064 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .167 mg

Remarks

METHOD 17

Run Number: 0-2-4/3
Date of Run: 10-30-81

FILTER ANALYSIS

Filter No. 17-14	Date: 11-2-81 By: Gabriel First Weigh (mg)	Date: 11-3-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	~~1.7509~~ 1756.9	1750.9		1750.9

Tare Weight: 1528.6 mg Blank Correction: ~~0.0~~ 0.2 mg

PROBE RINSE ANALYSIS

Beaker No. 42	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	67.4776	67.4777		67.4776

Tare Weight: 67.4678 g Vol. of Probe Rinse: 20 ml

Acetone Blank Correction: .167 mg

Remarks

METHOD 17

Run Number: 0-2-4C
Date of Run: 10-30-81

FILTER ANALYSIS

Filter No. 17-15	Date: 11-2-81 By: Gabriel First Weigh (mg)	Date: 11-3-81 By: Gabriel Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Final Weight	~~1684.1~~ ~~1684.4~~	1684.0		1684.0

Tare Weight: 1528.3 mg Blank Correction: ~~0.0~~ 0.2 mg

PROBE RINSE ANALYSIS

Beaker No. 13	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
Final Weight	69.4757	69.4753		69.4755

Tare Weight: 69.4716 g Vol. of Probe Rinse: .20 ml

Acetone Blank Correction: .167 mg

Remarks

Beaker 45 used as procedural blank

ANDERSEN HCSS STAGE TARE AND FINAL WEIGHTS

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

Run Number: I-1-1
Date of Run: 10-19-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: MG First Weigh (g)	Date: 10-7-81 By: Galwill Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
1	1	1.4384	1.4386		1.4385
1	2	1.4564	1.4567		1.45666
1	3	1.4428	1.4428		1.4428
1	4	1.3868	1.3870		1.3869

Thimble Filter Tare Weight (mg) 24082.8

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Galwill Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
1	1	3.6767	3.6771		3.67769
2	2	1.5582	1.5583		1.5582
3	3	1.6662	1.6660		1.6661
4	4	1.9096	1.9094		1.9095
Thimble Filter (mg)		24207.4	24207.9		24207.6

T-6

Thimble Filter Blank Correction (mg) ~~24082.3~~ .4

Remarks

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

Run Number: I-2-1
Date of Run: 10-29-81
20

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: MG First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
2	1	1.3813	1.3811		1.3812
2	2	1.3932	1.3933		1.3932
2	3	1.3882	1.3882		1.3882
2	4	1.3920	1.3923		1.3922

Thimble Filter Tare Weight (mg) ~~24331.6~~

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: ~~Johnson~~ First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
2	1	3.2475	3.2466		3.2470
2	2	1.4370	1.4370		1.4370
2	3	1.5312	1.5304		1.5308
2	4	1.6490	1.6491		1.6490
Thimble Filter (mg)		24403.1	24404.1		24403.6

~~F-6~~
T-19

Thimble Filter Blank Correction (mg) ~~24331.2~~ 0.4

Remarks

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

Run Number: I-2-2(A)
Date of Run: 10-19-81
20

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: MG First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
3	1	1.3872	1.3874		1.3873
3	2	1.3912	1.3911		1.3912
3	3	1.4382	1.4380		1.4381
3	4	1.4538	1.4536		1.4537

Thimble Filter Tare Weight (mg) 24082.2

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: 11-3-81 By: Gabriel Third Weigh (g)	Average Weight
3	1	7.6903	7.6920	7.6923	7.6922
3	2	1.5133	1.5133		1.5133
3	3	1.7347	1.7347		1.7347
3	4	1.9748	1.9734	1.9736	1.9735
Thimble Filter (mg)		24128.1	24128.5		24128.3

~~T-28~~ T-28

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-1-4
Date of Run: 10-17-81
21

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: M.G. First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
4	1	1.4464	1.4464		1.4464
4	2	1.3880	1.3880		1.3880
4	3	1.3809	1.3808		1.3808
4	4	1.3907	1.3906		1.3906

Thimble Filter Tare Weight (mg) 24359.7

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
4	1	12.0538	12.0542		12.0540
4	2	1.5676	1.5674		1.5675
4	3	2.1321	2.1313		2.1317
4	4	2.3686	2.3684		2.3685
Thimble Filter (mg)		24716.4	24716.7		24716.6

~~F-6~~
T-24

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-1-42
Date of Run: 10-21-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: GMS First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
5	1	1.3877	1.3878		1.3878
5	2	1.3889	1.3890		1.3890
5	3	1.3907	1.3908		1.3908
5	4	1.3819	1.3819		1.3819

Thimble Filter Tare Weight (mg) 23804.6

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: JOHNSON First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
5	1	7.4769	7.4761		7.4765
5	2	1.5137	1.5142		1.5140
5	3	1.9574	1.9574		1.9574
5	4	2.5252	2.5252		2.5252
Thimble Filter mg.		240029	240031		240030

T-~~34~~ 112

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-1-3
Date of Run: 10-22-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: MG First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
6	1	1.4387	1.4387		1.4387
6	2	1.4514	1.4516		1.4515
6	3	1.4416	1.4416		1.4416
6	4	1.3824	1.3825		1.3824

Thimble Filter Tare Weight (mg) 24389.2

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: ~~Johnson~~ First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: 11-3-81 By: Gabriel Third Weigh (g)	Average Weight
6	1	7.7843	7.7841		7.7842
6	2	1.5260	1.5239	1.5199 11-4-81 1.5201	1.5200
6	3	1.8409	1.8410 ~~2.2893~~ mg		1.8410
6	4	2.2891	2.2893		2.2892
Thimble Filter mg		28535.7	24524.0	24523.9	24523.9 ~~25~~

T-17

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-2-2B
Date of Run: 10-22-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: MG First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
7	1	1.3812	1.3813		1.3812
7	2	1.3905	1.3904		1.3904
7	3	1.3830	1.3829		1.3830
7	4	1.3888	1.3888		1.3888

Thimble Filter Tare Weight (mg) 24276.4

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: 11-3-81 By: Gabriel Third Weigh (g)	Average Weight
7	1	7.3695	7.2621 ~~7.3684~~ mG	7.2629	7.2625
7	2	1.5178	1.5171		1.5174
7	3	2.0049	2.0037	2.0045	2.0041
7	4	2.4502	2.4494		2.4498
Thimble Filter mg		24499.4	24499.5		24499.4

T-30

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-2-4
Date of Run: 10-22-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: MG First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
8	1	1.3844	1.3844		1.3844
8	2	1.3839	1.3837		1.3838
8	3	1.4395	1.4390		1.4392
8	4	1.4512	1.4513		1.4512

T

Thimble Filter Tare Weight (mg) 23790.7

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: [illegible] First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
8	1	10.4537	10.4529		10.4533
8	2	1.7909	1.7900		1.7904
8	3	2.2069	2.2061		2.2065
8	4	2.4903	2.4896		2.4900
Thimble Filter		24272.8	24272.8		24272.8

T-29

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-2-3
Date of Run: 10-26-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: ~~Lomeson~~ First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
9	1	1.4482	1.4484		1.4483
9	2	1.3792	1.3792		1.3792
9	3	1.3792	1.3791		1.3792
9	4	1.3943	1.3944		1.3944

Thimble Filter Tare Weight (mg) 24544.6

10-29-81

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: ~~10-26-81~~ By: ~~Lomeson~~ First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
~~10~~ 9	1	~~1.3805~~ 5.6063	5.6058		5.6060
~~10~~ 9	2	~~1.3899~~ 1.4399	1.4392		1.4396
~~10~~ 9	3	~~1.3813~~ 1.7422	1.7416		1.7419
~~10~~ 9	4	~~1.3831~~ 2.1417	2.1407		2.1412
Thimble Filter mg		24607.6	24607.3		24607.4

T-10

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-3-2
Date of Run: 10-26-81

TARE WEIGHTS

Sample ID		Date: 10-6-81 By: JOHNSON	Date: 10-7-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
10	1	1.3805	1.3808		1.3806
10	2	1.3879	1.3879		1.3879
10	3	1.3813	1.3812		1.3812
10	4	1.3831	1.3832		1.3832

Thimble Filter Tare Weight (mg) 24588.6

FINAL WEIGHTS

Sample ID		Date: 10-29-81 By: JOHNSON	Date: 11-2-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
10	1	7.4940	7.4933		7.4936
10	2	1.4693	1.4685		1.4689
10	3	1.8872	1.8866		1.8869
10	4	2.3811	2.3803		2.3807
Thimble Filter T-12		24883.5	24884.2		24883.8

Thimble Filter Blank Correction (mg) 0.0

Remarks

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

Run Number: I-1-18
Date of Run: 10-26-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: JOHNSON First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
11	1	1.4400	1.4400		1.4400
11	2	1.4534	1.4534		1.4534
11	3	1.4457	1.4458		1.4458
11	4	1.3817	1.3819		1.3818

Thimble Filter Tare Weight (mg) 24052.4

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: JOHNSON First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
11	1	6.2168	6.2148	6.2155	6.2152
11	2	1.5489	1.5484		1.5486
11	3	2.0634	2.0632		2.0633
11	4	2.4730	2.4725		2.4728
Thimble Filter mg T-20		24310.8	24310.8		24310.8

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-3-4
Date of Run: 10-26-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: Johnson First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
12	1	1.3774	1.3776		1.3775
12	2	1.3786	1.3785		1.3786
12	3	1.3759	1.3759		1.3759
12	4	1.3918	1.3918		1.3918

Thimble Filter Tare Weight (mg) 24196.0

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-29-81 By: Johnson First Weigh (g)	Date: 11-2-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
12	1	11.7241	11.7243		11.7242
12	2	1.5493	1.5489		1.5491
12	3	2.2651	2.2042		2.2646
12	4	2.4543	2.4536		2.4540
Thimble Filter		24631.6	24631.8		24631.7

T-1

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-3-3
Date of Run: 10-27-81

TARE WEIGHTS

Sample ID		Date: 10-6-81 By: JOHNSON	Date: 10-7-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
13	1	1.3841	1.3841		1.3841
13	2	1.3912	1.3912		1.3912
13	3	1.4382	1.4383		1.4382
13	4	1.4515	1.4515		1.4515

Thimble Filter Tare Weight (mg) 24409.4

FINAL WEIGHTS

Sample ID		Date: 10-29-81 By: JOHNSON	Date: 11-2-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
13	1	4.4707	4.4698		4.4702
13	2	1.4538	1.4531		1.4534
13	3	1.8323	1.8316		1.8320
13	4	2.3893	2.3885		2.3889
Thimble Filter		24569.0	24569.4		24569.2

T-1

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-3-1
Date of Run: 10-27-81

TARE WEIGHTS

Sample ID		Date: 10-6-81 By: Jamison	Date: 10-7-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
14	1	1.4448	1.4451		1.4450
14	2	1.3898	1.3898		1.3898
14	3	1.3810	1.3810		1.3810
14	4	1.3755	1.3755		1.3755

Thimble Filter Tare Weight (mg) 24382.5

FINAL WEIGHTS

Sample ID		Date: 10-29-81 By: Jamison	Date: 11-2-81 By: Gabriel	Date: 11-3-81 By: Gabriel	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
14	1	7.1632	7.1629		7.1630
14	2	1.7549	1.7543		1.7546
14	3	1.5818	1.5812		1.5815
14	4	2.3508	2.3503		2.3506
Thimble Filter		29065.1	24487.1	24486.9	24487.0

T-11

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-4-2
Date of Run: 10-27-81

TARE WEIGHTS

Sample ID		Date: 10-6-81 By: Johnson	Date: 10-7-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
15	1	1.3759	1.3762		1.3760
15	2	1.3917	1.3914		1.3916
15	3	1.3971	1.3972		1.3972
15	4	1.3912	1.3912		1.3912

Thimble Filter Tare Weight (mg) 23923.4

FINAL WEIGHTS

Sample ID		Date: 10-29-81 By: Johnson	Date: 11-2-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
15	1	4.6181	4.6179		4.6180
15	2	1.4702	1.4698		1.4700
15	3	1.7462	1.7458		1.7460
15	4	2.0343	2.0336		2.0340
Thimble Filter		24099.1	24098.9		24099.0

T-23

Thimble Filter Blank Correction (mg) 0.4

Remarks

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

Run Number: I-4-1
Date of Run: 10-30-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: JOHNSON First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
16	1	1.4378	1.4379		1.4378
16	2	1.4499	1.4501		1.4500
16	3	1.4499	1.4451		1.4450
16	4	1.3960	1.3958		1.3959

Thimble Filter Tare Weight (mg) ~~24005.2~~

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
16	1	3.5868	3.5875		3.5872
16	2	1.4980	1.4988		1.4984
16	3	1.7459	1.7465		1.7468
16	4	2.0673	2.0682		2.0678
Thimble Filter mg		24182.5	24182.2		24182.4

T-3

Thimble Filter Blank Correction (mg) 0.1

Remarks

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

Run Number: I-4-3
Date of Run: 10-30-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: Gabriel First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
17	1	1.3837	1.3836		1.3836
17	2	1.3802	1.3800		1.3801
17	3	1.3846	1.3843		1.3844
17	4	1.3901	1.3899 1.38 mg		1.3900

Thimble Filter Tare Weight (mg) 24848

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
17	1	9.1781	9.1780		9.1780
17	2	1.4690	1.4698		1.4694
17	3	1.9347	1.9353		1.9350
17	4	2.2638	2.2646		2.2642
Thimble Filter mg		24641.6	24641.4		24641.5

T-15

Thimble Filter Blank Correction (mg) 0.1

Remarks

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

Run Number: I-4-4
Date of Run: 10-30-81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: Gabriel First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
18	1	1.3897	1.3895		1.3896
18	2	1.3929	1.3927		1.3928
18	3	1.4351	1.4350		1.4350
18	4	1.4482	1.4479		1.4480

Thimble Filter Tare Weight (mg) 24320.4

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11-2-81 By: Gabriel First Weigh (g)	Date: 11-3-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
18	1	10.9753	10.9757		10.9755
18	2	1.5712	1.5714		1.5713
18	3	2.3084	2.3085		2.3084
18	4	2.2329	2.2330		2.2330
Thimble Filter		25097.9	25097.8		25097.8

T-22

Thimble Filter Blank Correction (mg) 0.1

Remarks

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

Run Number: I-2-1B
Date of Run: 10-30-81

TARE WEIGHTS

Sample ID		Date: 10-6-81 By: Gabriel	Date: 10-7-81 By: Gabriel	Date: ____ By: ____	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
19	1	1.4470	1.4470		1.4470
19	2	1.3853	1.3852		1.3852
19	3	1.3775	1.3774		1.3774
19	4	1.3844	1.3843		1.3844

Thimble Filter Tare Weight (mg) 24466.5

FINAL WEIGHTS

Sample ID		Date: 11-2-81 By: Gabriel	Date: 11-3-81 By: Gabriel	Date: 11-4-81 By: Gabriel	
Set No.	Stage No.	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
19	1	2.8481	2.8482		2.8482
19	2	1.4215	1.4215		1.4215
19	3	1.5800	1.5800		1.5800
19	4	2.0307	2.0307		2.0307
Thimble Filter		25772.7	24594.8	24594.6	24594.7

T-18

Thimble Filter Blank Correction (mg) 0.1

Remarks

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

Run Number: I-2-1(c)
Date of Run: 11/4/81

TARE WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 10-6-81 By: Gabriel First Weigh (g)	Date: 10-7-81 By: Gabriel Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
20	1	1.3920	1.3920		1.3920
20	2	1.3867	1.3867		1.3867
20	3	1.3868	1.3869		1.3868
20	4	1.3891	1.3892		1.3892

Thimble Filter Tare Weight (mg) 2427.7

FINAL WEIGHTS

Sample ID Set No.	Sample ID Stage No.	Date: 11/20/81 By: DW First Weigh (g)	Date: 11/20/81 By: DW Second Weigh (g)	Date: ____ By: ____ Third Weigh (g)	Average Weight
20	1	3.5209	3.5213		3521 mg
20	2	1.4322	1.4324		1432.3
20	3	1.6086	1.6086		1608.6
20	4	1.8354	1.8356		1835.5
Thimble Filter #14		24.1893	24.1889		24189.1

Thimble Filter Blank Correction (mg) 0.6

Remarks

ANDERSEN MARK III SUBSTRATE AND FILTER ANALYSIS

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: O-2-1
Date of Run: 10-30-81

Filter Set Number: 40

TARE WEIGHTS

Stage	Date: 10-5-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: 10-7-81* By: DML Third Weigh (mg)	Average Weight
Pres	259.22	259.23	—	259.23
0	410.29	411.35	411.31	411.33
1	403.20	404.26	404.22	404.24
2	390.05	391.10	391.06	391.08
3	388.83	389.96	389.93	389.945
4	387.11	387.13	—	387.13
5	374.52	374.53	—	374.53
6	406.63	406.68	—	406.68
7	381.76	381.77	—	381.77
F	445.79	445.83	—	445.83

FINAL WEIGHTS

Stage	Date: 11/3/81 By: D.G. First Weigh (mg)	Date: 11/4/81 By: D.G. Second Weigh (mg)	Date: By: Third Weigh (mg)	Average Weight
Pres	~~279.99~~ 278.79	~~278.92~~	279.36	
0	~~411.64~~ 410.37	~~410.36~~		~~410.36~~
1	~~404.82~~ 403.59	~~403.59~~		403.59
2	~~394.12~~ 392.92	~~392.91~~		392.92
3	~~393.80~~ 392.61	~~392.00~~		~~392.00~~
4	~~391.52~~ 390.32	~~390.32~~		390.32
5	~~378.32~~ 377.17	~~377.16~~		377.16
6	~~407.98~~ 406.73	~~406.73~~		406.73
7	~~381.99~~ 380.84	~~380.83~~		~~380.84~~
F	~~445.86~~ ~~444.98~~	~~444.98~~		~~444.98~~

Blank Weight Corrections (mg)

Cyclone: -5 -1.52
Substrate Stages 0-7: -105.87 -1.1
Final Filter: - 9.7 -1.09

* 3 hours after further desiccation, filters were reweighed

Remarks: Used Metric weights from Cahn on Loop A and Ohaus Class P Metric weights on Loop C. Difference between the two loops was -6.03.
Final weights incorrect; Refer to P. 16

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: ~~2nd Morning~~ 0-1-2
Date of Run: ~~10-9-81~~ 10-19-81

Filter Set Number: 31

TARE WEIGHTS

Stage	Date: 10-5-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: 10-7-81* By: DML Third Weigh (mg)	Average Weight
Pres	235.50	235.45	———	235.45
0	376.64	377.67	377.65	377.66
1	375.06	376.12	376.12	376.12
2	381.49	382.58	382.56	382.57
3	374.34	375.36	375.34	375.35
4	380.75	381.84	381.80	381.82
5	373.86	374.90	374.86	374.88
6	383.10	384.12	384.09	384.10
7	369.85	370.90	370.86	370.88
F	439.78	440.83	440.78	440.80

FINAL WEIGHTS

Stage	Date: 10-29-81 By: DML First Weigh (mg)	Date: 10-29-81 By: DML Second Weigh (mg)	Date: 10-29-81 By: DML Third Weigh (mg)	Average Weight
Pres	320.45	320.38 ▲	320.34	320.36
0	377.30	377.22	377.21	377.22
1	376.09		376.04	376.06
2	385.59		385.54	385.56
3	378.84		378.84	378.84
4	386.31		386.30	386.30
5	378.69		378.65	378.67
6	384.87		384.84	384.86
7	370.51		370.49	370.50
F	440.06		440.03	440.04

Blank Weight Corrections (mg)

Cyclone: 0.0
Substrate Stages 0-7: −0.95
Final Filter: −1.07

* 3-4 hours after further desiccation, filters were reweighed

Remarks ▲ weights after 4 hours of desiccation. Decided to wait and reweigh after at least 6 hours of desiccation following first reading

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: D-1-3
Date of Run: 10-20-81

Filter Set Number: 32

TARE WEIGHTS

Stage	Date: 10-5-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: 10-7-81* By: DML Third Weigh (mg)	Average Weight
Pres	236.07	236.09	—	236.09
0	382.74	383.86	383.81	383.8~~4~~5
1	378.37	379.51	379.47	379.49
2	384.54	385.66	385.59	385.62~~5~~
3	375.91	377.05	377.01	377.03
4	383.89	385.00	38~~4~~.95	384.93
5	378.29	379.38	379.33	379.3~~6~~5
6	387.99	389.06	389.02	389.04
7	371.77	372.85	372.80	372.82~~5~~
F	445.59	446.62	446.57	446.60

FINAL WEIGHTS

Stage	Date: 10-28-81 By: DML First Weigh (mg)	Date: 10-28-81 By: DML Second Weigh (mg)	Date: 10-29-81 By: DML Third Weigh (mg)	Average Weight
Pres	275.43	275.39	275.36	275.39
0	392.98		392.99	392.98
1	379.17		379.17	379.17
2	386.63		386.62	386.62
3	378.91		378.89	378.90
4	397.01		397.00	397.00
5	381.68		381.66	381.67
6	389.88		389.92	389.90
7	372.09		372.08	372.08
F	445.68		445.63	445.66

Blank Weight Corrections (mg)

Cyclone: 0.0
Substrate Stages 0-7: −0.95
Final Filter: −1.07

* 3-4 hours after further desiccation, filters were reweighed

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: 0-1-1A
Date of Run: 10-20-81

Filter Set Number: 33

TARE WEIGHTS

Stage	Date: 10-5-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: 10-7-81* By: DML Third Weigh (mg)	Average Weight
Pres	234.15	234.12	—	234.12
0	382.79	383.91	383.91	383.91
1	373.29	374.34	374.38	374.36
2	385.28	386.33	386.32	386.325
3	364.04	365.07	365.05	365.06
4	388.01	388.99	389.04	389.02
5	388.58	389.64	389.60	389.62
6	369.89	369.98	369.94	369.96
7	381.95	382.33	382.33	382.33
F	418.77	419.81	419.82	419.825

FINAL WEIGHTS

Stage	Date: 10-28-81 By: DML First Weigh (mg)	Date: 10-29-81 By: DML Second Weigh (mg)	Date: 10-29-81 By: DML Third Weigh (mg)	Average Weight
Pres	271.67	271.67	271.62	271.64
0	383.87		383.82	383.84
1	373.77		373.75	373.76
2	386.87		386.83	386.85
3	365.76		365.72	365.74
4	389.69		389.69	389.69
5	389.95		389.99	389.96
6	369.61		369.61	369.61
7	381.56		381.56	381.56
F	419.06		419.09	419.08

Blank Weight Corrections (mg)

Cyclone: 0.0
Substrate Stages 0-7: -.95
Final Filter: -1.07

* Reweighed after 4 hours of desiccation

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: 0-1-1B
Date of Run: 10-21-81

Filter Set Number: 34

TARE WEIGHTS

Stage	Date: 10-6-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: 10-7-81* By: DML Third Weigh (mg)	Average Weight
Pres	233.13	233.15	—	233.14
0	373.96	374.98	375.00	374.99
1	364.95	366.00	366.02	366.01
2	369.45	370.49	370.52	370.50
3	361.21	362.28	362.26	362.27
4	375.71	376.75	376.72	376.74
5	370.12	371.19	371.18	371.19
6	390.82	381.84	391.87	391.86
7	358.33	359.41	359.36	359.38
F	430.38	431.46	431.47	431.46

FINAL WEIGHTS

Stage	Date: 10-29-81 By: DML First Weigh (mg)	Date: 10-29-81 By: DML Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	271.09	271.12		271.10
0	374.44	374.46		374.45
1	366.41	366.38		366.40
2	373.19	373.20		373.20
3	366.63	366.61		366.62
4	394.25	394.23		394.24
5	375.94	375.95		375.94
6	392.99	392.98		392.99
7	358.77	358.74		358.76
F	430.77	430.75		430.76

Blank Weight Corrections (mg)

Cyclone: 0.0
Substrate Stages 0-7: -.95
Final Filter: -1.07

* Values after 3 hours of desiccation

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: 0-1-4
Date of Run: 10-22-81

Filter Set Number: 35

TARE WEIGHTS

Stage	Date: 10-6-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: 10-7-81* By: DML Third Weigh (mg)	Average Weight
Pres	238.65	238.67	———	238.66
0	386.34	387.42	387.37	387.40
1	377.32	378.40	378.41	378.40
2	383.87	384.92	384.94	384.93
3	369.00	370.06	370.03	370.04
4	387.51	388.59	388.56	388.58
5	370.21	371.20	371.25	371.22
6	377.30	378.34	378.33	378.34
7	365.64	366.69	366.68	366.68
F	418.48	419.57	419.53	419.55

FINAL WEIGHTS

Stage	Date: 10-29-81 By: DML First Weigh (mg)	Date: 10-29-81 By: DML Second Weigh (mg)	Date: ——— By: ——— Third Weigh (mg)	Average Weight
Pres	311.05	311.00		311.03
0	387.04	387.07		387.06
1	378.16	378.21		378.18
2	386.36	386.31		386.34
3	385.40	385.36		385.38
4	380.26	380.25		380.26
5	382.69	382.65		382.67
6	371.31	371.26		371.28
7	366.63	366.59		366.61
F	419.71	419.67		419.69

Blank Weight Corrections (mg)

Cyclone: 0.0
Substrate Stages 0-7: -.95
Final Filter: -1.07

* Values after 3 hours of desiccation

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: 0-2-2
Date of Run: 10-22-81

Filter Set Number: 36

TARE WEIGHTS

Stage	Date: 10-6-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	225.23	225.21	———	225.22
0	380.57	380.56	———	380.56
1	369.31	369.36		369.34
2	377.99	377.97		377.98
3	366.15	366.16		366.16
4	373.62	373.61		373.62
5	364.42	364.46		364.44
6	365.62	365.59		365.60
7	357.54	357.49		357.52
F	425.52	425.53		425.52

FINAL WEIGHTS

Stage	Date: 10-29-81 By: DML First Weigh (mg)	Date: 10-29-81 By: DML Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	275.02	274.97		275.00
0	380.25	380.30		380.28
1	369.24	369.25		369.24
2	380.37	380.41		380.39
3	369.56	369.51		369.54
4	380.60	380.55		380.58
5	370.11	370.12		370.12
6	367.60	367.59		367.60
7	357.34	357.33		357.34
F	424.65	424.65		424.65

Blank Weight Corrections (mg)

Cyclone: 0.0
Substrate Stages 0-7: -.95
Final Filter: -1.07

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: 0-2-4
Date of Run: 10-26-81

Filter Set Number: 37

TARE WEIGHTS

Stage	Date: 10-6-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	230.36	230.34	230.35 →	
0	387.62	387.64	387.63 →	
1	376.74	376.71	376.72 →	
2	384.84	384.82	384.83 →	
3	368.40	368.38	368.39 →	
4	378.27	378.24	378.21 →	
5	378.57	378.53	378.55 →	
6	386.73	386.68	386.70 →	
7	378.88	378.86	378.87 →	
F	442.90	442.91	442.90 →	

FINAL WEIGHTS

Stage	Date: 10-29-81 By: DML First Weigh (mg)	Date: 10-30-81 By: DML Second Weigh (mg)	Date: 11/9/81 By: D.G. Third Weigh (mg)	Average Weight
Pres	302.03	301.99	301.17	302.00
0	394.21	394.32	395.29	394.32
1	379.02	378.98	379.91	379.00
2	389.46	389.49	390.28	389.48
3	373.85	373.88	374.42	373.86
4	385.50	385.52	386.47	385.51
5	383.53	383.51	384.43	383.52
6	388.11	388.12	389.10	385.12
7	378.69	378.68	379.61	378.68
F	442.55	442.51	443.70	442.53

Blank Weight Corrections (mg)

Cyclone: -0.03
Substrate Stages 0-7: -1.10
Final Filter: -1.09

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: 0-2-3
Date of Run: 10-27-81

Filter Set Number: 38

TARE WEIGHTS

Stage	Date: 10-6-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	244.30	244.27		244.28
0	380.28	380.25		380.26
1	385.31	385.28		385.30
2	382.49	382.48		382.48
3	377.59	377.54		377.56
4	377.67	377.68		377.68
5	374.29	374.24		374.26
6	382.72	382.67		382.70
7	370.67	370.62		370.64
F	434.62	434.57		434.60

FINAL WEIGHTS

Stage	Date: 10-29-81 By: DML First Weigh (mg)	Date: 10-30-81 By: DML Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	395.78	395.80		395.79
0	392.68	392.69		392.68
1	386.15	386.20		386.18
2	386.17	386.13		386.15
3	381.05	381.02		381.04
4	393.62	393.62		393.62
5	378.27	378.23		378.25
6	384.07	384.03		384.05
7	370.01	370.00		370.00
F	433.64	433.63		433.64

Blank Weight Corrections (mg)

Cyclone: -0.03
Substrate Stages 0-7: -1.10
Final Filter: -1.09

Remarks

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: Scrap run
Date of Run: 10-30-81

Filter Set Number: 39

TARE WEIGHTS

Stage	Date: 10-6-81 By: DML First Weigh (mg)	Date: 10-7-81 By: DML Second Weigh (mg)	Date: ~~11/3/81~~ By: ~~DG~~ Third Weigh (mg)	Average Weight
Pres	233.31	233.33	~~233.34~~	233.32
0	383.63	383.68	~~384.44~~	~~3~~83.66
1	385.44	385.47	~~386.31~~	385.46
2	382.43	382.38	~~385.25~~	382.46
3	377.08	377.04		377.06
4	390.10	390.08		390.09
5	367.98	367.97		367.98
6	385.73	385.70		385.72
7	384.23	384.19		384.21
F	442.60	442.61		442.61

FINAL WEIGHTS

Stage	Date: 11/3/81 By: D.G. First Weigh (mg)	Date: 11/4/81 By: DG Second Weigh (mg)	Date: ____ By: ____ Third Weigh (mg)	Average Weight
Pres	~~232.34~~ 232.07	~~232.07~~		~~232.07~~
0	~~384.41~~ ~~383.14~~	~~383.13~~		~~383.14~~
1	~~386.34~~ ~~385.06~~	~~385.06~~		~~385.06~~
2	~~385.25~~ ~~383.97~~	~~383.98~~		~~383.98~~
3	~~380.39~~ ~~379.11~~	~~379.11~~		~~379.11~~
4	~~395.42~~ 394.11	~~394.11~~		~~394.11~~
5	~~371.20~~ ~~370.98~~	~~370.97~~		~~370.98~~
6	~~387.40~~ ~~386.12~~	~~386.12~~		~~386.12~~
7	~~384.98~~ ~~383.70~~	~~383.70~~		383.70
F	~~443.45~~ ~~441.98~~	~~441.98~~		~~441.98~~

Blank Weight Corrections (mg)

Cyclone: -1.52
Substrate Stages 0-7: -105.87
Final Filter: -9.7

Remarks: Final weight are incorrect; Refer to p. 15

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: Scrap Run
Date of Run: _____

Filter Set Number: 39

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: 11/9/81 By: D.B. First Weigh (mg)	Date: 11/16/81 By: DG Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres	233.22	233.23		233.23
0	384.46	384.46		384.46
1	386.42	386.43		386.43
2	385.33	385.34		385.34
3	380.45	380.45		380.45
4	395.49	395.49		395.49
5	372.28	372.29		372.29
6	387.48	387.49		387.49
7	385.06	385.06		385.06
F	443.51	443.52		443.52

Blank Weight Corrections (mg)

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

Remarks Reweighs of 11/3 & 12/4/81

ANDERSEN SUBSTRATE AND FILTER ANALYSIS

Run Number: _____
Date of Run: _____

Filter Set Number: 40

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: D.G. By: 11/9/81 First Weigh (mg)	Date: D.G. By: 11/10/81 Second Weigh (mg)	Date: _____ By: _____ Third Weigh (mg)	Average Weight
Pres	279.64	279.64		279.64
0	411.82	411.83		411.83
1	405.01	405.02		405.02
2	394.31	394.31		394.31
3	393.39	393.40		393.40
4	391.71	391.71		391.71
5	378.52	378.52		378.52
6	408.17	408.18		408.18
7	382.20	382.21		382.21
F	446.14	446.14		446.14

Blank Weight Corrections (mg)

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

Remarks Reweighs of 11/3 & 11/4/81

BLANK WEIGHT FINAL ANALYSIS

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 10-28-91
By: DML

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. BS1 First Weigh (mg)	Filter Set No. BS2 Second Weigh (mg)	Filter Set No. BS3 Third Weigh (mg)	Average Weight
Cyclone	(1000) 231.53	(1300) 232.25	(1515) 231.11	231.63
Substrate Stages 0-7	374.26	383.84	379.42	378.98
Final Filter	419.51	438.63	425.19	427.78

Average Tare Weights
Cyclone: 231.63 mg
Substrate (Stages 0-7): 379.93 mg
Final Filter: 429.85 mg

Blank Weights
0.00 mg
-0.95 mg
-1.07 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. ~~15~~ NG	First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight

Average Tare Weight: ____ mg
Blank Weight: ____ mg

Remarks * Andersen Mark III filters were analyzed over a 2-day period. Each day three blank sets were weighed in accordance with the procedure. However the daily blank average needs be calculated into the final weights of each day and then averaged.

Page _____

BLANK WEIGHT FINAL ANALYSIS

Date: 10-29-91
By: DMC

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. BS1 First Weigh (mg)	Filter Set No. BS2 Second Weigh (mg)	Filter Set No. BS3 Third Weigh (mg)	Average Weight
Cyclone	(0845) 231.51	(1045) 232.21	(1150) 231.07	231.60
Substrate Stages 0-7	374.23	383.87	378.38	378.83
Final Filter	419.50	438.59	425.19	427.76

Average Tare Weights		Blank Weights	
Cyclone:	231.63 mg		-0.03 mg
Substrate (Stages 0-7):	379.93 mg		-1.10 mg
Final Filter:	428.85 mg		-1.09 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

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 10-30-81
By: DMZ

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. BS1 First Weigh (mg)	Filter Set No. BS2 Second Weigh (mg)	Filter Set No. BS3 Third Weigh (mg)	Average Weight
Cyclone	(1540) 231.49	(1555) 232.19	(1615) 231.09	
Substrate Stages 0-7	374.14	383.75	378.32	
Final Filter	419.45	438.53	425.12	

	Average Tare Weights	Blank Weights
Cyclone:	____ mg	____ mg
Substrate (Stages 0-7):	____ mg	____ mg
Final Filter:	____ mg	____ 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. 45

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

Average Tare Weight: ____ mg
Blank Weight: ____ mg

Remarks

BLANK WEIGHT FINAL ANALYSIS

Date: 11-2-81
By: MG

METHOD 17

	Filter No. 17-41 First Weigh (mg)	Filter No. 17-42 Second Weigh (mg)	Filter No. 17-43 Third Weigh (mg)	Average Weight
Filter	1582.9	1587.5	1580.7	1583.7

Average Tare Weight: 1583.7 mg
Blank Weight: 0.0 mg

ANDERSEN MARK III

	Filter Set No. 1 First Weigh (mg)	Filter Set No. 2 Second Weigh (mg)	Filter Set No. 3 Third Weigh (mg)	Average Weight
Cyclone	~~230.60~~			
Substrate Stages 0-7	~~374.50~~			
Final Filter	419.10			

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

H.C.S.S.

	Filter No. T-26 First Weigh (mg)	Filter No. T-2 Second Weigh (mg)	Filter No. T-5 Third Weigh (mg)	Average Weight
Thimble Filter	24133.1	24020.0	24256.0	24136.4

T-26

Average Tare Weight: 24136.0 mg
Blank Weight: 000.4 mg

ACETONE ~~PROCEDURAL~~ BLANK

Beaker No. _____

First Weigh (g)	Second Weigh (g)	Third Weigh (g)	Average Weight
67.0947	69.9471	67.8822	67.9747

15 35 37

Average Tare Weight: 67.9742 mg
Blank Weight: 00.5 mg

Remarks: procedural blank #45 67.2521

Anderson blanks weighed incorrectly G-95

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 11-2-81
By: Gabriel

METHOD 5

	Filter No. 155 First Weigh (mg)	Filter No. 185 Second Weigh (mg)	Filter No. 192 Third Weigh (mg)	Average Weight
Filter	3.7716	3707.8 ~~3.7078~~	3749.3 ~~3.7493~~	3742.9 ~~3742.1~~

Average Tare Weight: 3742.1 mg
Blank Weight: 0.8 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

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 11/3/81
By: D.G

METHOD 17

	Filter No. 17-41 First Weigh (mg)	Filter No. 17-41 Second Weigh (mg)	Filter No. 17-41 Third Weigh (mg)	Average Weight
Filter	1582.5	1582.7	1582.4	1582.6

Average Tare Weight: 1582.8 mg
Blank Weight: 0.2 mg

ANDERSEN MARK III

	Filter Set No. B5-1 First Weigh (mg)	Filter Set No. B5-1 Second Weigh (mg)	Filter Set No. B5-1 Third Weigh (mg)	Average Weight
Cyclone	~~231.35~~ ~~230.11~~	~~231.37~~ ~~230.71~~		230.11
Substrate Stages 0-7	~~375.26~~ ~~374.06~~	~~375.29~~ ~~374.06~~		374.06
Final Filter	~~420.50~~ 419.15	~~420.53~~ ~~419.17~~		419.15

Average Tare Weights

Cyclone: 231.63 mg
Substrate (Stages 0-7): 379.93 mg
Final Filter: 428.85 mg

Blank Weights

-1.52 mg
~~+0.57~~ mg
-9.7 mg

-5.87

H.C.S.S.

	Filter No. T-2 First Weigh (mg)	Filter No. T-2 Second Weigh (mg)	Filter No. T-2 Third Weigh (mg)	Average Weight
Thimble Filter	24019.4	24019.3	24019.5	24019.4

Average Tare Weight: 24019.3 mg
Blank Weight: ~~24019.4~~ mg .1

ACETONE PROCEDURAL BLANK

Beaker No. ____

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

Average Tare Weight: ____ mg
Blank Weight: ____ mg

Remarks: One filter blank was weighed three different times throughout the day instead of three filters weighed at variable times. Andersen Blanks weighed incorrectly

Page

BLANK WEIGHT FINAL ANALYSIS

Date: 11-3-81
By: Gabriel

METHOD 5

	Filter No. 155 First Weigh (mg)	Filter No. 155 Second Weigh (mg)	Filter No. 155 Third Weigh (mg)	Average Weight
Filter	3.7708	3770.9	3770.9	3770.9

Average Tare Weight: 3770.8 mg
Blank Weight: 0.1 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

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 11-4-81
By: Gabriel Griffin

METHOD ~~7~~ 5

	Filter No. 155 First Weigh (mg)	Filter No. 155 Second Weigh (mg)	Filter No. 155 Third Weigh (mg)	Average Weight
Filter	3770.9	3770.8	3770.9	3770.9

Average Tare Weight: 3770.8 mg
Blank Weight: 00.1 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	~~230.11~~	~~230.11~~	~~230.11~~	230.11
Substrate Stages 0-7	~~374.06~~	~~374.07~~	~~374.06~~	374.06
Final Filter	~~419.15~~	~~419.16~~	~~419.16~~	419.16

	Average Tare Weights	Blank Weights
Cyclone:	____ mg	____ mg
Substrate (Stages 0-7):	____ mg	____ mg
Final Filter:	____ mg	____ 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 Andersen Blanks weighed incorrectly

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 11/19/81
By: DG

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. B51 First Weigh (mg)	Filter Set No. B51 Second Weigh (mg)	Filter Set No. B51 Third Weigh (mg)	Average Weight
Cyclone 1	231.28			
Substrate Stages 0-7 2	375.39			
Final Filter 3	420.62			

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

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 1/20/81
By: JLO

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. ____ 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	Blank Weights
Cyclone:	____ mg	____ mg
Substrate (Stages 0-7):	____ mg	____ mg
Final Filter:	____ mg	____ mg

H.C.S.S.

	Filter No. T-2 First Weigh (mg)	Filter No. T-2 Second Weigh (mg)	Filter No. T-2 Third Weigh (mg)	Average Weight
Thimble Filter	24.0200 g	24,0198	24,0198	24019.9

Average Tare Weight: 2409.3 mg
Blank Weight: 0.6 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

Page ____

BLANK WEIGHT FINAL ANALYSIS

Date: 11/2/89
By: DWS

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. 3 First Weigh (mg)	Filter No. 3 Second Weigh (mg)	Filter No. 3 Third Weigh (mg)	Average Weight
Filter - 2.5"	3.3604g	3.3605	3.3606	3360.6

Average Tare Weight: 3360.3 mg
Blank Weight: 0.3 mg

Remarks

ACETONE BLANK ANALYSIS

ACETONE BLANK

Total ml of acetone = 100 ml

	Tare weights		
	1st	2nd	Avg.
Beaker No. 15	67.0938	67.0942	67.0940
Beaker No. 35	68.9463	68.9463	68.9463
Beaker No. 37	67.8822	67.8825	67.8824

	Final wts.		
	1st	2nd	Avg.
Beaker No. 15	67.0948	67.0946	67.0947
Beaker No. 35	68.9471	68.9471	68.9471
Beaker No. 37	67.8820	67.8824	67.8822

	Final wt. - tare wt. = mg	Avg.
Beaker No. 15	67.0947 g - 67.0940 g = 0.0007 g = 0.7 mg	
Beaker No. 35	68.9471 g - 68.9463 g = 0.0008 g = 0.8 mg	0.43
Beaker No. 37	67.8822 g - 67.8824 g = -0.0002 g = -0.2 mg	

APPENDIX H

SAMPLING CALCULATIONS AND NOMENCLATURE

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

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
	Wvc_{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

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.

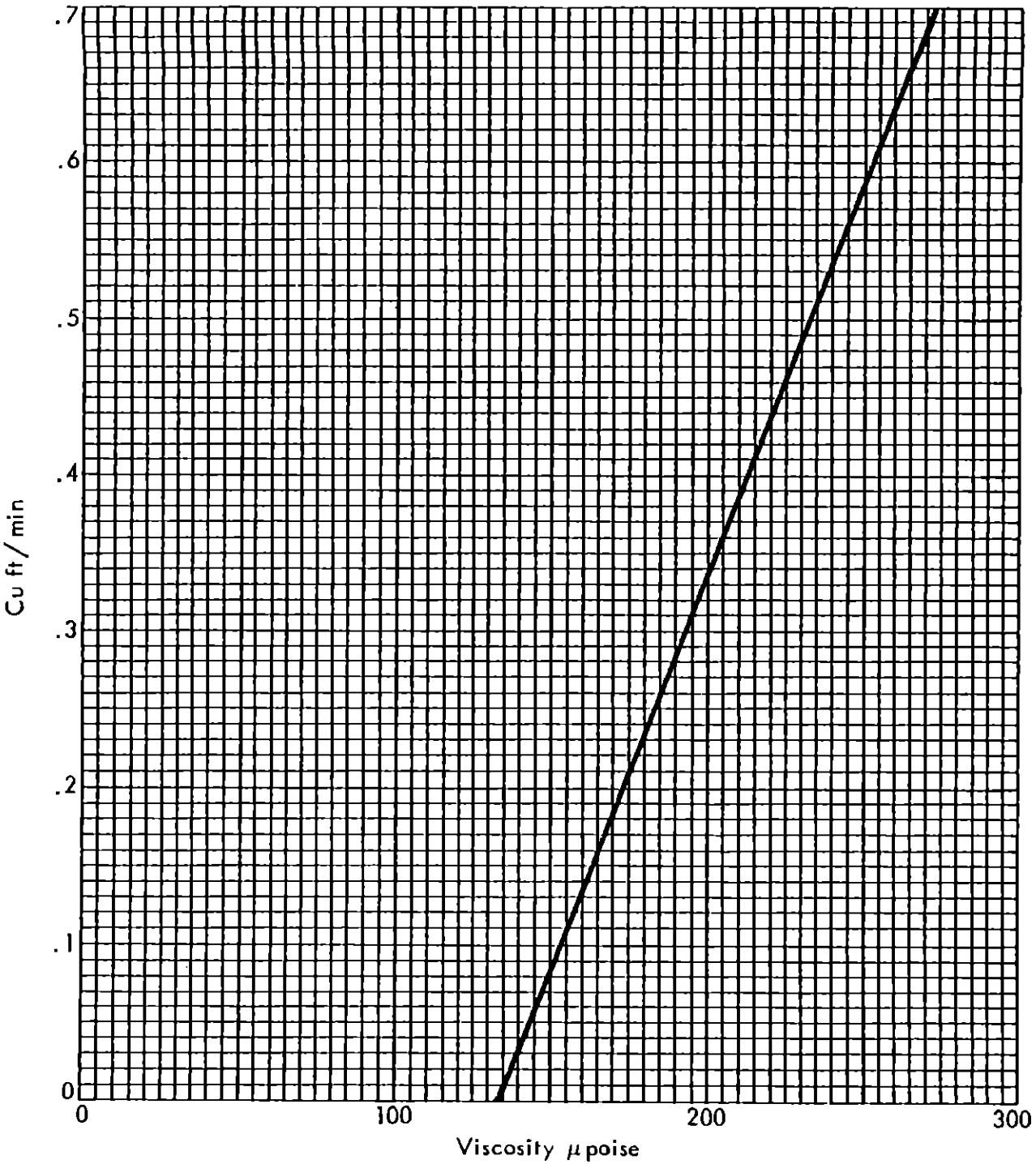
   $$24\sqrt{\frac{Fs/VS}{\pi}}$$

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

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

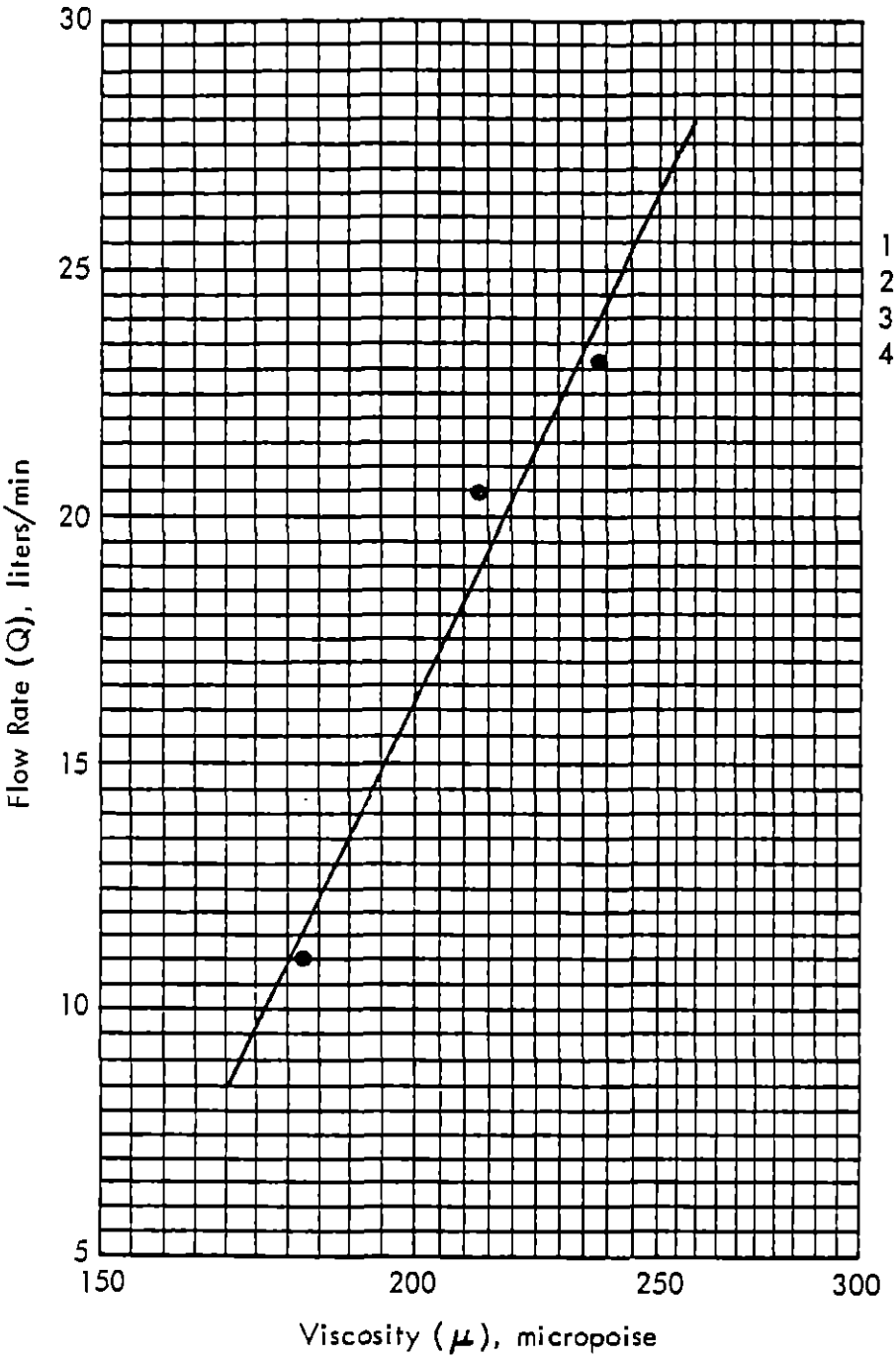
9. Percent isokinetic

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



1. °C = 5/9 (°F -32)
2. °K = °C + 273
3. Viscosity = 63 + 0.4T (°K)

Mark III or HCSS with
15 micron preseparator



1. °C = 5/9 (°F - 32)
2. °K = °C + 273
3. Viscosity = 63 + 0.4 x °K
4. CFM = l/m x 3.531 x 10^{-2}

Gas flow rate versus viscosity at D_{50} = 15 μm aerodynamic diameter for IP cyclone SRI-X

APPENDIX I

RAW FIELD DATA

	Page
Method 5 (Inlet Mass).	I-3
Andersen HCSS (Inlet Particle Sizing).	I-53
Method 17 (Outlet Mass).	I-135
Andersen Mark III (Outlet Particle Sizing) . . .	I-185
Unused Acceptable Method 5 Run	I-227
Unacceptable Method 5 Runs	I-235
Unacceptable and Suspect Andersen HCSS Runs. . .	I-249
Unused Acceptable Method 17 Runs	I-271
Unacceptable Andersen Mark III Run	I-297

METHOD 5 (INLET MASS)

MIDWEST RESEARCH INSTITUTE

Meth 5

RUN I-1-3 (c)

MRI Project Number 4891-683
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-21-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Bob Spotz
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-21-81

SAMPLING LOCATION Baghouse Inlet

I-1 (c)

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	60
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.34
STATIC PRESSURE IN STACK, in. Hg -3.0 ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.12
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	310
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.70
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.1
C FACTOR		.73
CALCULATED NOZZLE DIAMETER, in.		.250
ACTUAL NOZZLE DIAMETER, in.		.247
REFERENCE Δp, in. H_2O		.92

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen — Date 10-21-81
Sampling Location Bashouse Inlet — Initial RCS
Test Number I-1-3(C)

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

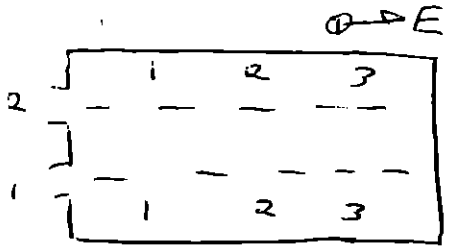
ΔPs = Velocity head of S pitot, inches H_2O

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	.8
Nozzle diameter, inches #30	Dn	.247
Barometric pressure, inches Hg	Pb	29.34
$\frac{5.168\ (60 + 460)\ (.84)\ (3)\ (.8)\ (.247^2)}{\sqrt{29.34}}$	K	61.008

FIELD DATA

PLANT Bowen
DATE 10-21-91
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Meth. 5
RUN NUMBER 1-1 (C)
OPERATOR RCS
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.34
STATIC PRESSURE (P_s) -3.0
FILTER NUMBER(s) MS-3 BEAKER NO. MS-5



Schematic of Traverse Point Layout
Read and Record All Data
Every 3 Minutes

PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. .247 #30
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 2
METER BOX NUMBER 2
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR .73
REFERENCE Δp .92

LEAK CK: Initial at 15" Hg, CFM .004
Final at 7" Hg, CFM .004

$VM = 61.008 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1002		767.202									
2-3	3 / 1005	769.23	769.29	.87	1.78	1.8	328	55	56	6		
2-2	6 / 1008	771.07	771.20	.72	1.47	1.4	333	60	56	6	230	
2-1	9 / 1011	772.29	772.45	.71	.64	.60	308	60	57	5	294	
	Start / 1014											
1-3	12 / 1017	774.48	774.58	1.0	2.0	1.9	317	61	58	7	328	
1-2	15 / 1020	776.43	776.53	.80	1.60	1.5	319	63	58	6	352	
1-1	18 / 1023	777.97	778.066	.48	.97	.85	301	63	59	6	368	
				.697		1.342	317.7	60.33	57.33			

COMMENTS

Moisture collected = 61.5 gm

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-21-81
Sampling Location Baghouse Inlet Name RCS
Run Number I-1 (C)

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-1(C)
  0.69  1.34 317
  60  57

I. VOL=767.202
F. VOL.=778.066
M FACTOR=1.037
B. P.=29.34
STATIC P.=-3.
% O2=15.31
% CO2=5.
MLS H2O=61.5
% H2O=  20.45
CP=   0.84
TIME=  18.00
NOZZLE D.=0.247
NET VOL.=11.2639
68
DS VOL.=  11.276
STACK P=  29.119
AVE M T=  58.930
√DP=   0.934
DH=   1.342
ST T.= 317.700
DRY MW=  29.412
WET MW=  27.079
% ISO= 100.260
STACK V.= 3571
```

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 Bowen
Sample Location inlet
Sample Box No. 2
Sample Type

Run No. I-1C
Sample Date 10-21-81
Recovery Date 10-21-81
Cleanup Person Gabriel

Filter No. MS-3
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]	149	108	1		
Initial Volume (wt)[b]	100	100	—		
Net Volume (wt)[b]	49	8	1		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 61.5

SILICA GEL

	734.7	
	731.2	
	3.5	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

Meth 5

RUN I - 2

MRI Project Number 4891-L83
Field Dates
Plant Brown
Sampling Location Inlet
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz
2
3

Engr. Technician 1 D L
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-22-81

SAMPLING LOCATION Baghouse Inlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.24
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	45
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	~~29.46~~ ~~29.37~~
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O) − 3	P_s	29.24
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	320
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.57
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.80
C FACTOR		.70
CALCULATED NOZZLE DIAMETER, in.		
ACTUAL NOZZLE DIAMETER, in. #42		.253
REFERENCE Δp, in. H_2O		.87

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Inlet
Test Number I-2

Date 10-28-81
Initial RCS

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

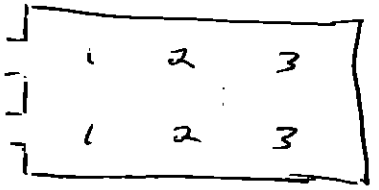
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	45 ~~60~~
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.8
Nozzle diameter, inches	Dn	.253
Barometric pressure, inches Hg	Pb	~~29.37~~ 29.46
$5.168\ (\frac{45}{60} + 460)\ (.84)\ (3)\ (.8)\ (.253^2) \div \sqrt{29.37}$ ~~$\sqrt{29.46}$~~	K	62,045 ~~62,785~~

FIELD DATA

PLANT Bowen
DATE ~~10-21-81~~ 10-22-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Meth. 5
RUN NUMBER I-2
OPERATOR RCS
AMBIENT TEMPERATURE 55°
BAROMETRIC PRESSURE ~~29.57~~ 29.46
STATIC PRESSURE (P_s) -3.0
FILTER NUMBER(s) M5-6 Reference M5-6



PROBE LENGTH AND TYPE 6' S
NOZZLE I.D. .253 #42
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER ~~3~~ 5
METER BOX NUMBER 2
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR ~~.75~~ .70
REFERENCE Δp ~~.62~~ .87
VM = ~~0.9745~~ 0.9615 x $\sqrt{\frac{\Delta Ps}{Ts + 460}}$

Schematic of Traverse Point Layout
Read and Record All Data
Every 3 Minutes

LEAK CK: Initial at 15" Hg, CFM .002
Final at 15" Hg, CFM .002

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³ ~~789.071~~ 790.700 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 / 0901											
2-3	3 / 0904	792.54	792.54	.68	1.42	1.5	315	41	41	10	~~3~~86	
2-2	6 / 0907	794.01	794.21	.48	1.0	1.0	323	43	41	8	401	
2-1	9 / 0910	795.27	795.37	.24	.62	.50	316	44	41	5	277	
	Start 0913											
2-3	12 / 0916	797.26	797.29	.80	1.7	1.6	317	44	41	14	358	
2-2	15 / 0919	799.17	799.19	.74	1.6	1.6	323	48	42	15	286	
2-1	18 / 0922	800.63	800.751	.43	.92	.90	310	49	42	10	217	
			Avg =	.570		1.183	317.33	44.83	41.33			

COMMENTS

Moisture Collected = 51.1
%O2 = 17.5
%CO2 = 3.37

EPA Dwg 235
1 77

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-22-81
Sampling Location Baghouse Inlet Name RCS
Run Number I-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.)

```
I-2
  0.57  1.18 317
  44  41

I. VOL=790.7
F. VOL.=800.751
M FACTOR=1.037
B. P.=29.46
STATIC P.=-3.
% O2=17.5
% CO2=3.33
ML% H2O=51.1
% H2O=  19.22
CP=   0.84
TIME=  18.00
NOZZLE D.=0.253
NET VOL.=10.4238
ST
DS VOL.=  10.798
STACK P=  29.239
AVE M T=  43.080
FDP=   0.754
DH=   1.183
ST T.= 317.330
DRY MW=  29.232
WET MW=  27.185
% ISO=  98.424
STACK V.= 3216
```

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 Bowen
Sample Location inlet
Sample Box No. MM 5
Sample Type

Run No. I-2
Sample Date 10-22-81
Recovery Date 10-22-81
Cleanup Person Gabriel

Filter No. #0 MM5 60
~~Beaker~~ No. MM5 60
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H2O	H2O			
Final Volume (wt)[b]	133	114	1		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	33	14	1		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 51.1

SILICA GEL

	770.3
~~736.1~~	767.2
	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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-3

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Bob Stultz
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-20-81

SAMPLING LOCATION Baghouse Inlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.06
STATIC PRESSURE IN STACK, in. Hg -3^{4} ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.84
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.992
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	300
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.62
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.88
C FACTOR		.73
CALCULATED NOZZLE DIAMETER, in.		.271
ACTUAL NOZZLE DIAMETER, in. #10		.250
REFERENCE Δp, in. H_2O		.86

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen — Date 10-20-81
Sampling Location Baghouse Inlet — Initial RCS
Test Number I-3

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	.8
Nozzle diameter, inches	Dn	~~.250~~ .247
Barometric pressure, inches Hg	Pb	29.06
$5.168\ (70 + 460)\ (.84)\ (3^3)\ (.8)\ (.247^2) \div \sqrt{29.06}$	K	~~62.484~~ 62.484

FIELD DATA

PLANT Bowen
DATE 10-20-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Mass - Meth. 5
RUN NUMBER I-3
OPERATOR BCS
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 29.06
STATIC PRESSURE (P_s) -3.0
FILTER NUMBER(s) MS-4

	1	2	3
2			
1			

PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. #30 ~~.312~~ .247
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 2
METER BOX NUMBER 2
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR .173
REFERENCE Δp .86

LEAK CK: Initial at 15" Hg, CFM .002
Final at 8" Hg, CFM .003

Schematic of Traverse Point Layout
Read and Record All Data
Every ~~2~~ 3 Minutes

$VM = ~~52.68~~ 62.484 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 0921		732,085									
1-3	3 / 0924	734.46	734.50	1.1	2.3	2.3	307	65	65	8	260	
1-2	6 / 0927	736.54	736.66	.85	1.8	1.8	310	69	66	6	269	
1-1	9 / 0930	737.88	738.13	.35	.75	.70	301	71	67	4	300	68
	Start 0935	~~740.~~		~~.93~~	~~1.98~~	~~1.85~~	~~294~~					
2-3	12 / 0938	740.07	740.23	.97	1.98	1.85	299	68	67	8	334	
2-2	15 / 0941	741.44	742.11	.68	1.45	1.3	303	70	67	6.5	749	
2-1	18 / 0944	743.29	743.476	.36	.78	.65	309	71	68	5	335	
				.712			304.8					

COMMENTS.

Moisture Col. = 55.1

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOILER Date 10/20/81
Sampling Location [redacted] INLET Name RCS
Run Number I-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.)

```
I. VOL=732.095
F. VOL.=743.476
M FACTOR=1.057
B. P.=29.06
STATIC P.=-3.
% O2=10.
% CO2=5.7
ML% H2O=55.1
% H2O=  18.39
CP=   0.84
TIME=  18.00
NOZZLE D.=0.247
NET VOL.=11.8124
67
DS VOL.=  11.613
STACK P=  28.839
AVE M T=  67.833
FDP=   0.825
DH=   1.433
ST T.= 304.833
DRY MW=  29.312
WET MW=  27.231
% ISO= 100.900
STACK V.= 3596
```

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 Bowen
Sample Location inlet
Sample Box No. 2
Sample Type

Run No. I-3
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M. Gabriel

Filter No. M5-4
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]	136	114	1		
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	36	14	1		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 55.1

SILICA GEL

	731.2	
	727.1	
	4.1	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-4

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-20-81

SAMPLING LOCATION Baghouse Inlet

Test I-4

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	75
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	305
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.712
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.1
C FACTOR		.73
CALCULATED NOZZLE DIAMETER, in.		
ACTUAL NOZZLE DIAMETER, in. #10		.251
REFERENCE Δp, in. H_2O		.86

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Inlet
Test Number I-4

Date 10-20-81
Initial RCS

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

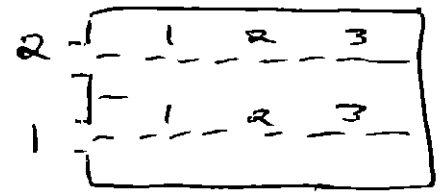
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	75
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.8
Nozzle diameter, inches #24	Dn	.251
Barometric pressure, inches Hg	Pb	29.06
$\frac{5.168\ (75 + 460)\ (.84)\ (3)\ (.8)\ (.251^2)}{\sqrt{29.06}}$	K	65.142

FIELD DATA

PLANT ~~10-20-81~~ Boilers
DATE 10-20-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE ~~EPA~~ Meth. 5
RUN NUMBER I-4
OPERATOR RLS
AMBIENT TEMPERATURE 75
BAROMETRIC PRESSURE 29.06
STATIC PRESSURE (P_s) -3.0"
FILTER NUMBER(s) ~~MS-5~~ BEAKER #MS-4



PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. #24 .251"
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 10
METER BOX NUMBER 2
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR .73
REFERENCE Δp .86

Schematic of Traverse Point Layout

LEAK CK: Initial at 15" Hg, CFM .002
Final at 13" Hg, CFM .002

Read and Record All Data
Every 3 Minutes

$VM = 65,142 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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 / 1312	751.280										
1-3	3 / 1315	753.69	753.66	1.1	2.3	2.3	344	76	75	13	145	
1-2	6 / 1318	755.88	755.92	.88	1.85	1.9	317	80	75	12	158	
1-1	9 / 1321	757.27	757.43	.35	.75	.70	310	80	76	6	180	
	Start 1326											
2-3	12		758.012	.88	1.87	1.7	306	80	76	10		
2-2	15											
2-1	18											
	Total Time 18 min											

COMMENTS: Stop 1327 final Vol = 758.012
Moisture Collected = 36.9

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1 77

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/20/81
Sampling Location INLET Name RCS
Run Number I-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.)

```
I-4
  0.77  1.65 319
  77  77

I. VOL=751.28
F. VOL.=758.012
M FACTOR=1.037
B. P.=29.06
STATIC P.=-3.
% O2=10.
% CO2=5.7
MLS H2O=36.4
% H2O=  20.40
CP=   0.84
TIME=  10.00
NOZZLE D.=0.251
NET VOL.=6.98103
4
DS VOL.=   6.666
STACK P=  28.339
AVE M T=  77.250
IDP=   0.879
DH=   1.650
ST T.= 319.250
DRY MW=  29.312
WET MW=  27.004
% ISO=  98.830
STACK V.= 3788
```

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 Bowen
Sample Location inlet
Sample Box No. 10
Sample Type

Run No. I-4
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M. Gabriel

Filter No. MS-5
~~Sample~~ Beaker No. MS-4
Sample Material Description

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	H_2O	—		
Final Volume (wt)[b]	127	107	0		
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	27	7	—		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 36.4

SILICA GEL

	767.2	
	764.8	
	2.4	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

Meth 5

RUN I-5

MRI Project Number 4891-483
Field Dates
Plant [illegible]
Sampling Location outlet
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz, C
2
3

Engr. Technician 1 DL
2
3

Lab Technician 1 Gabriel, W
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-22-81

SAMPLING LOCATION Baghouse Inlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	50
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.46
STATIC PRESSURE IN STACK, in. Hg −2.4 ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.28
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	320
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.57
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.8
C FACTOR		.70
CALCULATED NOZZLE DIAMETER, in.		
ACTUAL NOZZLE DIAMETER, in.		.250
REFERENCE Δp, in. H_2O		.87

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Outlet
Test Number I-5

Date 10-22-81
Initial RCS

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

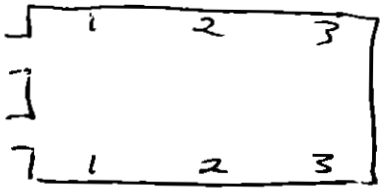
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	50
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	3
Mole fraction dry gas	Mf	.8
Nozzle diameter, inches	Dn	.250
Barometric pressure, inches Hg	Pb	29.46
$\frac{5.168\ (50 + 460)\ (.84)\ (3)\ (.8)\ (.25^2)}{\sqrt{29.46}}$	K	61.182

FIELD DATA

PLANT Bowen
DATE 10-22-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Meth. 5
RUN NUMBER I-5
OPERATOR RCS
AMBIENT TEMPERATURE 45°
BAROMETRIC PRESSURE 29.46
STATIC PRESSURE (P_s) -2.4
FILTER NUMBER(s) MS-7 BEAKER NO MS-7



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. #10 .250
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 8
METER BOX NUMBER 2
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR .70
REFERENCE Δp .87

LEAK CK: Initial at 15" Hg, CFM .008
Final at 10" Hg, CFM .001

Read and Record All Data Every 3 Minutes

$VM = 61.182 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³ Desired (807.380)	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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
1-3	3 / 1158	809.66	809.73	1.1	2.3	2.3	331	46	45	6	202	
1-2	6 / 1201	811.69	811.80	.87	1.86	1.7	331	49	46	6	290	
1-1	9 / 1204	813.48	813.54	.68	1.45	1.3	332	50	46	6	312	
	Start / 1208											
2-3	12 / 1211	815.74	815.77	1.1	2.3	2.2	345	48	46	9	266	
2-2	15 / 1214	817.52	817.55	.67	1.43	1.3	336	50	46	8	348	
2-1	18 / 1217	818.89	818.966	.39	.85	.8	314	51	46	7	321	
			Avg =	.802		1.60	331.5	49.0	45.833			

COMMENTS

Moisture Collected = 84.6
% O_2 = 17.5
% CO_2 = 3.33

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3 77

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-22-81
Sampling Location Baghouse Inlet Name RCS
Run Number [redacted] I-5

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.)

```
4

I-5
  0.80  1.60 331
  49  45

I. VOL=807.38
F. VOL.=818.966
M FACTOR=1.037
B. P.=29.46
STATIC P.=-2.4
% O2=17.5
% CO2=3.33
ML'S H2O=84.6
% H2O=  24.38
CP=   0.84
TIME=  18.00
NOZZLE D.=0.25
NET VOL.=12.0146
82
DS VOL.=  12.354
STACK P=  29.283
AVE M T=  47.416
DP=   0.895
DH=   1.600
ST T.= 331.500
DRY MW=  29.232
WET MW=  26.493
% ISO= 104.660
STACK V.= 3896
```

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 Bowen
Sample Location inlet
Sample Box No. 8
Sample Type

Run No. I-5
Sample Date 10-22-81
Recovery Date 10-22-81
Cleanup Person Caldwell

Filter No. 911.5-7
Sample No. 05-7
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	I	S	M	S	
Impinger Solution	H_2O	H_2O	—		
Final Volume (wt)[b]	170	111	0		
Initial Volume (wt)[b]	100	100	—		
Net Volume (wt)[b]	70	11	—		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 84.6

SILICA GEL

	739.7	
	736.1	
	3.6	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

Meth 5

RUN I-6B

MRI Project Number 4891-L83
Field Dates _____
Plant Bowen
Sampling Location Baghouse Inlet
Sampling Date 10-27-81

FIELD CREW

Crew Chief		Walker
Testing Engineer	1	Stultz
	2	
	3	
Engr. Technician	1	D.L.
	2	
	3	
Lab Technician	1	
	2	
	3	
Process Engineer	1	
	2	
Other	1	
	2	

NOMOGRAPH DATA

PLANT Bowen

DATE 10-27-81

SAMPLING LOCATION Baghouse Inlet
Test I-6 B

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.20
STATIC PRESSURE IN STACK, in. Hg -2.9 " ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	320
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.89
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.3
C FACTOR	.74	
CALCULATED NOZZLE DIAMETER, in.	.250	
ACTUAL NOZZLE DIAMETER, in. #30	.247	
REFERENCE Δp, in. H_2O	.89	

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen — Date 10-27-81
Sampling Location Baghouse Inlet — Initial RCS
Test Number I-6 B

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

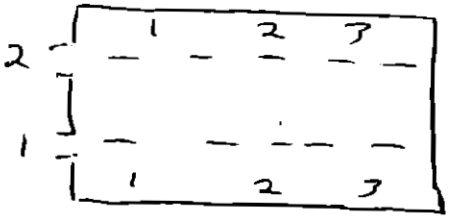
ΔPs = Velocity head of S pitot, inches H_2O

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	.8
Nozzle diameter, inches	Dn	.247
Barometric pressure, inches Hg	Pb	29.20
$\frac{5.168\ (70 + 460)\ (.84)\ (3)\ (.8)\ (.247)}{\sqrt{29.20}}$	K	62.331

FIELD DATA

PLANT Bowen
DATE 10-27-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Meth. 5
RUN NUMBER I-6 B
OPERATOR RCS
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 28.20
STATIC PRESSURE (P_s) -2.9
FILTER NUMBER(s) #11 Bowen 10 64



Schematic of Traverse Point Layout
Read and Record All Data
Every 3 Minutes

PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. #30 .247
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER
METER BOX NUMBER 10
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.034
C FACTOR .74
REFERENCE Δp .89

LEAK CK: Initial at 15" Hg, CFM .005
Final at 10" Hg, CFM .003

$VM = 62.33 / x \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
				218.634					INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0	1046	Desired	Actual		DESIRED	ACTUAL						
2-3	3	1049	220.79	220.88	.95	2.0	2.0	332	66	66	5		
2-2	6	1052	222.76	222.94	.82	1.77	1.65	362	70	67	6	324	
2-1	9	1053	224.15	224.39	.39	.85	.75	324	72	67	5	341	
	Start	1058											
1-3	12	1101	226.46	226.57	1.1	2.3	2.0	340	72	68	8	336	
1-2	15	1104	228.82	228.77	1.1	2.3	1.9	306	75	69	10	330	
1-1	18	1107	230.17	230.313	.35	.74	.8	293	76	70	8	316	
				Avg =	.785		1.517	326.167	71.833	67.833			

COMMENTS

Moisture = 80.4 ml

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-27-81
Sampling Location Baghouse Inlet Name RSS
Run Number I-6-B

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-6-B
  0.78  1.51 526
  71  67

I. VOL=218.634
F. VOL.=230.313
M FACTOR=1.034
B. P.=29.2
STATIC P.=-2.9
% O2=16.5
% CO2=4.5
MLS H2O=80.4
% H2O=  24.31
CP=   0.84
TIME=  18.00
NOZZLE D.=0.247
NET VOL.=12.0780
86
DS VOL.=  11.784
STACK P=  28.906
AVE M T=  69.833
FDP=   0.886
DH=   1.517
ST T.= 526.167
DRY MW=  29.380
WET MW=  26.512
% I90= 103.834
STACK V.= 36?5
```

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 Bowen
Sample Location inlet
Sample Box No. 2
Sample Type Meth 5

Run No. T-Le B
Sample Date 10-27-81
Recovery Date 10-27-81
Cleanup Person Gabriel

Filter No. 111
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]	197	122	3		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	97	22	3		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 30.4 g

SILICA GEL

245.0
736.6
8.4
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. BEACH No 64
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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

Meth 5

RUN I-7

MRI Project Number 4591-L83
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-26-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Shultz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-26-81

SAMPLING LOCATION Baghouse Inlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	65
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.18
STATIC PRESSURE IN STACK, in. Hg -2.1" H_2O ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	338
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.66
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.93
C FACTOR		.73
CALCULATED NOZZLE DIAMETER, in.		.270
ACTUAL NOZZLE DIAMETER, in. #11		.249
REFERENCE Δp, in. H_2O		.94

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Inlet
Test Number I-7

Date 10-26-81
Initial RCS

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

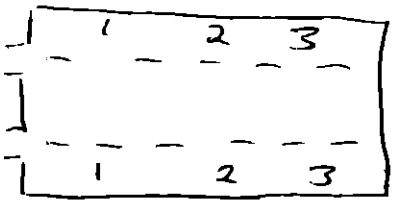
ΔPs = Velocity head of S pitot, inches H_2O

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	.8
Nozzle diameter, inches	Dn	.249
Barometric pressure, inches Hg	Pb	29.18
$\frac{5.168\ (65 + 460)\ (.84)\ (3)\ (.8)\ (.249^2)}{\sqrt{29.18}}$	K	62.778

FIELD DATA

PLANT Bowen
DATE 10-26-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Meth. 5
RUN NUMBER E-7
OPERATOR RCS
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE 29.18
STATIC PRESSURE (P_s) -2.1
FILTER NUMBER(s) 195 Beaker #22



PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. .249 # 11
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 8
METER BOX NUMBER 2
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR .73
REFERENCE Δp .94

LEAK CK: Initial at 15" Hg, CFM .005
Final at 9" Hg, CFM .002

Schematic of Traverse Point Layout
Read and Record All Data
Every 3 Minutes

$VM = 62.178 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1304		849.775									
1-3	3 / 1307	852.11	852.11	1.1	2.2	2.2	338	63	62	6	355	
1-2	6 / 1310	854.53	854.51	1.2	2.36	2.3	347	69	63	7	372	
1-1	9 / 1313	856.08	856.19	.50	1.0	1.0	353	71	64	5	371	
	Start 1316											
2-3	12 / 1319	858.38	858.41	1.05	2.1	2.1	323	71	64	7	420	
2-2	15 / 1322	860.47	860.50	.88	1.74	1.7	338	75	65	9	424	
2-1	18 / 1325	862.04	862.145	.50	1.0	1.0	335	76	66	7	421	
			Avg =	.872		1.717	339	70.8	64			

COMMENTS:

Moisture = 93.1 ml

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BROWN Date 10/26/81
Sampling Location INLET Name RCS
Run Number I-7

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-7
  0.87  1.71 339
  70  64

I. VOL=849.775
F. VOL.=862.145
M FACTOR=1.037
B. P.=29.18
STATIC P.=-2.1
% O2=17.5
% CO2=3.2
ML'S H2O=83.1
% H2O=  23.73
DP=   0.84
TIME=  18.00
NOZZLE D.=0.249
NET VOL.=12.8278
9
DS VOL.=  12.573
STACK P=  29.125
AVE M T=  67.400
√DP=   0.933
DH=   1.717
ST T.= 339.000
DRY MW=  28.212
WET MW=  26.356
% ISO= 103.150
STACK V.= 405
```

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 Bowen
Sample Location inlet
Sample Box No. 8
Sample Type

Run No. E-7
Sample Date 10-26-81
Recovery Date 10-26-81
Cleanup Person Gatewood

Filter No. 195
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	H_2O	H_2O	—		
Final Volume (wt)[b]	160	117	2		
Initial Volume (wt)[b]	100	100	—		
Net Volume (wt)[b]	60	17	2		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 83.1

SILICA GEL

	743.8	
	739.7	
	4.1	

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. Beaker #22
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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

Meth. 5

RUN I-8

MRI Project Number 4891-L 83
Field Dates
Plant Bowen
Sampling Location Baghouse Inlet
Sampling Date 10-27-81

FIELD CREW

Crew Chief Walker

Testing Engineer 1 Stultz
2
3

Engr. Technician 1 D. L.
2
3

Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-27-81

SAMPLING LOCATION Baghouse Inlet

Test # I-8

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.20
STATIC PRESSURE IN STACK, in. Hg −2.9 ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	340
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.8
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.1
C FACTOR	.74	
CALCULATED NOZZLE DIAMETER, in.	.26	
ACTUAL NOZZLE DIAMETER, in. # 10	.250	
REFERENCE Δp, in. H_2O	.91	

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Inlet
Test Number I-8

Date 10-27-81
Initial BCS

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

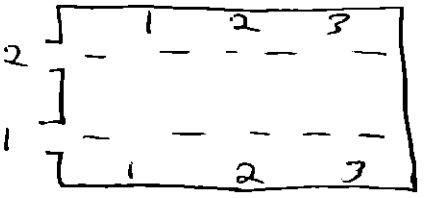
ΔPs = Velocity head of S pitot, inches H_2O

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	.8
Nozzle diameter, inches	Dn	.250
Barometric pressure, inches Hg	Pb	29.20
$5.168\ (70 + 460)\ (.84)\ (3)\ (.8)\ (.25^2) \Big/ \sqrt{29.20}$	K	63.864

FIELD DATA

PLANT Bowen
DATE 10-27-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Meth. 5
RUN NUMBER I-8
OPERATOR RCS
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE 29.20
STATIC PRESSURE (P_s) -2.9
FILTER NUMBER(s) 193 BEAKER NO 6



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. .250 #10
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 8
METER BOX NUMBER 10
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.034
C FACTOR .74
REFERENCE Δp .91

LEAK CK: Initial at 15" Hg, CFM 2 cfm Read and Record All Data
Final at 7" Hg, CFM .002 Every 3 Minutes

$VM = 63.864 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 0901		198.800									
1-3	3 0904	201.45	201.33	1.3	2.58	2.6	297	63	65	6	292	
1-2	6 0907	203.95	203.87	1.2	2.42	2.5	324	68	65	7	307	
1-1	9 0910	205.42	205.54	.42	.88	.9	327	70	65	4	330	
	Start 0913											
2-3	12 0916	207.83	207.83	1.1	2.2	2.2	310	69	66	7	346	
2-2	15 0919	209.93	209.94	.84	1.7	1.7	323	71	66	7	358	
2-1	18 0922	211.48	211.558	.46	.95	.95	314	72	67	6	368	
			Avg =	.887		1.808	315.833	68.833	65.667			

COMMENTS: Moisture = 80.4 ml

EPA Dun 235
3 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/27/81
Sampling Location INLET Name PCS
Run Number I-6

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.)

```
I-6
  0.88  1.00 315
  68  65

I. VOL=198.8
F. VOL.=211.558
M FACTOR=1.034
B. P.=29.2
STATIC P.=-2.9
% O2=16.5
% CO2=4.5
MLS H2O=80.4
% H2O=  22.63
CP=   0.84
TIME=  18.00
NOZZLE D.=0._8
NET VOL.=13.1917
T2
DS VOL.=  12.346
STACK P=  28.996
AVE M T=  67.250
DP=   0.941
DH=   1.808
ST T.= 315.833
DRY MW=  29.380
WET MW=  26.804
% ISO=  102.016
STACK V.= 40
```

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 Boven
Sample Location inlet
Sample Box No. 8
Sample Type Method 5

Run No. I-8
Sample Date 10-27-81
Recovery Date 10-27-81
Cleanup Person Gabriel

Filter No. 193
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]					
Impinger Solution	H_2O	H_2O	—		
Final Volume (wt)[b]	157	116	2		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	57	16	2		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 80.4 g

SILICA GEL

	749.2
	743.8
	54

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. Beaker #6
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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

ANDERSEN HCSS (INLET PARTICLE SIZING)

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-1-1 (B)

MRI Project Number 4891L-83
Field Dates
Plant BOWEN
Sampling Location INLET
Sampling Date 10126181

FIELD CREW

Crew Chief T. WALKER

Testing Engineer 1 STULTZ
2
3

Engr. Technician 1
2
3

Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant BOWEN
Sampling Location INLET
Test No. I-1-1(B)

Date 10/26/01
Initial RCS

Velocity head at sampling location, in. H_2O	ΔPs	1.1
Stack temperature at sample point, °F	Ts	353
Barometric pressure, in. Hg	Pb	29.12
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.1	Ps	28.96
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.21
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	26.97
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	4610
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.149
Actual nozzle diameter, in. #60-4.0	D_{n_a}	.155
Assumed meter temperature, °F	Tm	70
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.558
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.289

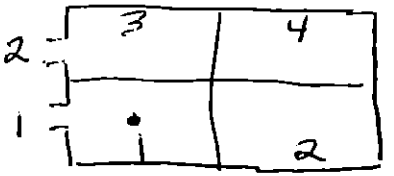
Visc. = 243.5

WATERPROOF PAPER

FIELD DATA - ANDERSEN

HCSS

PLANT BOWEN
DATE 10/26/91
SAMPLING LOCATION INLET
SAMPLE TYPE HCSS
RUN NUMBER I-1-1(B)
OPERATOR RSS
AMBIENT TEMPERATURE 60
BAROMETRIC PRESURE 29.12
STATIC PRESSURE, (P_s) -2.1
FILTER SET T-20 set 11



CALCULATED ACFM (DESIRED) .289
PROBE TIP DIAMETER .155 #60 - 4.0
CO_2 3.2
O_2 17.5
CO 0
N_2 79.3
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 9516
METER BOX NO. 2
Calculated ΔH = .254

Leak CK: Initial at 15" Hg, CFM .015
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 1405		862.550									
1-1	3 / 1408	863.42	863.41	1.1	.254	.25	329	62	62	<1		
	6 / 1411	864.29	864.27	1.15	.254	.25	337	62	64	<1		
	9 / 1414	865.15	865.14	1.15	.254	.25	342	62	64	<1		
	12 / 1417	866.02	866.00	1.20	.254	.25	344	62	64	1		
	15 / 1420	866.89	866.87	1.15	.254	.25	345	63	63	1		
	18 / 1423	867.76	867.73	1.10	.254	.25	342	64	63	1		
	21 / 1426	868.62	868.59	1.10	.254	.25	344	65	67	1		
	24 / 1429	869.49	869.439	1.10	.254	.25	346	67	67	1		
			Avg =	1.131		.25	341.125	63.38	64.25			

RUN I.D. I-1-1B
DATE 10/26/91
^PB=1.1
TS=353.
B.P.=29.12
PS=28.9646
%H2O=20.
MF=0.8
MD=29.212
MS=26.9696
VS=4609.625517
DNC=1.489329617E-01
TM=70.
PS=5.576666665E-01
FM=2.892851642E-01
VISCOSITY=243.5533333

COMMENTS:

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/26/81
Sampling Location INLET Name RCS
Run Number I-1-1(B)

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-1-1B
  1.13  0.25 341
  65  64

I. VOL.=862.55
F. VOL.=869.429
M FACTOR=1.057
B. P.=29.12
STATIC P.=-2.1
% O2=17.5
% CO2=3.2
% H2O=  20.00
CP=   0.84
TIME=  24.00
NOZZLE D.=0.155
NET VOL.=7.143893
DS VOL.=   7.010
STACK P=  28.965
AVE M T=  63.812
DIF=   1.063
DH=   0.250
ST T.= 341.129
DRY MW=  29.212
WET MW=  28.969
% ISO=  94.122
STACK V.= 4639
```

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 Bowen
Sample Location INLET
Sample Box No. _____
Sample Type HCSS

Run No. I-1-1-B
Sample Date 10/26/81
Recovery Date 10-26-81
Cleanup Person [illegible]

Filter No. I-20
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S			
Impinger Solution	H_2O	H_2O			
Final Volume (wt)[b]					
Initial Volume (wt)[b]	100	100			
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 _____

SILICA GEL

_____ _____
_____ _____
_____ _____
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-1-2

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-21-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 STULTZ
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-1-3

Date 10-21-81
Initial RCS

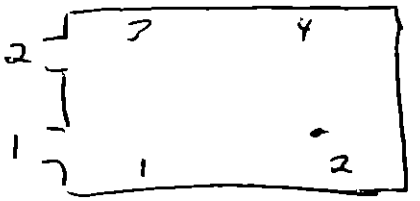
Velocity head at sampling location, in. H_2O	ΔPs	.75
Stack temperature at sample point, °F	Ts	318
Barometric pressure, in. Hg	Pb	29.38
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -3.0	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	
Molecular wt. dry stack gas, lb/lb-mole $O_2 = 15.31\%$ $CO_2 = 5.0\%$ (% 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}	.160
Actual nozzle diameter, in.	D_{n_a}	.156
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	.519
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.275

RUN I.D. I-1-3
DATE 10-21-8
DPS=0.75
TS=318.
B.P.=29.38
PS=29.158
%H2O=20.
MF=0.8
MD=29.4124
MS=27.12992
VS=3700.090588
DNC=1.605322211E-01
TM=60.
FS=0.5187777779
FM=2.750967223E-01
VISCOSITY=233.75
55556

WATERPROOF PAPER

FIELD DATA - ANDERSEN

PLANT Boiler
DATE 10-21-81
SAMPLING LOCATION Exhaust Inlet
SAMPLE TYPE HCS
RUN NUMBER I-1-2
OPERATOR RCS
AMBIENT TEMPERATURE 55
BAROMETRIC PRESURE 29.38
STATIC PRESSURE, (P_g) -3.0
FILTER SET T-16 SET 5



CALCULATED ACFM (DESIRED) .275
PROBE TIP DIAMETER .156 "
CO_2 15.31
O_2 5.0
CO 0
N_2 79.69
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 9516
METER BOX NO. 2
Calculated ΔH = .23

Leak CK: Initial at 15" Hg, CFM .006
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 778.321 Desired	Actual	VELOCITY HEAD (Δp_g), 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 / 1140											
1-2	3 / 1143	779.15	779.13	.97	.23	.23	331	56	57	<1		
	6 / 1146	779.91	779.94	.95	.23	.23	316	57	57	<1		
	9 / 1149	780.80	780.75	.97	.23	.23	321	58	58	<1		
	12 / 1152	781.62	781.56	.98	.23	.23	337	58	58	<1		
	15 / 1155	782.45	782.37	.87	.23	.23	309	59	58	<1		
	18 / 1158	783.27	783.20	.98	.23	.23	320	59	58	<1		
	21 / 1201	784.10	784.019	1.05	.23	.23	327	60	59	<1		
			Avg =	.967		.23	323	58.143	57.857			

COMMENTS:

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN CONST Date 10/21/81
Sampling Location INLET Name STUCTZ
Run Number I-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.)

```
I-1-2
  0.96  0.23 323
  56  57

I. VOL=778.321
F. VOL.=784.019
M FACTOR=1.037
B. P.=29.38
STATIC P.=-3.
% O2=15.31
% CO2=5.
ML% H2O=26.2
% H2O=  17.28   ← Measured
CP=   0.84
TIME=  21.00
NOZZLE D.=0.156
NET VOL.=5.90882
6
DS VOL.=   5.915
STACK P=  29.139
AVE M T=  58.000
FDP=   0.983
DH=   0.230
ST T.= 323.000
DRY MW=  29.412
WET MW=  27.442
% ISO=  93.132
STACK V.= 4190
```

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 Bowen
Sample Location inlet
Sample Box No. _____
Sample Type _____

Run No. I-1-2
Sample Date 10-21-81
Recovery Date 10-21-81
Cleanup Person Calvert

Filter No. ~~F-24~~ MG T-102
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S	M		
Impinger Solution	H_2O	H_2O			
Final Volume (wt)[b]	128	98	0		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	28	-2	0		
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 26.2

SILICA GEL

	772.7	
	772.5	
	0.2	
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-1-3

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date ~~10-21-81~~ 10-22-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 SULTZ
2
3

Engr. Technician 1 D L
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-1-3

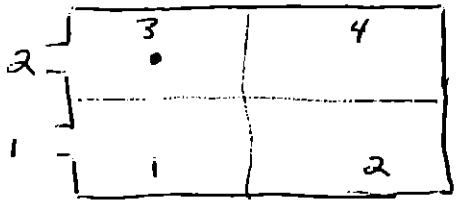
Date 10-22-81
Initial RCS

Velocity head at sampling location, in. H_2O	ΔPs	.34
Stack temperature at sample point, °F	Ts	333
Barometric pressure, in. Hg	Pb	29.46
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O) −3.0	Ps	29.24
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
Molecular wt. dry stack gas, lb/lb-mole (CO_2 = 5, O_2 = 15.31) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	29.41
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.13
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	2512
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.198
Actual nozzle diameter, in. #60-5.0	D_{n_a}	.195
Assumed meter temperature, °F	Tm	45
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.535
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.271

WATERPROOF PAPER

FIELD DATA - ANDERSEN

PLANT: Bowen
DATE: 10-22-81
SAMPLING LOCATION: Baghouse Inlet
SAMPLE TYPE: HCSS
RUN NUMBER: I-1-3
OPERATOR: RCJ
AMBIENT TEMPERATURE: 40
BAROMETRIC PRESURE: 29.46
STATIC PRESSURE, (P_g): -3.0
FILTER SET: T-17 SET 6



CALCULATED ACFM (DESIRED): .271
PROBE TIP DIAMETER: .195 @ 60-5.2
CO_2: 5
O_2: 15.31
CO: 0
N_2: 79.69
% H_2O: 20
METER CORRECTION (ΔY): 1.037
TEMP. METER NO.: 4576
METER BOX NO.: 3
Calculated ΔH = .22

Leak CK: Initial at 15" Hg, CFM .005
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 784.224 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
2-3	0 / 0807											
	3 / 0810	785.04	785.03	.42	.22	.22	335	38	38	<1		
	6 / 0813	785.85	785.82	.43	.22	.22	341	38	38	<1		
	9 / 0816	786.66	786.62	.41	.22	.22	330	39	38	<1		
	12 / 0819	787.48	787.41	.45	.22	.22	342	40	38	<1		
	15 / 0822	788.29	788.21	.44	.22	.22	338	41	39	<1		
	18 / 0825	789.10	789.02	.42	.22	.22	334	42	39	1		
	21 / 0828	789.92	789.82	.42	.22	.22	341	42	40	1		
	24 / 0831	790.73	790.630	.41	.22	.22	326	42	41	1		
			Avg =	.425		.22	335.875	40.25	38.88			

RUN I.D. I-1-3
DATE 10-22-
VPS=0.34
TS=335.
B.P.=29.46
PS=29.253
%H2O=20.
MF=0.8
MD=29.4124
MS=27.12992
VS=2511.7305
DNC=1.977001 [illegible]
-01
TM=45.
FS=5.3544444 [illegible]
01
FM=3.7073070 [illegible]
01
VLSC0817 [illegible]
88869

COMMENTS: Moisture Collected = ~~32.7~~ 20.7

I-66

EPA (Dur) 235
4-72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-22-81
Sampling Location Baghouse Inlet Name RCS
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.)

I. VOL=784.224
F. VOL.=790.63
M FACTOR=1.037
B. P.=29.46
STATIC P.=-3.
% O2=17.5
% CO2=3.33
ML% H2O=20.7
% H2O= 12.35
CP= 0.84
TIME= 24.00
NOZZLE D.=0.195
NET VOL.=6.643022
DS VOL.= 6.914
STACK P= 29.239
AVE M T= 39.565
ΔP= 0.651
ΔH= 0.220
ST T.= 335.875
DRY MW= 29.232
WET MW= 27.844
% ISO= 88.165
STACK V.= 2772

ASSUMED H_2O

I-1-3
0.42 0.22 335
39 39

I. VOL=784.224
F. VOL.=790.63
M FACTOR=1.037
B. P.=29.46
STATIC P.=-3.
% O2=17.5
% CO2=3.33
% H2O= 20.00
CP= 0.84
TIME= 24.00
NOZZLE D.=0.195
NET VOL.=6.643022
DS VOL.= 6.914
STACK P= 29.239
AVE M T= 39.565
ΔP= 0.651
ΔH= 0.220
ST T.= 335.875
DRY MW= 29.232
WET MW= 26.586
% ISO= 95.087
STACK V.= 3216

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 BOLIEN
Sample Location INLET
Sample Box No. _____
Sample Type _____

Run No. I-1-3
Sample Date 10/22/84
Recovery Date 10/22/84
Cleanup Person GABRIEL

Filter No. I-17
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]	117	102			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	17	2			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 209

SILICA GEL

370	
365.3	
1.7	
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I - 1 - 4

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location ~~Boiler~~ inlet
Sampling Date 10-21-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Bob Seltz
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen — Date 10-21-81
Sampling Location Baghouse Inlet — Initial RCS
Test No. I-1-4

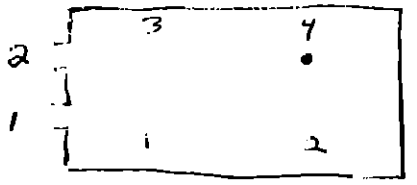
Velocity head at sampling location, in. H_2O	ΔPs	.73
Stack temperature at sample point, °F	Ts	337
Barometric pressure, in. Hg	Pb	~~29.28~~ 29.28
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O) −3.0	Ps	29.02
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.40
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.12
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3699.6
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.164
Actual nozzle diameter, in. #61-4.0mm	D_{n_a}	.156
Assumed meter temperature, °F	Tm	50
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.540
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.274

Viscosity = ~~.239~~ .240

WATERPROOF PAPER

FIELD DATA - ANDERSEN

PLANT Bowen
DATE 10-21-21
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCl S
RUN NUMBER I-1-4
OPERATOR BCS
AMBIENT TEMPERATURE 50
BAROMETRIC PRESURE 29.24
STATIC PRESSURE (P_g) -3.0
FILTER SET T-24 SET 4



CALCULATED ACFM (DESIRED) .274
PROBE TIP DIAMETER .156" #61-4.0
CO_2 5
O_2 ~~15~~ 15.31
CO 0
N_2 79
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 95/16
METER BOX NO. 2
Calculate ΔH = .23

Leak CK: Initial at 15" Hg, CFM .012
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 0858		761.418									
2-4	3 / 0901	762.24	762.22	.79	.23	.23	329	52	54	< 1		
	6 / 0904	763.06	763.02	.82	.23	.23	342	54	54	< 1		
	9 / 0907	763.88	763.84	.90	.27	.23	342	55	55	< 1		
	12 / 0910	764.71	764.66	.90	.23	.23	335	56	55	< 1		
	15 / 0913	765.53	765.47	.92	.23	.23	334	57	55	< 1		
	18 / 0916	766.35	766.28	.88	.23	.23	330	58	56	< 1		
	21 / 0919	767.17	767.107	.91	.23	.23	320	59	57	< 1		
				.874		.23	333.14	55.86	55.14			

RUN I.D. I-1-4
DATE 10-21-2
PS=0.73
TS=337.
B.P.=29.28
PS=29.053
%H20=20.
MF=0.8
MD=29.44
MS=27.152
VS=3699.575277
DNC=1.63573356TE-01
TM=50.
FS=0.539988835
FM=2.74284255 E-01
VISCOSITY=239.97 77778

COMMENTS:

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN CONST. Date I-1-4
Sampling Location INLET Name STULZ
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.)

```
I-1-4
 3.87  0.23 337
 55  55

I, VOL=761.418
S, VOL.=767.07
M FACTOR=1.057
B. P.=29.24
STATIC P.=-3.
% O2=15.31
% CO2=5.
% H2O=  20.00
DP=   0.34
TIME=  21.00
NOZZLE D.=0.156
NET VOL.=5.879949
3
DS VOL.=   5.906
STACK P=  29.213
AVE M T=  55.500
CDP=   0.334
DH=   0.230
ST T.= 333.140
DRY MW=  29.412
WET MW=  27.175
% ISO= 101.473
STACK V.= 4042
```

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 Bowen
Sample Location inlet
Sample Box No. _____
Sample Type _____

Run No. I-1-4
Sample Date 10-21-81
Recovery Date 10-21-81
Cleanup Person Gabriel

Filter No. ~~T-28~~ T-24 _____ _____
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]	106	98			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	6	-2			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 5.4

SILICA GEL

	1725	
	1721	
	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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen A/C SS

RUN I-2-1C

MRI Project Number 4571-153
Field Dates
Plant
Sampling Location Inlet
Sampling Date 11-6-51

FIELD CREW

Crew Chief

Testing Engineer 1 Stufty, R
2
3

Engr. Technician 1
2
3

Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-2-1C

Date 11-6-81
Initial RCS

Velocity head at sampling location, in. H_2O	ΔPs	.8
Stack temperature at sample point, °F	Ts	357
Barometric pressure, in. Hg	Pb	29.40
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -3.0	Ps	29.18
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
Molecular wt. dry stack gas, lb/lb-mole ($CO_2 = 5$, $O_2 = 16$) ($\% CO_2 \times 0.44$) + ($\% O_2 \times 0.32$) + ($\% N_2 + \% CO \times 0.28$)	Md	29.44
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.15
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3913.1
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.162
Actual nozzle diameter, in. #60 - 4.0	D_{n_a}	.155
Assumed meter temperature, °F	Tm	50
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.562
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.279

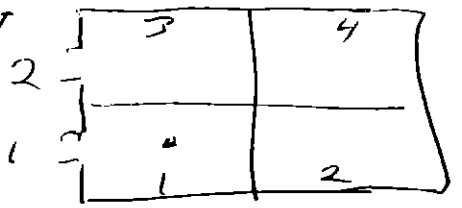
Visc. = 244.42

WATERPROOF PAPER

FIELD DATA - ANDERSEN

HCSS

PLANT Bowen
DATE 11-6-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER 1-2-1C
OPERATOR RJS
AMBIENT TEMPERATURE 45
BAROMETRIC PRESURE 29.40
STATIC PRESSURE, (P_s) -3.0
FILTER SET



CALCULATED ACFM (DESIRED) .279
PROBE TIP DIAMETER .155 #60-4.0
CO_2 4.8
O_2 16
CO 0
N_2 79.2
% H_2O 20
METER CORRECTION (ΔY) 1.034
TEMP. METER NO. 4519
METER BOX NO. 10
Calculated ΔH = .238

Leak CK: Initial at 15" Hg, CFM .012
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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
		275.762						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1013	Desired	Actual		DESIRED	ACTUAL						
1-1	3 / 1016	276.57	276.57	1.2	.238	.24	361	53	53	<1		
	6 / 1019	277.38	277.41	1.2			360	54	54	<1		
	9 / 1022	278.19	278.23	1.3			358	56	55	<1		
	12 / 1025	279.00	279.06	1.2			363	58	56	<1		
	15 / 1028	279.81	279.88	1.1			360	59	56	<1		
	18 / 1031	280.62	280.69	1.1			340	60	57	<1		
	21 / 1034	281.43	281.52	.97			373	62	58	<1		
	24 / 1037	282.24	282.328	1.00			359	62	59	<1		
			Avg =	1.134		.24	359.25	58	56			

RUN I.D. I-2-1C
DATE 11/6/81
^PS=0.8
TS=357.
B.P.=29.4
PS=29.178
%H2O=20.
MF=0.8
MD=29.44
MS=27.152
VS=3913.113039
DNC=1.6228791[illegible]E-01
TM=50.
FS=0.5621111[illegible]
FM=2.7859188752E-01
VISCOSITY=24[illegible].42
22022

COMMENTS:

I-76

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 11-6-81
Sampling Location Baghouse Inlet Name RCS
Run Number I-2-1C

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. VOL=275.752
F. VOL=282.326
M FACTOR=1.034
LK CK=0.
B. P=29.4
STATIC P=-3.
%O2=16.
%CO2=4.8
% H2O=  17.00
CP=   0.84
TIME=  24.00
NOZZLE D=0.165
NET VOL=6.789244
DS VOL=   6.514
STACK P=  29.179
AVE M T=  57.300
√DP=   1.063
DH=   0.240
ST T= 359.25
DRY MW=  29.408
WET MW=  27.468
% ISO=  89.661
STACK V= 463.
```

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 Bowen
Sample Location inlet
Sample Box No.
Sample Type HCSS

Run No. I-2-1C
Sample Date 11-6-81
Recovery Date 11-6-81
Cleanup Person Caldwell

Filter No. 14
Sample No.
Sample Material Description

WEIGHING BOAT SET = 20

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	H O				
Final Volume (wt)[b]	38	3			
Initial Volume (wt)[b]	000				
Net Volume (wt)[b]					
Sample No.(s)					

Combined impinger contents, Sample No. 41
Liquid Level Marked ____ Container(s) Sealed ____
Description of Impinger Solution
Total Moisture, gm 52.5

SILICA GEL

742.5
230.0
115
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 ____ Date Shipped: ____
Remarks:

Date of laboratory custody ____ Seal(s) broken by ____
Personnel accepting custody ____ Date broken ____
Remarks:

THE 52.5 ml of H_2O REPORTED ABOVE WAS COLLECTED DURING TWO CONSECUTIVE TESTS. TESTS I-2-1(C) ON THE HCSS AND SI-1 USING THE DUAL CYCLONE I.P. SAMPLER. THE MOISTURE SHOULD BE 17%

SEE RON SI-1 FOR CALCULATIONS.

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-2B

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location Inlet
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1
2
3

Engr. Technician 1 DL
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-2-2(B)

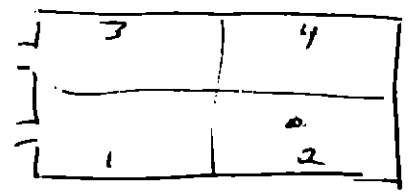
Date 10-22-81
Initial BCS

Velocity head at sampling location, in. H_2O	ΔPs	.71
Stack temperature at sample point, °F	Ts	308
Barometric pressure, in. Hg	Pb	29.47
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O) ~~-5.0~~ -2.4	Ps	29.29
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
Molecular wt. dry stack gas, lb/lb-mole (CO_2 = 5, O_2 = 15.31) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	29.41
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.13
Stack velocity, fpm 5,128.8 (Cp) $\left(\sqrt{\Delta Ps}\right) \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3568.6
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.162
Actual nozzle diameter, in. #61 - 4.0	D_{n_a}	.156
Assumed meter temperature, °F	Tm	40
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.508
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.263

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Bowen
DATE 10-22-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCl
RUN NUMBER 1-2-2 (B)
OPERATOR RCS
AMBIENT TEMPERATURE 40
BAROMETRIC PRESURE 29.47
STATIC PRESSURE, (P_s) -3.4
FILTER SET T-30 SET



CALCULATED ACFM (DESIRED) .263
PROBE TIP DIAMETER .156
CO_2 ~~5~~
O_2 13.31
CO 0
N_2 79.69
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 8576
METER BOX NO. 2
Calculated ΔH = .21

Leak CK: Initial at 15" Hg, CFM .004
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³ 801.079 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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
1-2	0 / 1056											
	3 / 1059	801.87	801.83	.84	.21	.21	322	44	44	<1		
	6 / 1102	802.66	802.61	.95	.21	.21	342	46	45	<1		
	9 / 1105	803.45	803.38	.87	.21	.21	333	47	46	<1		
	12 / 1108	804.24	804.16	.98	.21	.21	336	48	47	<1		
	15 / 1111	805.03	804.93	.89	.21	.21	343	49	48	<1		
	18 / 1114	805.81	805.71	.92	.21	.21	326	48	48	<1		
	21 / 1117	806.60	806.48	___	.21	.21	344	48	48	<1		
	24 / 1120	807.39	807.256	.96	.21	.21	348	49	48	<1		
			Avg =	.916		.21	336.75	47.375	46.75			

```
RUN I.D.  1-2
DATE  10-22-
CP=0.71
TS=308.
B.P.=29.47
PS=29.2924
%H2O=20.
NF=3.8
ND=29.4124
MS=27.12792
VS=3568.6429
DNC=1.6150051 E-01
TM=40.
FS=5.0766866 E-01
FM=1.6281626 E-01
VISCOSITY=23 E3
ERRS
```

COMMENTS:

Moisture Collected = ~~8~~ 207
O_2 = 17.5 %
CO_2 = 3.33 %

EPA (Durl 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-22-81
Sampling Location Baghouse Inlet Name RCS
Run Number 1-2-2 (B)

ISOKINETIC EQUATION

$$\%I = \frac{1{,}039(ST\ T.+460)(DS\ VOL.)}{(STACK\ V.)(TIME)(STACK\ P)(Mf)(NOZZLE\ D.)^2}$$

Assumed 20% H_2O

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.)

```
1-2-2 B
  0.91  0.21 336
  47  46

I. VOL=801.079
F. VOL.=807.256
M FACTOR=1.037
B. P.=29.47
STATIC P.=-2.4
% O2=17.5
% CO2=3.33
% H2O=  20.00
CP=   0.84
TIME=  24.00
NOZZLE D.=0.156
NET VOL.=6.405549
DS VOL.=   6.670
STACK P=  29.293
AVE M T=  47.062
IDP=   0.957
DH=   0.210
ST T.= 336.750
DRY MW=  29.252
WET MW=  26.986
% ISO=  95.999
STACK V.= 4139
```

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 BOWEN
Sample Location INLET
Sample Box No. _____
Sample Type _____

Run No. I-2-2-(B)
Sample Date 10/22/81
Recovery Date 10/22/81
Cleanup Person GABRIEL

Filter No. T-30
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S	M		
Impinger Solution					
Final Volume (wt)[b]	117	102	0		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	17	2			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 20.7

SILICA GEL

Final Volume (wt)[b]	718.7	
Initial Volume (wt)[b]	717.0	
Net Volume (wt)[b]	1.7	
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-3

MRI Project Number 4591-683
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-26-81

FIELD CREW

Crew Chief Walker T

Testing Engineer 1 Stubbs, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel M
2
3

Process Engineer 1
2

Other 1 Lee, D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-2-3

Date 10-26-81
Initial BCS

Velocity head at sampling location, in. H_2O	ΔPs	.33
Stack temperature at sample point, °F	Ts	322
Barometric pressure, in. Hg	Pb	29.17
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.1 "H_2O	Ps	29.01
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	30.76
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	28.21
Stack velocity, fpm $5,128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	2419.1
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.199
Actual nozzle diameter, in. #60-5.0	D_{n_a}	.195
Assumed meter temperature, °F	Tm	50
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.523
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.272

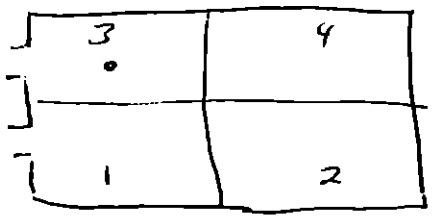
Viscosity = 236.64

WATERPROOF PAPER

FIELD DATA - ANDERSEN

HCSS

PLANT Bowen
DATE 10-26-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-2-3
OPERATOR RCS
AMBIENT TEMPERATURE 45
BAROMETRIC PRESURE 29.17
STATIC PRESSURE, (P_g) -2.1
FILTER SET T-1D SET4



CALCULATED ACFM (DESIRED) .272
PROBE TIP DIAMETER # 60-5.0 = .195
CO_2
O_2
CO
N_2
% H_2O
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 7516
METER BOX NO. 2
Calculated ΔH = .225
$(ACFM \times 1.81)^2$

Leak CK: Initial at 15" Hg, CFM .005
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 (825.878)	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
	0 / 1002											
2-3	3 / 1005	826.55	826.70	.35	.225	.23	324	48	48	<1		
	6 / 1008	827.23	827.50	.35	.225	.23	324	50	49	<1		
	9 / 1011	827.90	828.30	.36	.225	.23	341	51	50	<1		
	12 / 1014	828.58	829.08	.34	.225	.23	335	52	50	<1		
	15 / 1017	829.25	829.87	.36	.225	.23	322	52	50	<1		
	18 / 1020	829.93	830.64	.35	.225	.23	339	56	52	<1		
	21 / 1023	830.60	831.40	.36	.225	.23	326	58	53	1		
	24 / 1026	831.29	832.140	.37	.225	.23	347	59	54	1		
			Avg =	.355		.23	332.25	53.25	50.25			

I-86

RUN I.D. I-2-3
DATE 10/26/8
^PS=0.33
TS=322.
B.P.=29.17
PS=29.0146
%H2O=20.
MF=0.8
MD=30.76
MS=28.208
VS=2419.139755
DNC=1.991356059E-01
TM=50.
FS=0.523222222
FM=2.715312066E-01
VISCOSITY=235.64
44444

COMMENTS.

EPA (Dun 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-26-81
Sampling Location Baghouse Inlet Name BCS
Run Number I-2-3

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.)

```
I-2-3
  0.35  0.25 330
  55   50

I. VOL=825.678
F. VOL.=832.14
M FACTOR=1.057
B. P.=29.17
STATIC P.=-2.1
% O2=17.5
% CO2=3.2
% H2O=  20.00
CP=   0.84
TIME=  24.00
NOZZLE D.=0.193
NET VOL.=6.4[illegible]
4
DS VOL.=   6.523
STACK P=  29.015
AVE M T=  52.000
FDP=   0.395
DH=   0.230
ST T.= 352.857
DRY MW=  29.[illegible]
WET MW=  26.[illegible]
% ISO=  98.241
STACK V.= 15[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 Bowen
Sample Location Unit
Sample Box No.
Sample Type HCSS

Run No. I-2-3
Sample Date 10-26-81
Recovery Date 10-26-81
Cleanup Person Gabriel

Filter No. T-10
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S			
Impinger Solution	H_2O				
Final Volume (wt)[b]					
Initial Volume (wt)[b]	100				
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 SEE RUN I-3-4

SILICA GEL

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks: [illegible]

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HSS

RUN I - 2 - 4

MRI Project Number 4891 - L 83
Field Dates
Plant Bowen
Sampling Location Baghouse Inlet
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker

Testing Engineer 1 Stultz
2
3

Engr. Technician 1 DL
2
3

Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

MRI - Form PO (10/72)

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location ~~Exit~~ Inlet
Test No. I-2-4

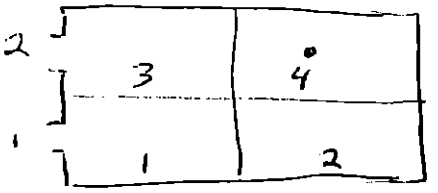
Date 10-22-81
Initial RCS

Velocity head at sampling location, in. H_2O	ΔPs	.79
Stack temperature at sample point, °F	Ts	341
Barometric pressure, in. Hg	Pb	29.45
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) $-2.4"$	Ps	29.27
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
Molecular wt. dry stack gas, lb/lb-mole $CO_2 = 5$ $O_2 = 15.31$ (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	29.41
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.13
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3845.7
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.161
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	50
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.544
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.276

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Bowen
DATE 10-22-81
SAMPLING LOCATION Inlet
SAMPLE TYPE Hcss
RUN NUMBER 1-2-4
OPERATOR RCS
AMBIENT TEMPERATURE 56
BAROMETRIC PRESURE 29.45
STATIC PRESSURE, (P_g) -2.4
FILTER SET T-29 SETB



CALCULATED ACFM (DESIRED) .276
PROBE TIP DIAMETER .156 & 6/4-4.0
CO_2 0
O_2 15.31
CO 0
N_2 79.69
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 9516
METER BOX NO. 2
Calculated ΔH = .23

Leak CK: Initial at 15" Hg, CFM .005
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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
		Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1300	819.201										
2-4	3 / 1303	820.03	820.01	.75	.23	.23	342	46	46	< 1		
	6 / 1306	820.86	820.82	.72	.23	.23	321	47	47	< 1		
	9 / 1309	821.69	821.64	.76	.23	.23	355	48	47	< 1		
	12 / 1312	822.51	822.45	.74	.23	.23	337	49	48	< 1		
	15 / 1315	823.34	823.28	.75	.23	.23	353	50	48	1		
	18 / 1318	824.17	824.10	.70	.23	.23	322	50	48	1		
	21 / 1321	824.997	824.92	.76	.23	.23	338	50	48	1		
	24 / 1324	825.83	825.751	.80	.23	.23	341	50	49	1		
			Avg =	.748		.23	338.625	48.75	47.625			

RUN I.D. [illegible]
DATE 10-22-[illegible]
PS=0.79
TS=341.
B.P.=29.45
PS=29.2724
%H20=20.
MF=0.8
MD=29.4124
MS=27.12992
VS=3845.6646[illegible]
DNC=1.610953[illegible]E-01
TM=50.
FS=5.44[illegible]E-01
FM=0.2755913[illegible]
VISCOSITY=240.86[illegible]

COMMENTS:

Moisture Collected = 38

I-91

EPA (Dur) 235
1 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-22-91
Sampling Location Baghouse Inlet Name RCS
Run Number I-2-4

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.)

```
I-2-4
  0.74  0.23 338
  48  47

I. VOL=819.201
F. VOL.=825.751
M FACTOR=1.037
B. P.=29.45
STATIC P.=-2.4
% O2=17.5
% CO2=3.33
ML% H2O=38.
% H2O=  20.48
DP=   0.84
TIME=  24.00
NOZZLE D.=0.156
NET VOL.=6.79235
DS VOL.=   6.947
STACK P=  29.275
AVE M T=  48.187
TDP=   0.864
DH=   0.230
ST T.= 338.625
DRY MW=  29.232
WET MW=  26.931
% ISO= 113.071
STACK V.= 3750
```

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 Bowen
Sample Location Baghouse Inlet
Sample Box No. _____
Sample Type _____

Run No. I-2-4
Sample Date 10-22-81
Recovery Date "
Cleanup Person MG

Filter No. I-29
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]					
Impinger Solution	H2O	—	(SG)		
Final Volume (wt)[b]	137				
Initial Volume (wt)[b]	100	—			
Net Volume (wt)[b]	37	—			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 38

SILICA GEL

719.7	
718.7	
1.0	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-1

MRI Project Number 4891-L 83
Field Dates
Plant Bowen
Sampling Location Baghouse Inlet
Sampling Date 10-27-81

FIELD CREW

Crew Chief Walker

Testing Engineer 1 Stultz
2
3

Engr. Technician 1 D. L.
2
3

Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-3-1

Date 10-27-81
Initial RCS

Velocity head at sampling location, in. H_2O	ΔPs	1.05
Stack temperature at sample point, °F	Ts	348
Barometric pressure, in. Hg	Pb	29.18
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.9 "H_2O	Ps	28.97
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.21
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	26.97
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	4489.7
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.150
Accual nozzle diameter, in. #60-4.0	D_{n_a}	.155
Assumed meter temperature, °F	Tm	~~75~~ 50
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.552
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.277

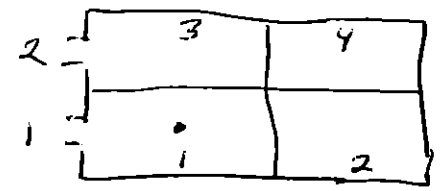
Visc. = 242.42

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT Bowen
DATE 10-27-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-3-1
OPERATOR BCS
AMBIENT TEMPERATURE 45
BAROMETRIC PRESURE 29.18
STATIC PRESSURE, (P_g) -2.4
FILTER SET T-11 SET 14



CALCULATED ACFM (DESIRED) .277
PROBE TIP DIAMETER .155" @ 60 -4.0
CO_2 4.5
O_2 16.5
CO 0
N_2 79
% H_2O 20
METER CORRECTION (ΔY) 1.034
TEMP. METER NO. 9516
METER BOX NO. 10
Calculated ΔH=.235

Leak CK: Initial at 15" Hg, CFM .007
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3 192.132 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 / 0814											
1-1	3 / 0817	192.96	192.90	1.10	.235	.24	350	57	57	<1		
	6 / 0820	193.79	193.72	1.10	.235	.24	353	58	57	<1		
	9 / 0823	194.63	194.55	1.15	.235	.24	339	60	59	<1		
	12 / 0826	195.46	195.38	1.10	.235	.24	355	61	59	1		
	15 / 0829	196.29	196.20	.90	.235	.24	333	62	60	1		
	18 / 0832	197.12	197.03	1.1			347	63	61	2		
	21 / 0835	197.95	197.86	1.1			356	64	62	2		
	24 / 0838	198.78	198.693	1.0			346	65	63	2		
			Avg =	1.069		.24	347.33	61.25	59.75			

SAN I.D. [illegible]
DATE 10-27-
CP=1.05
TS=348.
B.P.=29.18
PS=28.9654
%H2O=20.
MF=0.8
MD=29.212
MS=26.9696
VS=4489.710746
DNC=1.5015551565E-01
TM=50.
FS=0.5521111 .1
FM=2.7673646 9E-01
VLSOOS77.=24' [illegible]
[illegible]

I-96

COMMENTS:

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-27-81
Sampling Location Baghouse Inlet Name RES
Run Number I-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.)

```
I-3-1
  1.06  0.24  347
  61  59

I. VOL=192.17
F. VOL.=198.495
M FACTOR=1.014
B. P.=29.18
STATIC P.=-2.5
% O2=16.5
% CO2=4.5
% H2O=  20.0
CP=   0.84
TIME=  24.00
NOZZLE D.=0.375
NET VOL.=5.73407
4
DS VOL.=   5.712
STACK P=  29.156
AVE M T=  60.000
FDP=   1.033
DH=   0.240
ST T.= 347.375
DRY MW=  29.190
WET MW=  27.174
% ISO=  99.501
STACK V.= 45.7
```

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 Bowen
Sample Location inlet
Sample Box No. _____
Sample Type HCSS

Run No. I-3-1
Sample Date 10-27-81
Recovery Date 10-27-81
Cleanup Person Galmed

Filter No. I-11
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]					
Initial Volume (wt)[b]	100				
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 *

SILICA GEL

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
*Remarks: Refer to Run I-4-2
% H_2O Mass 17.27 %

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-2

MRI Project Number 4591-LSS
Field Dates
Plant Bruce M.
Sampling Location inlet
Sampling Date 10-26-81

FIELD CREW

Crew Chief Walker T

Testing Engineer 1 Studtz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gebauer M
2
3

Process Engineer 1
2

Other 1 Lacy D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-3-2

Date 10-26-81
Initial RCS

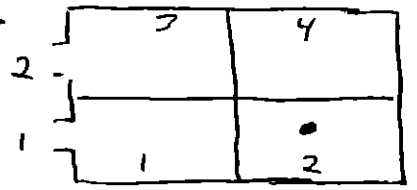
Velocity head at sampling location, in. H_2O	ΔPs	.83
Stack temperature at sample point, °F	Ts	331 ~~348~~
Barometric pressure, in. Hg	Pb	29.18
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	29.02 ~~29.18~~
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
Molecular wt. dry stack gas, lb/lb-mole (CO_2=32 O_2=17.5) ($\% CO_2$ x 0.44) + ($\% O_2$ x 0.32) + ($\% N_2$ + % CO x 0.28)	Md	29.21
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	26.97
Stack velocity, fpm $5,128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	2945 ~~3415~~
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.157 ~~.161~~
Actual nozzle diameter, in. #60-4.0	D_{n_a}	.155 ~~.156~~
Assumed meter temperature, °F	Tm	65
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.533 ~~.552~~
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.282 ~~.285~~

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT Bowen
DATE 10-26-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-3-2
OPERATOR RCS
AMBIENT TEMPERATURE 55
BAROMETRIC PRESURE 29.18
STATIC PRESSURE, (P_s) -2.1
FILTER SET I-12 SET B



CALCULATED ACFM (DESIRED) .282 ~~.285~~
PROBE TIP DIAMETER .156 #60-4.0
CO_2 3.2
O_2 12.5
CO 0
N_2 79.3
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 9576
METER BOX NO. 2
Calculated ΔH = .24

Leak CK: Initial at 15" Hg, CFM Zero
Final at ____ Hg, CFM ____

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 1211		843,204									
1-2	3 / 1214	844.05	844.00	1.05	.24	.22	351	56	57	<1		
	6 / 1217	844.90	844.79	.97	.24	.22	345	57	57	1		
	9 / 1220	845.74	845.60	.92	.24	.22	345	60	58	1		
	12 / 1223	846.59	846.40	.93	.24	.22	348	61	58	1		
	15 / 1226	847.43	847.22	.94	.24	.22	342	61	58	1		
	18 / 1229	848.28	848.03	.91	.24	.22	343	61	59	1		
	21 / 1232	849.13	848.87	.92	.24	.22	345	64	60	2		
	24 / 1235	849.97	849.681	.94	.24	.22	333	67	61	2		
			Avg =	.948		.22	344	60.875	78			

RUN I.D. I-3-2
DATE 10/26/81
PS=0.88
TS=331.
B.P.=29.18
PS=29.0246
%H2O=20.
MF=0.8
MD=29.212
MS=26.9696
VS=3945.499276
DNC=1.574125324E-01
TM=65.
FS=0.533222222
FM=0.281619033
VISCOSITY=239.64
44444

COMMENTS.

I-101

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-26-81
Sampling Location Baghouse Inlet Name BCS
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.)

I-3-2
Bowen
0.94 0.22 94
60 78

I. VOL.=843.204
S. VOL.=849.621
M FACTOR=1.017
B. P.=29.18
STATIC P.=-2.1
% O2=17.5
% CO2=3.2
% H2O= 20.00
CP= 0.84
TIME= 24.00
NOZZLE D.=0.158
NET VOL.=6.7624
9
DS VOL.= 6.735
STACK P= 29.025
AVE M T= 69.437
FDP= 0.973
DH= 0.220
ST T.= 344.000
DRY MW= 29.212
WET MW= 26.569
% ISO= 95.893
STACK V.= 42.51

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 Bowen
Sample Location Inlet
Sample Box No. _____
Sample Type HCSS

Run No. I-3-2
Sample Date 10-26-81
Recovery Date 10-26-81
Cleanup Person Gabriel

Filter No. T-12
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]					
Initial Volume (wt)[b]	100				
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 _____

SILICA GEL

_____ _____
_____ _____
_____ _____
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: See particulate data sheet re recovery and integrity sheet in Run 1 data

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-3

MRI Project Number 4891-L 87
Field Dates
Plant Bowen
Sampling Location Baghouse Inlet
Sampling Date 10-27-81

FIELD CREW

Crew Chief Walker

Testing Engineer 1 Stultz
2
3

Engr. Technician 1 D.L.
2
3

Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen — Date 10-27-81
Sampling Location Baghouse Inlet — Initial RCS
Test No. I-3-3

Velocity head at sampling location, in. H_2O	ΔPs	.37
Stack temperature at sample point, °F	Ts	352
Barometric pressure, in. Hg	Pb	29.20
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.9	Ps	28.99
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.38
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.10
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	2664
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.196
Actual nozzle diameter, in. # 60 - 5.0	D_{n_a}	.195
Assumed meter temperature, °F	Tm	70
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.557
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.288

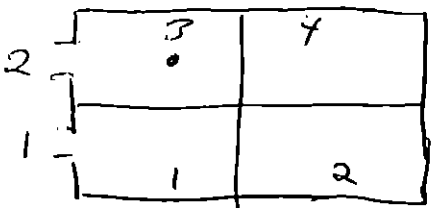
Visc. = 243.31

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT Bowen
DATE 10-27-81
SAMPLING LOCATION Barhouse Exhaust
SAMPLE TYPE HCSS
RUN NUMBER I-3-3
OPERATOR RCS
AMBIENT TEMPERATURE 70
BAROMETRIC PRESURE 29.20
STATIC PRESSURE, (P_s) -2.9
FILTER SET T-1 - SET 13



CALCULATED ACFM (DESIRED) .288
PROBE TIP DIAMETER .195 #60-5.0
CO_2 4.5
O_2 16.5
CO 0
N_2 79
% H_2O 20
METER CORRECTION (ΔY) 1.034
TEMP. METER NO. 9516
METER BOX NO. 10
Calculated ΔH = .254

Leak CK: Initial at 15" Hg, CFM .016
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 0958		211.726									
2-3	3 / 1001	212.59	212.56	.45	.254	.26	346	63	64	<1		
	6 / 1004	213.45	213.42	.48	.254	.26	353	63	65	<1		
	9 / 1007	214.32	214.27	.46			346	64	65	<1		
	12 / 1010	215.18	215.13	.46			346	66	66	1		
	15 / 1013	216.05	215.96	.47			353	68	66	1		
	18 / 1016	216.91	216.82	.45			346	67	67	1		
	21 / 1019	217.77	217.68	.50			357	68	67	1		
	24 / 1022	218.64	218.544	.43			346	68	67	1		
				Σ								
			Avg =	.463		.26	349.125	65.85	65.875			

```
UNIT I.D.  I-
DATE  10 27
ΔH=0.37
TS=352.
B.P.=29.
PS=28.98
%H2O=20.
MF=0.8
MD=29.35
MS=27.10
VS=2664.2046
DNC=1.95707
-01
TM=70.
FS=5.6555555 E-
01
FM=2.88N7935
01
WTSOSIT=24
.1111
```

I-106

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-27-81
Sampling Location Baghouse Inlet Name RCS
Run Number I-3-3

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.)

```
I-3-3
 0.46  0.26
 60  65

I. VOL=211.72
F. VOL.=218.5
M FACTOR=1.0
B. P.=29.2
STATIC P.=-2.
% O2=16.5
% CO2=4.5
% H2O=  20.00
CP=   0.84
TIME=  24.00
NOZZLE D.=0.
NET VOL.=7.04961
2
DS VOL.=    6
STACK P=   28
AVE M T=   65
FIP=   0.880
DH=   0.260
ST T.= 349.125
DRY MW=  29.
WET MW=  27.
% ISO=  92.
STACK V.=  2
```

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 Bowen | Run No. I-3-3
Sample Location Inlet | Sample Date 11-22-81
Sample Box No. | Recovery Date 11-22-81
Sample Type HCSS | Cleanup Person Crew

Filter No. T-1
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	I	S			
Impinger Solution	H2O				
Final Volume (wt)[b]					
Initial Volume (wt)[b]	100	200			
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 *

SILICA GEL

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 | Date Shipped:
Remarks:

Date of laboratory custody | Seal(s) broken by
Personnel accepting custody | Date broken
* Remarks: See PARTICULATE Sample RECOVERY AND INTEGRITY SHEET Run I-4-2

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-3-4

MRI Project Number 4891-283
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-26-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-2-4

Date 10-26-81
Initial RCS

Velocity head at sampling location, in. H_2O	ΔPs	.85
Stack temperature at sample point, °F	Ts	337
Barometric pressure, in. Hg	Pb	29.08
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.1	Ps	28.92
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
Molecular wt. dry stack gas, lb/lb-mole $CO_2 = 3.2$ $O_2 = 17.5$ (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	29.21
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	26.97
Stack velocity, fpm $5,128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	4015
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.157
Actual nozzle diameter, in. #6 (-4.0)	D_{n_a}	.156
Assumed meter temperature, °F	Tm	60
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.540
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.280

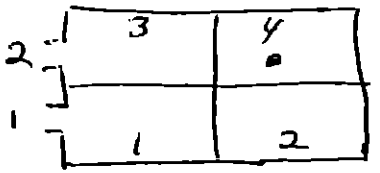
Visc. = 239.98

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT Bowen
DATE 10-26-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-3-4
OPERATOR RCS
AMBIENT TEMPERATURE 60
BAROMETRIC PRESURE 29.08
STATIC PRESSURE, (P_s) -2.1
FILTER SET



CALCULATED ACFM (DESIRED) .280
PROBE TIP DIAMETER .156 & .61 - 4.0
CO_2 3.2
O_2 17.5
CO 0
N_2 79.3
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 9576
METER BOX NO. 2
Calculated ΔH = .239

Leak CK: Initial at 15" Hg, CFM Zero
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 (869.542)	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
	0 / 1455											
2-4	3 / 1458	870.38	870.38	.90	.239	.24	336	67	66	1		
	6 / 1501	871.22	871.23	.92	.239	.24	375	70	68	1		
	9 / 1504	872.06	872.08	.97	.239	.24	316	71	69	1		
	12 / 1507	872.90	872.92	.93	.239	.24	340	72	69	1		
	15 / 1510	873.74	873.87	.97			336	74	70	1		
	18 / 1513	874.58	874.62	.89			348	76	72	1		
	21 / 1516	875.42	875.45	.93			347	78	72	1		
	24 / [illegible]	876.26		.90			334	80	73	1		
			Avg =	.926		.24	341.5	73.5	69.88			

RUN I.D. I-3-4
DATE 10/26/81
^PS=0.85
TS=337.
B.P.=29.08
PS=28.9046
%H2O=20.
MF=0.8
MD=29.212
MS=26.9696
VS=4014.78913
DNC=1.57020779
-01
TM=60.
FS=0.5898888
FM=2.60293
-01
VISCOSITY=23
77778

I-111

COMMENTS: Stop 1517 final Vol. 875.664
Pump Stopped

EPA (Dun 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-26-81
Sampling Location Baghouse Inlet Name RCS
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.)

```
I-3-4
  0.92  0.24 341
  73  69

I. VOL.=869.542
F. VOL.=875.664
M FACTOR=1.037
B. P.=29.08
STATIC P.=-2.1
% O2=17.5
% CO2=3.2
% H2O=  20.00
CP=   0.84
TIME=  22.00
NOZZLE D.=0.156
NET VOL.=6.34851
4
DS VOL.=   6.133
STACK P=  28.425
AVE M T=  71.687
FDP=   0.962
DH=   0.240
ST T.= 341.500
DRY MW=  29.213
WET MW=  26.969
% ISO=  98.053
STACK V.= 4202
```

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 Bowen
Sample Location inlet
Sample Box No.
Sample Type HCSS

Run No. I-3-4
Sample Date 10-26-81
Recovery Date 10-26-81
Cleanup Person Gabriel

Filter No. I-7
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]	232	1			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	132	1			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 139.3

SILICA GEL

726.0
719.7
6.3
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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks: ONE IMPINGER TRAIN WAS USED FOR ALL HCSS RUNS ON THIS DAY % MOISTURE WILL BE THE SAME FOR ALL RUNS AND WAS DETERMINED AS FOLLOWS

$$\%\ H_2O = \frac{100}{1 + \left[375 \frac{P_m V_m}{(T_m + 460) W_m}\right]} = \frac{100}{1 + \left[375 \frac{29.18 \times 25.536}{(61.7 + 460) \times 139.3}\right]} = 20.64$$

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-1

MRI Project Number 4891-683
Field Dates
Plant ~~10-30-81~~ Bowen
Sampling Location inlet
Sampling Date 10-30-81

FIELD CREW

Crew Chief Walker T

Testing Engineer 1 Stubbs R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel M
2
3

Process Engineer 1
2

Other 1 Lacy D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-4-1

Date 10-30-81
Initial RCS

Velocity head at sampling location, in. H_2O	ΔPs	.65
Stack temperature at sample point, °F	Ts	340
Barometric pressure, in. Hg	Pb	29.01
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.2	Ps	28.85
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
Molecular wt. dry stack gas, lb/lb-mole $O_2 = 16.5$ $CO_2 = 4.5$ (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	29.38
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.10
Stack velocity, fpm $5,128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3513.4
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.168
Actual nozzle diameter, in. #60-4.0	D_{n_a}	.155
Assumed meter temperature, °F	Tm	66
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.543
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.281

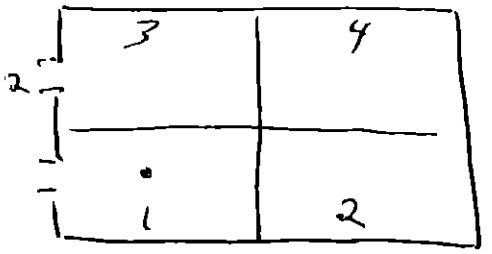
Visc. = 240.64

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT Bowen
DATE 10-30-91
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-4-1
OPERATOR RCS
AMBIENT TEMPERATURE 60
BAROMETRIC PRESURE 29.01
STATIC PRESSURE, (P_s) -3.2
FILTER SET



CALCULATED ACFM (DESIRED) .281
PROBE TIP DIAMETER .155 # 60-4.0
CO_2 4
O_2 18
CO 0
N_2 78
% H_2O 20
METER CORRECTION (ΔY) 1.043
TEMP. METER NO. 9576
METER BOX NO. 10
Calculated ΔH = .242

Leak CK: Initial at 15" Hg, CFM .014
Final at ___ Hg, CFM

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)		GAS METER READING (V_m), ft³ 237.549		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			
1-1	0	0749											
	3	0752	238.39	238.38	.71	.242	.24	333	60	60	<1		
	6	0755	239.24	239.21	.71			324	62	60	<1		
	9	0758	240.08	240.04	.72			340	62	61	<1		
	12	0801	240.92	240.88	.71			328	64	62	<1		
	15	0804	241.76	241.72	.76			342	66	63	<1		
	18	0807	242.61	242.57	.70			334	67	64	<1		
	21	0810	243.45	243.41	.68			330	68	65	<1		
	24	0813	244.29	244.249	.71			338	68	65	1		
				Avg =	.713		.24	333.625	64.625	62.5			

RUN I.D. (illegible)
DATE 10/30/91
[illegible]=0.65
Ts=740.
[illegible]=29.01
[illegible]=9.647
[illegible]=20.
[illegible]=.8
[illegible]=.89
[illegible]=.04
[illegible]=38.5
[illegible]

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-30-81
Sampling Location Geykouse Inlet Name BCS
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
  0.71  0.24 333
  64  62

I. VOL.=237.549
F. VOL.=244.249
M FACTOR=1.034
B. P.=29.01
STATIC P.=-2.2
% O2=18.
% CO2=4.
% H2O=  20.00
CP=   0.84
TIME=  24.00
NOZZLE D.=0.155
NET VOL.=6.9278
DS VOL.=   6.775
STACK P=  28.843
AVE M T=  63.562
FDP=   0.844
DH=   0.240
ST T.= 333.325
DRY MW=  29.360
WET MW=  27.088
% ISO= 114.499
STACK V.= 3665
```

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 Bowen
Sample Location inlet
Sample Box No.
Sample Type HCSS

Run No. I-4-1
Sample Date 10-30-81
Recovery Date 10-30-81
Cleanup Person C. Brock

Filter No. F-3
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]					
Initial Volume (wt)[b]	100				
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 *

SILICA GEL

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 Date Shipped:
Remarks:

Date of Laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks: 16.4 g/g H_2O 73 SET 16
* SEE RUN # I-2-1(B)

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-2

MRI Project Number 4891-L53
Field Dates
Plant Bruce
Sampling Location Inlet
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker T

Testing Engineer 1 Stultz R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabrul M
2
3

Process Engineer 1
2

Other 1 Lacy D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-4-2

Date 10-2
Initial RCS

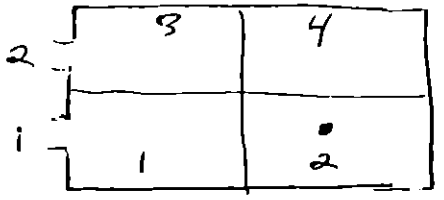
Velocity head at sampling location, in. H_2O	ΔPs	.78
Stack temperature at sample point, °F	Ts	335
Barometric pressure, in. Hg	Pb	29.16
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	28.95
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.83
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.60
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3830
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.160
Actual nozzle diameter, in. #60 - 4.0	D_{n_a}	.155
Assumed meter temperature, °F	Tm	75
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.538
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.287

Visc. = 239.5

WATERPROOF PAPER

FIELD DATA - ANDERSEN
HCSS

PLANT Bowen
DATE 10-27-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-4-2
OPERATOR RCS
AMBIENT TEMPERATURE 65
BAROMETRIC PRESURE 29.16
STATIC PRESSURE, (P_g) -2.9
FILTER SET



CALCULATED ACFM (DESIRED) .287
PROBE TIP DIAMETER .155 #60-4.0
CO_2 4.5
O_2 16.5
CO 0
N_2 79
% H_2O 20
METER CORRECTION (ΔY) 1.034
TEMP. METER NO. 5/6
METER BOX NO. 10
Calculated ΔH = .252

Leak CK: Initial at 15" Hg, CFM .008
Final at ___ Hg, CFM

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1418		230.480									
1-2	3	1421	231.34	231.35	.75	.252	.25	334	72	72	<1		
	6	1424	232.20	232.21	.77			347	72	72	<1		
	9	1427	233.06	233.06	.73			330	73	72	<1		
	12	1430	233.92	233.93	.74			348	74	72	<1		
	15	1433	234.79	234.78	.72			329	75	73	<1		
	18	1436	235.65	235.64	.74			355	76	74	1		
	21	1439	236.51	236.50	.72			337	77	75	1		
	24	1442	237.37	237.358	.73			353	78	75	1		
				Avg =	.738		.25	341.625	74.625	73.125			

RUN I.D. I-4-2
DATE 10/27/8
^PS=0.78
TS=335.
B.P.=29.16
PS=28.9454
%H20=20.
MF=0.8
MD=29.38
MS=27.104
VS=3830.182287
DNC=1.6042909732E-01
TM=75.
FS=5.376666665E-01
FM=2.873305398E-01
VISCOSITY=239.53333333

COMMENTS:

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10 -
Sampling Location Baghouse Inlet Name RCS
Run Number I-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.)

```
I-4-2
  0.73  0.35 341
  74   73

I. VOL=230.48
F. VOL.=237.358
M FACTOR=1.034
B. P.=29.16
STATIC P.=-2.9
% O2=16.5
% CO2=4.5
% H2O=  20.00
CP=   0.84
TIME=  24.00
NOZZLE D.=0.155
NET VOL.=7.11185
2
DS VOL.=   6.856
STACK P=  28.946
AVE M T=  73.875
FDP=   0.859
DH=   0.250
ST T.= 341.625
DRY MW=  29.380
WET MW=  27.104
% ISO= 114.322
STACK V.= 3741
```

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 Bruce Unit
Sample Location
Sample Box No.
Sample Type HCSS

Run No. I-4-2
Sample Date 10-27-81
Recovery Date 10-27-81
Cleanup Person Gallup

Filter No. I-23
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S			
Impinger Solution	4.0				
Final Volume (wt)[b]	193				
Initial Volume (wt)[b]	100				
Net Volume (wt)[b]	83				
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 88.0 g

SILICA GEL

	736.0	
	726.0	
	10.0	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks: THREE RUNS - I-3-1, I-3-3, I-4-2 WERE MADE USING THE SAME IMPINGER TRAIN. CALCULATIONS FOR %H2O WERE MADE ACCORDINGLY

$$\%H_2O = \frac{100}{1+\left[375\frac{P_{in}V_m}{(T_m+460)W_m}\right]} = 17.27\%$$

$W_m = 88.0\ g$

$P_{in} = (29.16 + 29.18 + 29.20) \div 3$

$V_m = [(237.358 - 230.480) + (198.093 - 192.132) + (218.544 - 211.726)]$

$T_m = (74.6 + 73.1 + 61.2 + 59.8 + 65.9 + 65.9) \div 6$

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-3

MRI Project Number 4891-183
Field Dates
Plant Bruce
Sampling Location inlet
Sampling Date 10-30-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Beloit
Sampling Location Baghouse Inlet
Test No. I-4-3

Date 10-30-81
Initial RCC

Velocity head at sampling location, in. H_2O	ΔPs	.35
Stack temperature at sample point, °F	Ts	336
Barometric pressure, in. Hg	Pb	29.01
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.2	Ps	28.85
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.36
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.09
Stack velocity, fpm $5,128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	2572
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.196
Actual nozzle diameter, in. 60-5.0	D_{n_a}	.195
Assumed meter temperature, °F	Tm	70
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.539
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.285

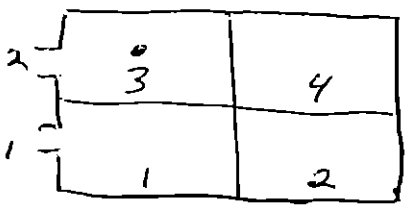
Visc = 239.76

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT: Bowen
DATE: 10-30-81
SAMPLING LOCATION: Baghouse Inlet
SAMPLE TYPE: ~~7-7~~ HCSS
RUN NUMBER: 1-4-3
OPERATOR: RCS
AMBIENT TEMPERATURE: 70
BAROMETRIC PRESURE: 29.01
STATIC PRESSURE, (P_g): -2.2
FILTER SET:



CALCULATED ACFM (DESIRED): .285
PROBE TIP DIAMETER: .195 Ø60-5.0
CO_2: 4
O_2: 19
CO: 0
N_2: 77
% H_2O: 20
METER CORRECTION (ΔY): 1.034
TEMP. METER NO.: 9516
METER BOX NO.: 10
Calculated ΔH = .249

Leak CK: Initial at 15" Hg, CFM .007
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 0850		244.342									
2-3	7 / 0853	245.20	245.19	.40	.249	.25	329	67	68	<1		
	6 / 0856	246.05	246.04	.42			332	68	68	<1		
	9 / 0859	246.91	246.89	.42			340	69	69	<1		
	12 / 0902	247.76	247.75	.41			338	70	69	<1		
	15 / 0905	248.62	248.59	.43			344	71	70	<1		
	18 / 0908	249.47	249.46	.42			334	72	70	<1		
	21 / 0911	250.33	250.31	.40			333	74	72	1		
	24 / 0914	251.18	251.18	.39			342	74	72	1		
	27 / 0917	252.04	252.04	.42			336	74	73	1		
	30 / 0920	252.89	252.999	.40			349	74	74	1		
			Avg =	.411		.25	337.7	71.3	70.5			

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-30-81
Sampling Location Baghouse Inlet Name RCS
Run Number I-4-3

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-4-3
  0.41  0.25 337
  71  70

I. VOL=244.342
F. VOL.=252.999
M FACTOR=1.034
B. P.=29.01
STATIC P.=-2.2
% O2=18.
% CO2=4.
% H2O=  20.00
CP=   0.84
TIME=  30.00
NOZZLE D.=0.195
NET VOL.=8.951338
DS VOL.=   8.633
STACK P=  28.848
AVE M T=  70.900
TDP=   0.641
DH=   0.250
ST T.= 337.700
DRY MW=  29.360
WET MW=  27.088
% ISO=  97.401
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 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 Bowen
Sample Location Inlet
Sample Box No. _____
Sample Type Particulate

Run No. I-4-3
Sample Date 10-30-81
Recovery Date 10-30-81
Cleanup Person Gaskin

Filter No. I-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]					
Initial Volume (wt)[b]	200				
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 *

SILICA GEL

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: I-15 Set #17

* TOTAL % MOISTURE = 16.41% SEE RUN # I-2-1(B)

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-4-4

MRI Project Number 4891-L83
Field Dates
Plant Barrow
Sampling Location inlet
Sampling Date 10-30-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Cabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-4-4

Date 10-30-81
Initial BCS

Velocity head at sampling location, in. H_2O	ΔPs	.75
Stack temperature at sample point, °F	Ts	324
Barometric pressure, in. Hg	Pb	29.04
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.2	Ps	28.88
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.36
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.09
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3735
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.1606
Actual nozzle diameter, in.	D_{n_a}	.155
Assumed meter temperature, °F	Tm	73
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.525
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.284

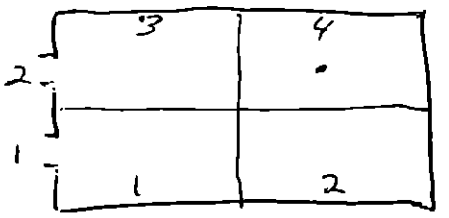
Visc. = 237.09

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT Bowen
DATE 10-30-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER 2-4-4
OPERATOR RCS
AMBIENT TEMPERATURE 70
BAROMETRIC PRESURE 29.04
STATIC PRESSURE, (P_s) -2.2
FILTER SET



CALCULATED ACFM (DESIRED) .284
PROBE TIP DIAMETER .155 #60 - 4.0
CO_2 4
O_2 18
CO 0
N_2 28
% H_2O 30
METER CORRECTION (ΔY) 1.034
TEMP. METER NO. 9516
METER BOX NO. 10

Calculated ΔH = .247
$\left[\left(.284 \times \frac{1}{1.034}\right)(1.81)\right]^2$

Leak CK: Initial at 15" Hg, CFM .005
Final at ___ Hg, CFM

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 0948		253,001									
2-4	3 / 0951	253.85	253.86	.75	.247	.25	342	70	71	<1		
	6 / 0954	254.71	254.71	.75			343	70	72	<1		
	9 / 0957	255.56	255.57	.82			339	71	72	<1		
	12 / 1000	256.41	256.42	.72			324	72	72	<1		
	15 / 1003	257.26	257.28	.81			351	73	72	<1		
	18 / 1006	258.11	258.12	.69			350	74	73	1		
	21 / 1009	258.97	258.98	.64			337	74	74	2		
	24 / 1012	259.82	259.84	.75			342	75	74	2		
	27 / 1015	260.67	260.70	.72			342	76	75	2		
	30 / 1018	261.52	261.560	.68			338	76	75	2		
			Avg=	.733		.25	340.8	73.1	73.0			

COMMENTS:

I-131

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-30-81
Sampling Location Baghouse Inlet Name RCS
Run Number I-4-4

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.)

```
I-4-4
  0.75  0.25 340
  TS    TS

I. VOL=253.001
F. VOL.=261.56
M FACTOR=1.034
B. P.=29.04
STATIC P.=-2.2
% O2=18.
% CO2=4.
% H2O=  20.00
CP=   0.84
TIME=  30.00
NOZZLE D.=0.155
NET VOL.=8.85000
6
DS VOL.=   8.510
STACK P=  28.878
AVE M T=  73.050
√DP=   0.956
DH=   0.250
ST T.= 340.800
DRY MW=  29.360
WET MW=  27.088
% ISO= 113.947
STACK V.= 3731
```

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 Brown
Sample Location inlet
Sample Box No. _____
Sample Type HCSS

Run No. I-1-4
Sample Date 10-30-81
Recovery Date 10-30-81
Cleanup Person Gabriel

Filter No. I-22
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]					
Initial Volume (wt)[b]	100				
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 *

SILICA GEL

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: T-22 Set ~~#2~~ #18

* MOISTURE = 16.41% SEE RUN # I-2-1(B)

METHOD 17 (OUTLET MASS)

MIDWEST RESEARCH INSTITUTE

m-17

RUN 0-1-1

MRI Project Number 4891-L83
Field Dates
Plant BOILER
Sampling Location OUTLET
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker T

Testing Engineer 1 White
2
3

Engr. Technician 1
2
3

Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Beaver

DATE 10-~~28~~ 27-81

SAMPLING LOCATION Outlet
0-1-1

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.94
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	19
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	~~29.36~~ 29.46
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.39
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.998
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	280
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	~~0.7~~ .68
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR	0.80	
CALCULATED NOZZLE DIAMETER, in.	0.257	
ACTUAL NOZZLE DIAMETER, in.	0.251	
REFERENCE Δp, in. H_2O	~~0.70~~ .75	

EPA (Our) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location OUTLET
Test Number 0-1-1

Date 10-22-81
Initial CE

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

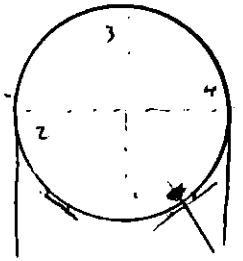
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.81
Nozzle diameter, inches	Dn	.251
Barometric pressure, inches Hg	Pb	29.96 ~~29.36~~
$\frac{5.168\ (70 + 460)\ (.84)\ (.81)\ (5)\ (.251^2)}{\sqrt{29.96}}$	K	107.299 ~~108.343~~

FIELD DATA

PLANT Bowen
DATE 10-22-91
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-1-1
OPERATOR Wilcox
AMBIENT TEMPERATURE 40
BAROMETRIC PRESSURE 29.46
STATIC PRESSURE (P_s) -2"
FILTER NUMBER(s) 17-10



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 7 ½
NOZZLE I.D. .251
ASSUMED MOISTURE, % 19%
SAMPLE BOX NUMBER
METER BOX NUMBER 4
TEMPERATURE METER NO. 9577
METER ΔH@ 1.5
METER CORRECTION 1.001
C FACTOR .80
REFERENCE Δp 0.75

LEAK CK: Initial at 15" Hg, CFM 0.000 Read and Record All Data
Final at 15½ Hg, CFM 0.030 Every 5 Minutes

$VM = 107.3 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
		185.838						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 7:55	Desired	Actual		DESIRED	ACTUAL						
	5 0800	188.88	188.93	.6	1.5	1.5	287	48	48	4		
	10 0805	192.06	192.15	.65	1.6	1.5	281	68	51	4		
	15 0810	195.10	195.33	.60	1.5	1.3	286	68	53	4		
	20 0815	198.21	198.35	.63	1.6	1.3	289	72	58	5		
	25 0820	201.27	201.35	.62	1.5	1.2	292	73	58	5		
	30 0825	204.31	204.34	.60	1.5	1.2	285	74	60	5		
	35 0830	207.43	207.51	.63	1.6	1.4	287	73	60	6½		
	40 0835	210.59	210.69	.65	1.6	1.4	290	76	62	7		
	45 0840	213.69	213.72	.62	1.5	1.2	284	76	63	8		
	50 0845	216.79	216.83	.62	1.5	1.4	281	76	63	8		
	55 0850	219.78	219.83	.58	1.4	1.2	286	75	62	8		
	200 0855	222.84	222.75	.61	1.5	1.3	290	75	63	9		
	65 0900	225.90	225.97	.61	1.5	1.2	288	74	63	9		
	70 0905	228.95	229.04	.60	1.5	1.3	283	75	63	10		
	75 0910	232.00	232.15	.60	1.5	1.3	282	74	63	10½		
	80 0915	235.05	235.20	.60	1.5	1.2	281	74	63	11½		
	85 0920	238.05	238.15	.58	1.4	1.1	280	76	64	11		
	90 0925	241.00	241.07	.56	1.4	1.1	281	80	65	11		
	95 0930	244.05	244.13	.60	1.5	1.3	284	78	64	12½		
	100 0935	247.09	247.30	.60	1.5	1.3	285	76	64	14		
	105 0940	250.16	250.26	.61	1.5	1.2	284	74	62	14		
	110 0945	253.15	253.24	.58	1.4	1.1	287	76	63	14½		
	115 0950	256.14	256.245	.58	1.4	1.2	287	80	64	15½		

COMMENTS

Ag 0.6 1.265 285.1 73.52

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Boiler House Date 10-22-81
Sampling Location Outlet Name Eckert
Run Number 81-1-1

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.)

```
011
  0.60  1.26 285
  73  73

I. VOL.=185.838
F. VOL.=256.245
M FACTOR=1.006
B. P.=29.46
STATIC P.=-0.94
% O2=17.83
% CO2=4.
MLS H2O=318.6
% H2O=  17.81
CP=   0.84
TIME= 115.00
NOZZLE D.=0.251
NET VOL.=70.8294
42
DS VOL.=  69.209
STACK P=  29.390
AVE M T=  73.520
√DP=   0.774
DH=   1.265
ST T.= 285.100
DRY MW=  29.353
WET MW=  27.330
% ISO=  95.260
STACK V.= 3214
```

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 Bowen — Run No. O-1-1
Sample Location outlet — Sample Date 10-22-81
Sample Box No. _____ — Recovery Date 10-22-81
Sample Type _____ — Cleanup Person Cabinet

Filter No. 17-10
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	M	S	M		
Impinger Solution	H2O	H2O	—		
Final Volume (wt)[b]	361	152			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	261	52			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 318.6

SILICA GEL

	776.0	
	760.4	
	15.6	

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 _____ 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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

73
59
152

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN 0-1-2

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Whited
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-20-81 (0800)

SAMPLING LOCATION Outlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	17
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)	P_s	28.96
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.999
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	300
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.1
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR	0.82	
CALCULATED NOZZLE DIAMETER, in.	0.230	
ACTUAL NOZZLE DIAMETER, in. (1 ± 10)	0.250	
REFERENCE Δp, in. H_2O	0.78	

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Outlet
Test Number 0-1-2

Date 10-20-81
Initial CC

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

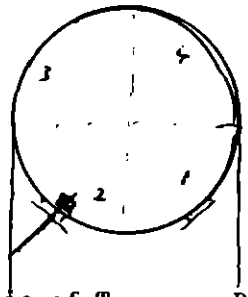
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	10
Mole fraction dry gas	Mf	.83
Nozzle diameter, inches	Dn	.250
Barometric pressure, inches Hg	Pb	29.06
$\frac{5.168\ (70 + 460)\ (.84)\ (.83)\ (10)\ (.25^2)}{\sqrt{29.06}} = 5.39$	K	221.4

FIELD DATA

PLANT Bowan
DATE 10-20-18
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-1-2
OPERATOR Whited
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.06
STATIC PRESSURE (P_s) -.84"H2O
FILTER NUMBER(s) 17-5



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 7½"
NOZZLE I.D. 0.250
ASSUMED MOISTURE, % 17
SAMPLE BOX NUMBER
METER BOX NUMBER 4
TEMPERATURE METER NO. 9519
METER ΔH@ 1.84
METER CORRECTION 1.006
C FACTOR 0.82
REFERENCE Δp 0.79

LEAK CK: Initial at 15" Hg, CFM .005 Read and Record All Data
Final at 11 Hg, CFM .005 Every 10 Minutes

$VM = 22.\text{re} \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) SAMPLING TIME, min	GAS METER READING (V_m), ft³ 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
	0830	35.220										
"2"	0840	43.24	43.39	1.0	2.3	2.6	302	60	60	5		
	0850	51.22	49.68	0.99	2.3	2.2	303	68	62	4		
	0851 off		50.294	1.20								
	Sample Train Check											
	0903 on	50.294 − 51.958			2.9	3.0						
	0912	61.66	59.55	1.20	2.4	3.0	301	68	68			
	0922	70.09	68.325	1.1	2.6	2.8	297	78	68	11		
		off										
				Leak Check			Tank 1.	694	Out			
			68.325 −	1.649	=		66.661	Final	Vm.			
			Vm	ΔPs	ΔH		Ts					
			~~53.105~~	1.67	2.7		300.25		66.5			
			~~31.444~~									
			31.441									

COMMENTS

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Boiler House Date 10-20-81
Sampling Location Outlet Name Whitsel
Run Number 0-1-2

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.)

0-1-2
1.00 2.60 302
60 60
0.99 2.20 303
68 62
1.20 3.00 301
68 68
1.10 3.00 297
78 68

I. VOL=35.22
F. VOL.=68.325
M FACTOR=1.006
B. P.=29.06
STATIC P.=-0.94
% O2=14.8
% CO2=4.3
ML'S H2O=152.4
% H2O= 18.02
CP= 0.84
TIME= 40.00
NOZZLE D.=0.25
NET VOL.=33.3036
3
DS VOL.= 32.647
STACK P= 28.990
AVE M T= 66.500
FIP= 1.034
DH= 2.700
ST T.= 300.750
DRY MW= 29.280
WET MW= 27.246
% ISO= 99.271
STACK V.= 4375

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. 0-1-1
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M Gabriel

Filter No. 17-5
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]	300	216	8		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	200	116	8		
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 152.4

SILICA GEL

712.4	
702.0	
10.4	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

208
- 66
142
10.4
152.4

MIDWEST RESEARCH INSTITUTE

Method 17

RUN 0-1-3B

MRI Project Number 4891-83
Field Dates
Plant BOILEN
Sampling Location Outlet
Sampling Date 10-13-81

FIELD CREW

Crew Chief T. Walker

Testing Engineer 1 E. Whited
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M.
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Beaver

DATE 10-19-81

SAMPLING LOCATION OUTLET 0-1-3 B

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.82
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m\,avg.}$	70°F
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	17
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.38
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O) -.74	P_s	29.31
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.998
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	300
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.08
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		0.810
CALCULATED NOZZLE DIAMETER, in.		0.233
ACTUAL NOZZLE DIAMETER, in.		0.249
REFERENCE Δp, in. H_2O		0.80

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Outlet
Test Number 0-1-3 B

Date 10-19-81
Initial CL

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

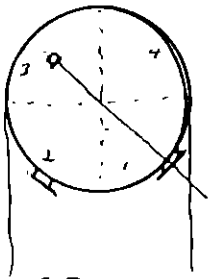
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	0.84
Sampling time interval, minutes	θi	10
Mole fraction dry gas	Mf	.83
Nozzle diameter, inches	Dn	0.249
Barometric pressure, inches Hg	Pb	29.38
$\frac{5.168\ (70 + 460)\ (.84)\ (.83)\ (10)\ (.249^2)}{\sqrt{29.38}}$	K	218.44

FIELD DATA

PLANT BOWEN
DATE 10-19-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-1-3-B
OPERATOR White
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.38
STATIC PRESSURE (P_s) -.94
FILTER NUMBER(s) 17-4



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 40 3/4
NOZZLE I.D. .249
ASSUMED MOISTURE, % 17%
SAMPLE BOX NUMBER #1
METER BOX NUMBER 4
TEMPERATURE METER NO. 9518
METER ΔH@ 1.84
METER CORRECTION 1.006
C FACTOR 0.84
REFERENCE Δp 0.80

LEAK CK: Initial at 15" Hg, CFM 0.05 Read and Record All Data
Final at 20" Hg, CFM 0.025 Every 10 Minutes

$VM = 218.44 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min / TPM	GAS METER READING (V_m), ft³ 983.440 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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	110 PM	992.10	99229	1.2	2.8	2.8	303	65	67	8		
	120	1000.02	.450	1.0	2.3	2.1	297	77	68	7½		
	130 PM	08.66	9.15	1.2	2.7	2.5	306	77	70	8		
	140	16.93	16.33	1.1	2.5	2.3	307	77	70	7		
	150	25.57	25.23	1.2	2.7	2.7	308	78	69			
	2PM	34.88	34.540	1.1	2.5	2.8	310	80	70	18		
			(V_m) 51.1	ΔP_s 1.13			T_s 305.167		T_m 72.33			

COMMENTS

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10-15-81
Sampling Location OUTLET Name E WHITED
Run Number 0-1-7(B)

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.)

```
013B
013B
  1.20  2.80 303
  65  67
  1.00  2.10 297
  77  68
  1.20  2.50 306
  77  70
  1.10  2.70 308
  78  69
  1.10  2.80 310
  80  70
                  5

I. VOL=983.44
F. VOL.=1034.54
M FACTOR=1.
B. P.=29.38
STATIC P.=-0.94
% O2=14.8
% CO2=4.3
% H2O=  17.00
DP=   0.84
TIME=  60.00
NOZZLE D.=0.249
NET VOL.=51.1
DS VOL.=  50.092
STACK P=  29.310
AVE M T=  72.100
TDP=   1.057
DH=   2.580
ST T.= 304.800
DRY MW=  29.280
WET MW=  27.362
% ISO=  98.841
STACK V.= 4449
```

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 Bowen
Sample Location outlet
Sample Box No.
Sample Type

Run No. 0-7-3B
Sample Date 10-19-81
Recovery Date 10-19-81
Cleanup Person M. Cadwell

Filter No. 17-4
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	dry	dry	
Final Volume (wt)[b]	280	163			
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	180	63			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 261.4 gm

SILICA GEL

	744.3
	739.9
	18.4

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 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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

180
63
18.4
261.4

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN 0-1-4

MRI Project Number 4892-L83
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 WHITED
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-20-81

SAMPLING LOCATION Outlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	17
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.08
STATIC PRESSURE IN STACK, in. Hg −.94 "H_2O ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.01
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.998
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	300
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.83
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR		0.81
CALCULATED NOZZLE DIAMETER, in.		0.245 ~~0.260~~
ACTUAL NOZZLE DIAMETER, in.		0.253
REFERENCE Δp, in. H_2O		0.75

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Boozer
Sampling Location Outlet
Test Number 0-1-4

Date 10-20-81
Initial CW

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

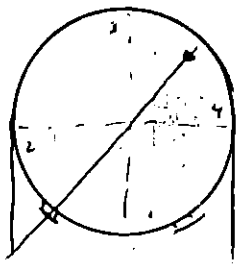
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	0.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.83
Nozzle diameter, inches	Dn	.253
Barometric pressure, inches Hg	Pb	29.08
$\frac{5.168\ (70 + 460)\ (5)\ (.84)\ (.83)\ (.253^2)}{\sqrt{29.08}}$	K	113.33

FIELD DATA

PLANT Bowen
DATE 10-20-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-1-4
OPERATOR Ubited
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.08
STATIC PRESSURE (P_s) -.9" H_2O
FILTER NUMBER(s) 17-7



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 4' S
NOZZLE I.D. .253"
ASSUMED MOISTURE, % 17%
SAMPLE BOX NUMBER 4
METER BOX NUMBER 4
TEMPERATURE METER NO. 9519
METER $\Delta H@$ 1.84
METER CORRECTION 1.006
C FACTOR 0.81
REFERENCE Δp 0.75

LEAK CK: Initial at 15" Hg, CFM ~~.005~~ .005 Read and Record All Data
Final at 5" Hg, CFM ~~0-0-7~~ .007 Every 5 Minutes

$VM = 113.33 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min	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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	1223	69.665										
	1228	73.49	73.54	.87	022	.22	304	70	72	5		
	1233	77.42	77.63	.92	.203	.22	305	72	76	5		
	1238	81.35	81.59	.92	.23	.20	303	80	73	5		
	END		83.120	.82	2.0	1.7	302	73	78		13.455	a/c for run
	New Filter										Use Fo moisture Data	—
0	1 Pm START	83.203										
5	1:05	86.76	86.90	.75	1.9	1.9	307	75	75	4		
10	1:10	90.54	90.70	.85	2.1	2.0	313	76	74	4		
15	1:15	94.32	94.43	.86	2.1	1.9	313	80	75	4		
20	1:20	98.15	98.26	.88	2.2	2.0	312	80	75	4		
25	1:25	101.95	102.09	.86	2.1	1.9	304	81	77	4½		
30	~~1:30~~ 1:28	~~105.75~~	105.274	.86	2.1	2.0	306	81	78	4¾		
	Time 28 minutes											
	For Moisture		35.526	= 19.48	% H_2O							
	For Filter		V_m						76.05			
			22.071									

COMMENTS: A NEW FILTER WAS USED AFTER IT WAS DISCOVERED THAT THE NOZZLE WAS NOT DIRECTED INTO THE FLOW. THE MOISTURE TRAIN WAS NOT RECOVERED, THEREFORE THE TOTAL VOLUME OF GAS AND TOTAL mLS of H_2O collected were used TO CALCULATE % H_2O

EPA (Dist 235 1-77

I-157

(OVER)

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-20-81
Sampling Location Outlet Name White
Run Number 0-1-4

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.)

```
014
  0.75  1.90 307
  75   75
  0.85  2.00 313
  76   74
  0.86  1.90 313
  80   75
  0.88  2.00 312
  80   75
  0.86  1.90 304
  81   77
                  5
  0.81  2.00 306
  81   78

I. VOL=83.205
F. VOL.=105.274
M FACTOR=1.006
B. P.=29.08
STATIC P.=-0.94
% O2=14.8
% CO2=4.3
% H2O=  19.48
CP=   0.84
TIME=  28.00
NOZZLE D.=0.253
NET VOL.=22.2034
26
DS VOL.=  21.304
STACK P=  29.210
AVE M T=  77.290
DP=   0.913
DH=   1.950
ST T.= 309.166
DRY MW=  29.280
WET MW=  27.082
% ISO= 104.441
STACK V.= 3895
```

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. 0-1-4
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M. Cahill

Filter No. 17-7
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]	253	109	2	1	
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	153	9	2	1	
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 174.9

SILICA GEL

	722.3	
	712.4	
	9.9	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN C-2-1

MRI Project Number 4591-L83
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-26-71

FIELD CREW

Crew Chief Walker

Testing Engineer 1 United
2
3

Engr. Technician 1
2
3

Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-26-81

SAMPLING LOCATION Outlet (O-2-1)

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.94
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	75
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	19
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.18
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in. H_2O)	P_s	29.13
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.998
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	295
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.6
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	—
C FACTOR		0.77
CALCULATED NOZZLE DIAMETER, in.		0.270
ACTUAL NOZZLE DIAMETER, in.		0.251
REFERENCE Δp, in. H_2O		0.85

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Boiler — Date 10-26-81
Sampling Location Outlet — Initial CW
Test Number 0-2-1 #6

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

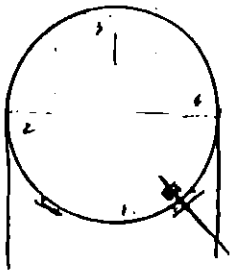
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	75
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.81
Nozzle diameter, inches	Dn	.251
Barometric pressure, inches Hg	Pb	29.18
$\frac{5.168\ (75 + 460)\ (5)\ (.97)\ (.81)\ (.251^2)}{\sqrt{29.18}}$	K	109.702

FIELD DATA

PLANT Bowen
DATE 10-26-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-2-1
OPERATOR Whitfield
AMBIENT TEMPERATURE 48
BAROMETRIC PRESSURE 29.18
STATIC PRESSURE (P_s) ~~-.94~~ 20" H_2O -.6
FILTER NUMBER(s) 12



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 7' S
NOZZLE I.D. 0.251
ASSUMED MOISTURE, % 19%
SAMPLE BOX NUMBER —
METER BOX NUMBER 4
TEMPERATURE METER NO. 9519
METER ΔH@ 1.74
METER CORRECTION 1.006
C FACTOR 0.77
REFERENCE Δp 0.85"

LEAK CK: Initial at ~~15~~ 20" Hg, CFM 0.005
Final at 15½ Hg, CFM 0.015

Read and Record All Data Every 5 Minutes

$VM = 109.202 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 294.090 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 / 1000											
	5 / 1005	296.77	296.82	.45	.97	.97	291	62	62	4		
	10 / 1010	299.63	299.74	.52	1.1	1.1	288	72	65	5		
	15 / 1015	302.44	302.59	.49	1.0	0.98	288	80	69	4½		
	20 / 1020	305.24	305.40	.49	1.0	.97	291	84	71	5		
	25 / 1025	308.08	308.19	.50	1.1	.98	292	86	71	5		
	30 / 1030	310.90	310.95	.50	1.1	.97	290	88	72	5		
	35 / 1035	313.78	313.78	.52	1.1	1.0	293	91	80	5		
	40 / 1040	316.60	316.60	.50	1.1	1.0	294	93	81	5		
	45 / 1045	319.40	318.39	.49	1.0	0.98	291	94	82	5½		
	50 / 1050	322.23	322.25	.50	1.1	0.99	290	95	83	6		
	55 / 1055	325.12	325.12	.52	1.1	1.0	283	97	84	6½		
	60 / 1100	327.95	327.97	.50	1.1	0.99	290	98	86	6½		
	65 / 1105	330.91	330.88	.55	1.2	1.1	295	98	87	7		
	70 / 1110	333.78	333.75	.52	1.1	1.0	299	98	87	7		
	75 / 1115	336.68	336.69	.53	1.1	1.1	297	100	90	7½		
	80 / 1120	339.42	339.55	.47	1.0	0.98	292	102	91	8		
	85 / 1125	342.37	342.57	.53	1.2	1.2	298	100	91	8½		
	90 / 1130	345.10	345.20	.47	1.0	0.98	296	102	91	8		
	95 / 1135	347.97	348.25	.52	1.1	1.0	297	99	91	8½		
	100 / 1140	350.90	351.10	.47	1.0	0.97	299	99	90	8½		
	105 / 1145	353.54	353.94	.51	1.1	1.0	297	99	89	10		
	110 / 1150	356.36	(OVER)	.50	1.1	0.98	295	97	88	10		

COMMENTS 17½ O_2 %
3.2 CO_2 %

EPA Dun 235
1 77

109.702 = K

TRAVERSE POINT NUMBER	SAMPLING TIME min / CLOCK TIME (24 hr CLOCK) 110		GAS METER READING (V_m, ft³) 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
	110	1160	356.36	356.78	.5	1.1	0.98	295	97	88	10		
	115	1155	359.32	359.62	.55	1.2	1.0	296	97	88	10½		
	120	1200	362.23	362.45	.53	1.1	1.0	294	99	88	11		
	125	1205	365.10	365.26	.52	1.1	0.98	297	100	89	11½		
	130	1210	367.83	368.12	.47	1.0	0.98	300	100	90	12		
	135	1215	370.91	371.13	.60	1.3	1.2	303	102	90	14		
	140	1220	373.91	374.210	.57	1.2	1.1	302	104	92	15½		
			Avg.	50.12	.5293		1.02	284.46		88.82			

Run Number 0-2-1B Date 10-26-81 Sampling Location Outlet

Comments:

EPA (Dun 236
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-26-81
Sampling Location Outlet Name United
Run Number 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.)

```
JOB
  0.53  1.00  1.94
  88   88

I. VOL=294.09
F. VOL.=374.31
M FACTOR=1.0..
B. P.=29.18
STATIC P.=-0.6
% O2=17.5
% CO2=3.2
MLS H2O=403.8
% H2O=  20.0
CP=   0.84
TIME= 140.00
NOZZLE D.=0.2[illegible]
NET VOL.=80.[illegible]
2
DS VOL.=  75 [illegible]
STACK P=  29 1[illegible]
AVE M T=  88.[illegible]
FDP=   0.728
DH=   1.020
ST T.= 294.460
DRY MW=  29.212
WET MW=  26.962
% ISO=  94.088
STACK V.= 30[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 Bowen
Sample Location outlet
Sample Box No.
Sample Type

Run No. 0-2-1B
Sample Date 10-24-81
Recovery Date 10-26-81
Cleanup Person [illegible]

Filter No. 12
Sample No. [illegible]
Sample Material Description

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S	M	M	
Impinger Solution	H.O	H.O			
Final Volume (wt)[b]	378	195	10		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	278	95	10		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 403.8

SILICA GEL

	758.2	
	737.4	
	20.8	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

100
96
102
80
378

92
103

MIDWEST RESEARCH INSTITUTE

METH-17

RUN 0-2-2 B

MRI Project Number 4891L-03
Field Dates
Plant BOILER
Sampling Location OUTLET
Sampling Date 10/27/81

FIELD CREW

Crew Chief WALKER

Testing Engineer 1 WHITED, E
2
3

Engr. Technician 1
2
3

Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT. Dow Corn

DATE 10-27-81

SAMPLING LOCATION OUTLET (0-2-28)

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.18
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.13
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.998
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	300
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.85 ~~0.62~~
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR		0.78
CALCULATED NOZZLE DIAMETER, in.		0.240
ACTUAL NOZZLE DIAMETER, in.		0.253
REFERENCE Δp, in. H_2O		0.78

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location OUTLET
Test Number 10-22-81 B

Date 10-22-81
Initial GL

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

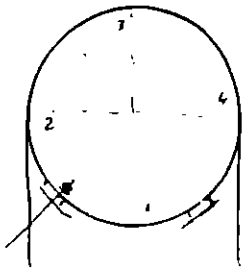
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	85
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.50
Nozzle diameter, inches	Dn	.253
Barometric pressure, inches Hg	Pb	29.18
$\frac{5.168\ (85 + 460)\ (.84)\ (5)\ (.5)\ (.253^2)}{\sqrt{29.18}}$	K	112.139

FIELD DATA

PLANT Bowen
DATE 10-27-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-2-2 B
OPERATOR Whited
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.18
STATIC PRESSURE (P_s) -.82
FILTER NUMBER(s) 19



PROBE LENGTH AND TYPE 7' S
NOZZLE I.D. .253
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER —
METER BOX NUMBER 4
TEMPERATURE METER NO. 9519
METER ΔH@ ~~1.006~~ 1.94
METER CORRECTION 1.006
C FACTOR 0.78
REFERENCE Δp 0.78

LEAK CK: Initial at 20" Hg, CFM 0.001
Final at 16½ Hg, CFM 0.000

Schematic of Traverse Point Layout
Read and Record All Data
Every 5 Minutes

$VM = 112.139 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 374.907 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
	0 0805											
	5 0810	378 85	378.90	1.0	2.3	2.3	310	58	58	4		
	10 0815	382.92	382.99	1.0	2.3	2.3	312	62	60	4		
	15 0820	387.15	387.44	1.1	2.6	2.6	312	64	65	4½		
	20 0825	391.58	391.79	1.2	2.8	2.6	307	67	68	5		
	25 0830	395.63	395.77	1.0	2.3	2.0	305	67	70	5		
	30 0835	400.06	400.19	1.2	2.8	2.6	310	67	70	7		
	35 0840	404.49	404.55	1.2	2.8	2.6	310	68	72	8		
	40 0845	408.54	408.56	1.0	2.3	2.0	307	71	72	8		
	45 0850	412.59	412.51	1.0	2.3	2.05	308	71	75	9½		
	50 0855	416.63	416.45	1.0	2.3	2.0	309	68	74	10½		
	55 0900	420.88	420.80	1.1	2.6	2.5	304	62	75	13		
	60 0905	425.13	425.135	1.1	2.6	2.4	305	65	75	15½		
	65					2						
	70	Avg	850.328	1.075		2.32	308.25	62.5	69.5			
	75											
	80											
	85											
	90											
	95											
	100											
	105											
	110											

COMMENTS: O_2 = ~~16~~ 16.661%
CO_2 = 4%
* 1 - 02.5"

EPA (Dun) 235
4 77

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/27/81
Sampling Location OUTLET Name ED
Run Number 0-2-2(B)

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.)

```
J225
3220
  1.07  2.32 338
  80  69

I. VOL=374.807
F. VOL.=425.135
M FACTOR=1.005
B. P.=29.18
STATIC P.=-0.4
% O2=16.667
% CO2=4.
MLS H2O=285.2
% H2O=  21.5
CP=   0.84
TIME=  60.00
NOZZLE D.=0.252
NET VOL.=50.3296
68
DS VOL.=  48 905
STACK P=  29 149
AVE M T=  76 320
FDP=   1.036
DH=   2.320
ST T.= 308.250
DRY MW=  29.106
WET MW=  26.36?
% ISO= 100.429
STACK V.= 44?-
```

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 Bowen
Sample Location outlet
Sample Box No.
Sample Type Mathis 17

Run No. 0-2-2B
Sample Date 10-27-81
Recovery Date 10-27-81
Cleanup Person Gabriel

Filter No. 17-13
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	H_2O	H_2O			
Final Volume (wt)[b]	297	171	5		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	197	71	5		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 305 g

SILICA GEL

	735.0	
	722.4	
	12.6	

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 / 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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

101
94
102
297

96
75
171

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN C-2-13

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location Outlet
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker

Testing Engineer 1 Whited
2
3

Engr. Technician 1
2
3

Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-22-81

SAMPLING LOCATION Outlet
0-2-3

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.94
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$Tm_{avg.}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	19
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.46
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.39
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.998
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	320
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.0
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR	0.77	
CALCULATED NOZZLE DIAMETER, in.	0.242	
ACTUAL NOZZLE DIAMETER, in.	0.249	
REFERENCE Δp, in. H_2O	0.875	

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Outlet
Test Number 0-2-3

Date 10-27-81
Initial CGL

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

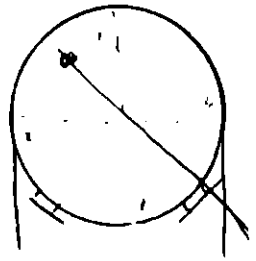
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.91
Nozzle diameter, inches	Dn	.249
Barometric pressure, inches Hg	Pb	29.46
$\frac{5.168\ (70 + 460)\ (.84)\ (.91)\ (5)\ (.249^2)}{\sqrt{29.46}}$	K	106.442

FIELD DATA

PLANT Bowen
DATE 10-22-91
SAMPLING LOCATION Outlet
SAMPLE TYPE Tatac Particulate
RUN NUMBER 0-2-3
OPERATOR Whited
AMBIENT TEMPERATURE 45
BAROMETRIC PRESSURE 29.46
STATIC PRESSURE (P_s) -.94 "H_2O
FILTER NUMBER(s) 17-11



PROBE LENGTH AND TYPE 40 "
NOZZLE I.D. .249
ASSUMED MOISTURE, % 18 %
SAMPLE BOX NUMBER
METER BOX NUMBER 4
TEMPERATURE METER NO. 9519
METER ΔH@ 1.94
METER CORRECTION 1.006
C FACTOR .77
REFERENCE Δp ~~.475~~ .550

LEAK CK: Initial at ~~15~~ 20 " Hg, CFM 0.02
Final at 20½ Hg, CFM 0.02

Schematic of Traverse Point Layout
Read and Record All Data
Every 5 Minutes

$VM = 106.442 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 258.422 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
	0 / 1105											
	5 / 1110	262.84	262.89	1.3	2.8	2.8	295	62	62	7		
	10 / 1115	267.44	267.52	1.4	3.0	3.0	290	76	66	7½		
	15 / 1120	271.67	271.79	1.2	2.6	2.5	299	80	66	7½		
	20 / 1125	276.24	276.35	1.4	3.1	2.8	298	83	70	9½		
	25 / 1130	280.64	280.71	1.3	2.8	2.6	300	82	70	10½		
	30 / 1135	285.21	285.22	1.4	3.0	2.8	301	83	71	13½		
	35 / 1140	289.61	289.60	1.3	2.8	2.6	297	85	72	15½		
	40 / 1145	293.84	293.785	1.2	2.6	2.4	298	84	71	17½		
		off								20½		
							297.25					
				1.312		2.6875		73.9375				

COMMENTS

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Sowin Date 10-22-81
Sampling Location Outlet Name Uhitco
Run Number 0-2-3

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.)

```
025
  1.31  2.68 297
  73  73

I. VOL=258.422
F. VOL.=293.785
M FACTOR=1.006
B. P.=29.46
STATIC P.=-0.94
% O2=17.853
% CO2=4.
ML'S H2O=186.
% H2O=  20.08
CP=   0.84
TIME=  40.00
NOZZLE D.=0.249
NET VOL.=35.5751
78
DS VOL.=  34.857
STACK P=  29.390
AVE M T=  73.937
TDP=   1.145
DH=   2.687
ST T.= 297.250
DRY MW=  29.353
WET MW=  27.073
% ISO=  97.800
STACK V.= 4814
```

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 Brown
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. C-3-B
Sample Date 10-22-81
Recovery Date 10-22-81
Cleanup Person _____

Filter No. 17-11
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	S	S	M	M	
Impinger Solution	H_2O	H_2O			
Final Volume (wt)[b]	254 ~~361~~ 416	123			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	154 ~~261~~ 316	23			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 184 gm

SILICA GEL

217.5
208.5
9.0
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

97
97
60
254

107
102
90
68
361

154
23
9
186

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN D-2-4C

MRI Project Number 4591-C83
Field Dates
Plant Bowen
Sampling Location Outlet
Sampling Date 10-30-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 White, E
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Boaz-4

DATE 10-30-81

SAMPLING LOCATION Outlet
0-2-4-C

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.54
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	75
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.06
STATIC PRESSURE IN STACK, in. Hg −.43 ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.03
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.999
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	295
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.84
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR	.75	
CALCULATED NOZZLE DIAMETER, in.	.250	
ACTUAL NOZZLE DIAMETER, in.	.251	
REFERENCE Δp, in. H_2O	.85	

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Outlet
Test Number 0-2-4-C

Date 10-30-81
Initial W

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

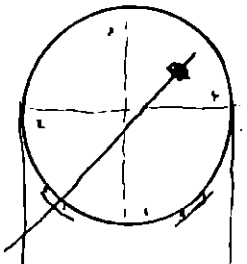
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	75
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.8
Nozzle diameter, inches	Dn	.251
Barometric pressure, inches Hg	Pb	29.06
$\frac{5.168\ (75 + 460)\ (.84)\ (.8)\ (5)\ (.251)^2}{\sqrt{29.06}}$	K	108.571

FIELD DATA

PLANT Bowen
DATE 10-30-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-2-4-C
OPERATOR Whited
AMBIENT TEMPERATURE 65
BAROMETRIC PRESSURE 22.06
STATIC PRESSURE, (P_s) -.43" H_2O
FILTER NUMBER (s) D-15



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 4' S
NOZZLE I.D. .251
ASSUMED MOISTURE, % 20%
SAMPLE BOX NUMBER —
METER BOX NUMBER 4 / 1.006
METER $\Delta H_@$ 1.94
C FACTOR 0.75
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp 0.85

Leak CK: Initial at ~~15~~ 20" Hg, CFM 0.001
Final at Hg, CFM 14" - 0.001

READ AND RECORD ALL DATA EVERY 5 MINUTES

VM = 106.57 x $\sqrt{\frac{Ps}{Ts + 460}}$

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
		484.140						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1130	Desired	Actual		DESIRED	ACTUAL						
	5 / 1135	487.68	487.75	.80	1.7	1.7	290	70	70	4		
	10 / 1140	491.10	491.16	.75	1.6	1.5	295	75	70	4½		
	15 / 1145	494.56	494.55	.77	1.7	1.5	299	78	71	4½		
	20 / 1150	498.09	498.04	.80	1.7	1.6	296	80	72	5		
	25 / 1155	501.57	501.57	.78	1.8	1.6	297	81	74	5½		
	30 / 1200	504.88	504.89	.70	1.5	1.4	293	81	75	5½		
	35 / 1205	508.17	508.10	.69	1.3	1.2	288	81	76	5½		
	40 / 1210	511.60	511.43	.75	1.6	1.5	290	79	75	6½		
	45 / 1215	516.20	515.19	.83	1.8	1.8	293	80	74	7		
	50 / 1220	518.74	518.70	.80	1.7	1.6	293	80	75	8½		
	55 / 1225	522.21	522.20	.77	1.7	1.6	294	80	75	9		
	60 / 1230	525.70	525.78	.78	1.8	1.7	294	81	76	10		
	65 / 1235	529.12	529.21	.75	1.6	1.5	294	81	75	10		
	70 / 1240	532.62	532.66	.79	1.7	1.55	295	79	85	11		
	75 / 1245	536.17	536.16	.81	1.7	1.6	299	82	76	12		
	80 / 1250	539.62	539.62	.76	1.6	1.6	294	83	76	13		

COMMENTS

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/30/81
Sampling Location OUTLET Name ED
Run Number 0-2-4(c)

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. VOL=484.14
F. VOL.=539.662
M FACTOR=1.006
B. P.=29.06
STATIC P.=-0.43
% O2=16.833
% CO2=3.833
ML'S H2O=280.45
% H2O=  19.79
CP=   0.84
TIME=  80.00
NOZZLE D.=0.251
NET VOL.=56.8551
32
DS VOL.=  53.520
STACK P=  29.028
AVE M T=  77.093
FDP=   0.877
DH=   1.559
ST T.= 275.933
DRY MW=  29.286
WET MW=  27.052
% ISO=  95.282
STACK V.= 3660
```

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 Bowen Constr Co
Sample Location outlet
Sample Box No. _____
Sample Type Meth 17

Run No. 0-2-4C
Sample Date 10-30-81
Recovery Date 10-30-81
Cleanup Person Gabriel

Filter No. 12-15
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]	270	196	1	0	
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	170	96	1		
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 280.45

SILICA GEL

	744.80	
	731.35	
	13.45	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

ANDERSEN MARK III (OUTLET PARTICLE SIZING)

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN 0-1-1B

MRI Project Number 4891-683
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-21-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Cobb, D.
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen Const. Co
Sampling Location Outlet Quad 1
Test No. 0-1-1B

Date 10-21-81
Initial DC

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		
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		

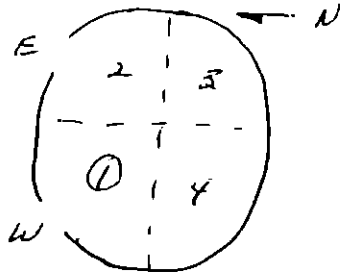
```
RUN I.D.  0-1-1B
DATE  10-21-8
%PS=0.8
TS=295.
B.P.=29.32
PS=29.28152
%H2O=18.
MF=0.82
MD=29.312
MS=27.27584
VS=3746.5164=8
DNC=1.553616+15E
-01
TM=60.
FS=0.49?222222
FM=2.781906511E-
01
VISCOSITY=250.64
44444
```

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 Beaver Const. Co
DATE 10-21-21
SAMPLING LOCATION Outlet/Quad 1
SAMPLE TYPE Port. Sizing
RUN NUMBER 0-1-1B
OPERATOR Cobb
AMBIENT TEMPERATURE 55
BAROMETRIC PRESURE 29.32
STATIC PRESSURE, (P_g) -.52
FILTER SET 34



CALCULATED ACFM (DESIRED) .278 (2.78/10 min)
PROBE TIP DIAMETER ~~.456~~ .446 c
CO_2 4
O_2 16.8
CO 0
N_2 79.2
% H_2O 18 assumed
METER CORRECTION (ΔY) 1.038
TEMP. METER NO. 95 F
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM .002
Final at 1" Hg, CFM .00

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)		GAS METER READING (V_m), ft^3 846.158		VELOCITY HEAD (Δp_g), 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	0925	Desired	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
Quad 1	10	0935	848.94	848.87	.78	.23	.23	287	59	56	1	N/A	N/A
	20	0945	851.72	851.79	.80		.24	284	62	58	1		
	30	0955	854.50	854.51	.80		.24	291	67	62	1		
	40	1005	857.28	857.33	.78		.24	292	70	65	1		
	50	1015	860.06	860.18	.78		.24	288	71	68	1		
	60	1025	862.84	—	.76		.23	283	71	69	1		
	70	1107	865.62	—	.73		.23	286	62	63	1		
	80	1117	868.40	868.46	.74		.23	281	68	65	1		
	90	1127	871.18	—	.73		.23	285	70	68	1		
	100	1137	873.96	874.00	.75		.23	283	71	69	1		
	110	1147	876.74	876.77	.75		.23	284	74	71	1		
	120	1157	879.52	879.54	.77		.23	284	75	74	1		

1026 – 1058

COMMENTS:
a] no nozzle retained
b] pressure down
c] slightly damaged nozzle

EPA (Dur) 235
4-72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Comb Co Date 10-21-81
Sampling Location Outlet Quad 1 Name DC
Run Number 0-1-1B

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. VOL=846.158
F. VOL.=879.54
M FACTOR=1.038
B. P.=29.32
STATIC P.=-0.52
% O2=16.8
% CO2=4.
MLS H2O=176.
% H2O= 19.59
CP= 0.84
TIME= 120.00
NOZZLE D.=0.146
NET VOL.=34.65056
16
DS VOL.= 34.024
STACK P= 29.281
AVE M T= 67.025
DP= 0.874
DH= 0.233
ST T.= 285.666
DRY MW= 29.312
WET MW= 27.085
% ISO= 119.895
STACK V.= 3650

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 Bowen
Sample Location Outlet
Sample Box No.
Sample Type

Run No. 10-1-1B
Sample Date 10-21-81
Recovery Date 10-21-81
Cleanup Person M. Gabriel

Filter No. 34
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	H_2O	H_2O			
Final Volume (wt)[b]	265	200	—	—	
Initial Volume (wt)[b]	100	100	—	—	
Net Volume (wt)[b]	165				
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 176 gm

SILICA GEL

	729.2	
	718.2	
	11.0	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

95
97
73
265

165
11
176

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN 0-1-2

MRI Project Number 4491-183
Field Dates
Plant Bruce
Sampling Location Inlet
Sampling Date 10-19-81

FIELD CREW

Crew Chief: Walker, T.

Testing Engineer: 1 Cobb, D.
2
3

Engr. Technician: 1
2
3

Lab Technician: 1 Gabriel, M.
2
3

Process Engineer: 1
2

Other: 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen Const. Co
Sampling Location Outlet/Quad 2
Test No. 0-1-2

Date 10-19-81
Initial DC

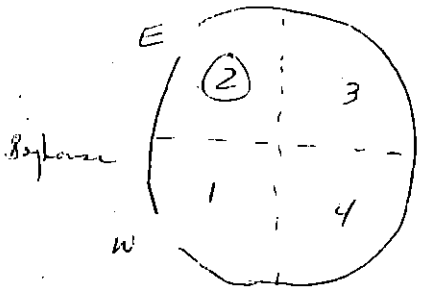
Velocity head at sampling location, in. H_2O	ΔPs	1.4
Stack temperature at sample point, °F	Ts	319
Barometric pressure, in. Hg	Pb	29.38
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	29.31
Percent moisture in gas stream by volume	% H_2O	17
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.83
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	29.29
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.37
Stack velocity, fpm $5{,}128.8\ (Cp)\ (\sqrt{\Delta Ps})\ \sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	5023
Calculated nozzle diameter, in. $Fs = .51$ $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.136
Actual nozzle diameter, in.	D_{n_a}	
Assumed meter temperature, °F	Tm	70
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	.261 / .272 a

a) meter in vert

WATERPROOF PAPER

FIELD DATA - ANDERSEN

PLANT Bayou Coal Co
DATE 10-19-21
SAMPLING LOCATION Outlet / Cyclone 2
SAMPLE TYPE Particle Sizing
RUN NUMBER 0-1-2
OPERATOR C.G.
AMBIENT TEMPERATURE 70
BAROMETHIC PRESURE 29.38
STATIC PRESSURE, (P_s) -.74
FILTER SET 31



CALCULATED ACFM (DESIRED) .292 / 2.92/10 min
PROBE TIP DIAMETER .137 (6 - 3.5)
CO_2 4.33
O_2 14.83
CO ~~.00~~ 0
N_2 80.84
% H_2O 17 assumed
METER CORRECTION (ΔY) 1.032
TEMP. METER NO. 5516
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM 0.0
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 1050	730.423										
0.82	10 / 1100	733.34	733.43	1.2	~~.28~~ [a]	.28 [a]	316	60	62	1	N/A	N/A
	20 / 1120	736.26	736.37	1.2	.28	.28	316	64	63	1		
	30 / 1130	739.18	739.31	1.2	.28	.28	299	64	64	1		
	40 / 1140	742.10	—	1.2	.28	.275	292	65	65	1		
	50 / 1150	745.02	745.16	1.2	.26	.27	291	70	67	1		
	60 / 1200	747.94	748.11	1.1	.28	.27	290	72	69	1		
	70 / 1210	750.86	751.04	1.1	.28	.27	286	71	70	1		
	80 / 1220	753.78	—	1.1	.26	.26	293	72	72	1		
	90 / 1230	756.70	756.94	.99		.26	287	72	72	1		
	100 / 1240	757.62	—	.99		.26	290	72	73	1		
	110 / 1250	762.54	762.52	.98		.25	297	74	74	1		
	120 / 1300	765.46	765.44	1.1		.26	300	72	73	1		
	130 / 1310	768.36	768.36	1.0		.25	303	70	72	1		
	140 / 1320	771.30	771.31	1.1		.26	301	72	72	1		
	150 / 1330	774.22	774.25	1.1		.26	304	68	72	1		
	160 / 1340	777.14	777.22	1.3		.26	298	69	70	1		
	170 / 1350	780.06	780.15	1.4		.255	311	70	70	1		
	180 / 1400	782.98	783.067	1.0		.25	307	71	70	1		

1100 / b / 1110 — I-193

COMMENTS:
[a] .27 .28
[b] trouble w/ pitot

EPA (Dun) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Coal Co. Date 10-19-81
Sampling Location Outlet/Unit 2 Name Cobb
Run Number 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.)

```
I. VOL=730.423
F. VOL.=783.067
M FACTOR=1.038
B. P.=29.38
STATIC P.=-0.94
% O2=14.83
% CO2=4.33
ML$ H2O=259.5
% H2O=  18.58
CP=   0.84
TIME= 180.00
NOZZLE D.=0.137
NET VOL.=54.6444
T2
DS VOL.=  53.531
STACK P=  29.310
AVE M T=  69.388
√DP=   1.059
DH=   0.263
ST T.= 298.944
DRY MW=  29.286
WET MW=  27.188
% ISO= 117.531
STACK V.= 4455
```

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 Rowe
Sample Location Outlet
Sample Box No. _____
Sample Type _____

Run No. C 1-1
Sample Date 10-16-81
Recovery Date 10-17-81
Cleanup Person [illegible]

Filter No. 31
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	Dry.	Dry.	
Final Volume (wt)[b]	347	100	0	0	
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	247	0	0	0	
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 259.5 gm

SILICA GEL

	771.3
~~754.2~~	746.8
	12.5

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

247
12.5
259.5

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~0-2-3~~ 116 0-1-3

MRI Project Number 4891-483
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Cobb, D
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen Coal Co.
Sampling Location Outlet / Quad 3
Test No. 0-2-3

Date 10-20-81
Initial AC

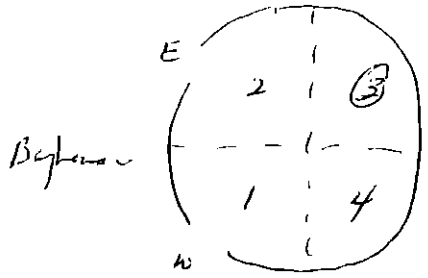
Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume		
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
Molecular 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.	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. 0-2-3
DATE 10-20-8
^PS=1.1
TS=305.
B.P.=29.06
PS=28.99044
%H2O=18.
MF=0.82
MD=29.28
MS=27.2496
VS=4446.46257
DNC=1.44207491BE-01
TM=70.
FS=5.043333335E-01
FM=2.858282545E-01
VISCOSITY=232.9666667

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Bowen Coal Co
DATE 10-22-81
SAMPLING LOCATION Outlet/Unit 3
SAMPLE TYPE Part. Size Dist
RUN NUMBER 1-1-3
OPERATOR Cobb
AMBIENT TEMPERATURE 60
BAROMETRIC PRESURE 29.06
STATIC PRESSURE, (P_g) -.44
FILTER SET ~~28~~ 32



CALCULATED ACFM (DESIRED) 1285 (2.85/10 min)
PROBE TIP DIAMETER ~~.447~~ .436
CO_2 4.33
O_2 14.83
CO 0
N_2 80.84
% H_2O 18 assumed
METER CORRECTION (ΔY) 1.038
TEMP. METER NO. 7518
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM .005
Final at 1 Hg, CFM 0.0

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 806	783.70 [1]										
2.Q3	10 / 816	786.55	786.55	1.5	.25	.25	302	59	58	1	N/A	N/A
	20 / 826	789.40	—	1.4		.25	301	62	60	1		
	30 / 836	792.25	—	1.4		.25	301	60	60	1		
	40 / 848	795.10	795.15	1.5		.25	303	63	62	1		
	50 / 858	797.95	~~798.03~~ 798.03 [2]	1.6		.25	302	64	62	1		
	60 / 908	800.80	800.90	1.5		.245	300	64	63	1		
	70 / 918	803.65	803.75	1.5		.24	289	66	65	1		
	80 / 928	806.50	806.57	1.4		.24	292	66	65	1		
	90 / 938	809.35	809.42	1.4		.24	297	64	65	1		
	100 / 948	812.20	812.30	1.3		.24	297	65	64	1		
	110 / 958	815.05	815.09	1.1		.23	297	64	64	1		
	120 / 1008	817.90	817.90	1.2		.23	297	64	64	1		
	130 / 1018	820.75	820.77	1.2		.24	299	65	64	1		
	140 / 1028	823.60	823.67	1.3		.24	301	66	65	1		
	150 / 1038	826.45	826.55	1.6		.24	302	67	66	1		

COMMENTS:
[1] 783.70
[2] 798.03

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Const. Co Date 11-20-81
Sampling Location Outlet/Quad 3 Name D.C
Run Number C-1-3

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.)

```
I. VOL=783.7
F. VOL.=826.55
M FACTOR=1.038
B. P.=29.06
STATIC P.=-0.94
% O2=14.83
% CO2=4.33
ML'S H2O=198.9
% H2O=  17.69
CP=   0.84
TIME= 150.00
NOZZLE D.=0.136
NET VOL.=44.4783
DS VOL.=  43.977
STACK P=  28.990
AVE M T=  63.533
√DP=   1.178
DH=   0.242
ST T.= 298.666
DRY MW=  29.286
WET MW=  27.289
% ISO= 104.337
STACK V.= 4973
```

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 Bowen
Sample Location Outlet
Sample Box No. _____
Sample Type _____

Run No. 0-1-3
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M. Gabriel

Filter No. 32
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	dry	dry	
Final Volume (wt)[b]	290	100			
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	190	0	0	0	
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution X
Total Moisture, gm 198.9

SILICA GEL

786.2		
717.3		
68.9		

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

190
68.9
198.9

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen N/K III

RUN 0-1-4

MRI Project Number 4891-L83
Field Dates
Plant Bowen Con.
Sampling Location outlet
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker T

Testing Engineer 1 Cobb. D
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen Const. Co. Date 10-22-81
Sampling Location Outlet / Quad 4 Initial DC
Test No. 0-1-4

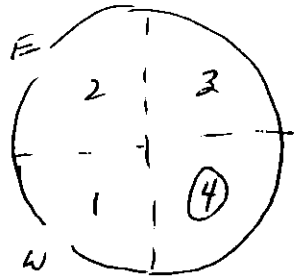
Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
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.	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. 0-1-4
DATE 10-22-81
MS=0.88
TS=290.
B.P.=29.45
PS=29.42152
%H2O=18.
MF=0.82
MD=29.352
MS=27.30864
VS=2904.6708??
DNC=1.51322327??E-01
TM=60.
FS=1.8766666 .E-01
FM=2.7683261..E-01
VISCOSITY=22 .75 ?????

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Bowen Coal Co.
DATE 10-22-81
SAMPLING LOCATION Outlet Run 4
SAMPLE TYPE Part. S.C. #4
RUN NUMBER 0-1-4
OPERATOR Cobb
AMBIENT TEMPERATURE 60
BAROMETRIC PRESURE ~~29.37~~ 29.46
STATIC PRESSURE, (P_g) -.52
FILTER SET 35



CALCULATED ACFM (DESIRED) ~~.28~~ .277 (.277 ft³/min.)
PROBE TIP DIAMETER ~~.156~~ .146 6/
CO_2 4
O_2 ~~16.8~~ 17.8
CO 0
N_2 78.2
% H_2O 16 assumed
METER CORRECTION (ΔY) 1.038
TEMP. METER NO. 9518
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM 0.002
Final at 1" Hg, CFM 0.0

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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
		880.006						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / ~~0867~~	Desired	Actual		DESIRED	ACTUAL						
Run 4	10 0817	882.76	882.78	.87	.23	.23	286	47	45	1	N/A	N/A
	20 0827	885.55	885.40	.87		.23	284	52	47	1		
	30 0837	888.32	888.12	.90		.24	286	55	52	1		
	40 0847	891.09	891.92	.85		.25	282	55	53	1		
	50 0857	893.86	—	.85		.25	286	55	54	1		
	60 0907	896.63	896.55	.83		.25	280	56	55	1		
	70 0917	899.40	—	.85		.25	280	57	56	1		
	80 0927	902.17	—	.86		.25	279	59	57	1		
	90 0937	904.94	905.02	.83		.25	280	59	58	1		
	100 0947	907.71	—	.83		.24	280	60	59	1		
	110 0957	910.48	910.60	.78		.24	279	61	60	1		
	120 1007	913.25	913.40	.85		.24	280	61	61	1		

I-203

COMMENTS: ~~.28~~ .277 orfice
6/ slightly damaged nozzle

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Const. Co Date 10-22-81
Sampling Location Outlet/Unit 2 Name DE
Run Number 0-1-4

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.)

I. VOL=880.006
F. VOL.=913.4
M FACTOR=1.038
B. P.=29.46
STATIC P.=-0.52
% O2=17.8
% CO2=4.
MLS H2O=161.1
% H2O= 17.85
CP= 0.84
TIME= 120.00
NOZZLE D.=0.146
NET VOL.=34.56292
DS VOL.= 34.964
STACK P= 29.421
AVE M T= 95.500
PIP= 0.920
DH= 0.243
ST T.= 281.833
DRY MW= 29.352
WET MW= 27.327
% ISO= 114.412
STACK V.= 3809

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. 0-1-4
Sample Date 10-22-81
Recovery Date 10-22-81
Cleanup Person M. Gabriel

Filter No. 35
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]	251	104	1		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	151	4	1		
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 161.1

SILICA GEL

733	733	
729.2	729.2	
5.1	5.1	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN O-2-1

MRI Project Number 4891-L(83)
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-30-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Hansen, M.
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M.
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Outlet
Test No. O-2-1

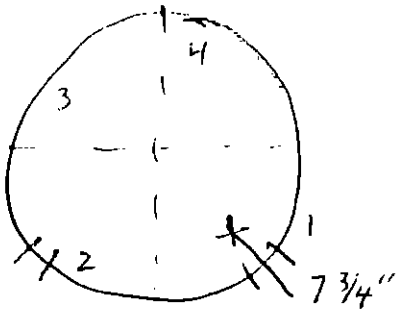
Date 10-30-81
Initial MDH

Velocity head at sampling location, in. H_2O	ΔPs	.72
Stack temperature at sample point, °F	Ts	294
Barometric pressure, in. Hg	Pb	29.06
Static pressure in stack, in. Hg (Pb) ± (0.074 x gage pressure, in. H_2O) +.43	Ps	29.09
Percent moisture in gas stream by volume assumed	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.80
Molecular wt. dry stack gas, lb/lb-mole $O_2 = 16.933$ $CO_2 = 3.833$ (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28)	Md	29.29
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.03
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3580
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.159
Actual nozzle diameter, in.	D_{n_a}	.156 61-4.0
Assumed meter temperature, °F	Tm	80
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.492
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.282

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Bacon
DATE 10-30-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Particulate
RUN NUMBER 0-2-1
OPERATOR M. Hansen
AMBIENT TEMPERATURE 72°F
BAROMETRIC PRESURE 29.06
STATIC PRESSURE, (P_s) +.43
FILTER SET 40



CALCULATED ACFM (DESIRED) .282
PROBE TIP DIAMETER .156" (6/1-4.0)
CO_2 3.833
O_2 16.833
CO –
N_2
% H_2O 20 assumed
METER CORRECTION (ΔY) 1.038
TEMP. METER NO. 9518
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM 0.00
Final at 15" Hg, CFM 0.00

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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			
2-1	0 / 1130	58.60										
	10 / 1140	~~58.68~~ 61.42	61.42	.77	.245	.245	295	82	79	<1	NH	NH
	20 / 1150	64.24	64.28	.75			295	83	80	<1		
	30 / 1200	67.06	67.15	.70			298	80	80	<1		
	40 / 1210	69.86	70.01	.71			289	78	78	<1		
	50 / 1220	72.70	72.87	.73			290	80	79	<1		
	60 / 1230	75.52	75.74	.73			293	83	81	<1		
	70 / 1240	78.34	78.60	.74			294	84	81	<1		
	80 / 1250	81.16	81.45	.73			298	86	83	<1		
	90 / 1300	83.95	84.32	.71			293	85	83	<1		
	100 / 1310	86.80	87.13	.68			297	84	84	<1		
	110 / 1320	89.62	90.02	.68			291	84	83	<1		
	120 / 1330	92.44	92.92	.68	↓	↓	291	84	83	<1	↓	↓
				ΔP=.72								
		V_m=34.32					T_s=293.7					
								T_m=	82			

I-208

COMMENTS:

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-30-81
Sampling Location Outlet Name Hansen, M.
Run Number 0-2-1

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. VOL=58.6 0-2-1
F. VOL.=92.92
M FACTOR=1.038
B. P.=29.06
STATIC P.=0.43
% O2=16.833
% CO2=3.833
ML'S H2O=149.6
% H2O=  17.28
CP=   0.84
TIME= 120.00
NOZZLE D.=0.156
NET VOL.=35.6241
6
DS VOL.=  33.716
STACK P=  29.091
AVE M T=  81.958
FDP=   0.846
DH=   0.245
ST T.= 293.666
DRY MW=  29.286
WET MW=  27.335
% ISO= 105.777
STACK V.= 3551
```

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 Bowen
Sample Location Outlet
Sample Box No. _____
Sample Type MK III

Run No. 0-2-1
Sample Date 10-30-91
Recovery Date 10-30-91
Cleanup Person C.A.L.

Filter No. 40
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]	238	102			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	138	2			
Sample No.(s)					

Combined impinger contents, Sample No. ~~240~~ 149.6
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm _____

SILICA GEL

	738.5	
	728.9	
	9.6	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN 0-2-2

MRI Project Number 4891-283
Field Dates
Plant Bowen Coal Co.
Sampling Location Outlet Duct 2
Sampling Date 10-22-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Cobb, D
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen Coal Co
Sampling Location Outlet / Annulus
Test No. 0-2-2

Date 11-22-81
Initial DC

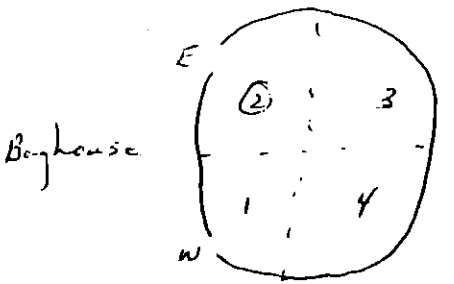
Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume		
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
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.	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. O-[illegible]
DATE 10 '22/
PS=0.98
TS=290.
B.P.=29.46
PS=29.42152
%H2O=18.
MF=0.82
MD=29.352
MS=27.30864
VS=4120.5589[illegible]
DNO=1.473057[illegible]E-01
TM=60.
FS=4.8766666[illegible]E-01
FM=2.768[illegible]E-01
VISCOSITY=22.[illegible]
[illegible]

WATERPROOF PAPER

FIELD DATA - ANDERSEN

PLANT Brown Coal Co
DATE 10-22-91
SAMPLING LOCATION Outlet Quad 2
SAMPLE TYPE Vel. 5:2 min
RUN NUMBER 10-22-2
OPERATOR Cobb
AMBIENT TEMPERATURE 57
BAROMETRIC PRESURE 29.46
STATIC PRESSURE, (P_g) -.52
FILTER SET 36



CALCULATED ACFM (DESIRED) .277 (2.77/10 min)
PROBE TIP DIAMETER ~~.156~~ .146 4
CO_2 4
O_2 17.8
CO 0
N_2 ~~78.2~~
% H_2O 18 assumed
METER CORRECTION (ΔY) 1.038
TEMP. METER NO. 9518
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM 0.002
Final at 1" Hg, CFM 0.00

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 1100	913.605										
Quad 2	10 1110	916.38	916.18	.99	.24	.25	292	57	57	1	N/A	N/A
	20 1120	919.15	920.01	1.2		.25	297	60	59	1		
	30 1130	921.92	921.80	1.1		.24	295	61	59	1		
	40 1140	924.69	924.56	.98		.24	294	62	60	1		
	50 1150	927.46	927.48	1.1		.24	301	62	62	1		
	60 1200	930.23	930.18	1.1		.24	307	64	62	1		
	70 1210	933.00	932.98	.98		.24	301	65	64	1		
	80 1220	935.77	935.75	1.1		.24	297	66	65	1		
1248	90 1230	938.54	—	1.1		.24	294	66	66	1		
4 *	100 1240	941.31	941.34	1.1		.24	290	68	67	1		
	110 1254	944.08	944.08	1.1		.23	294	68	67	1		
1252	120 1304	946.85	946.83	1.1		.23	295	66	67	1		

I-213

COMMENTS:
4) equipment problem
6) slightly damaged nozzle

EPA (Dun) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Brown Const. Co. Date 10-22-81
Sampling Location Outlet/Quad 2 Name Cobb
Run Number 0-2-2

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.)

I. VOL=913.605
F. VOL.=946.883
M FACTOR=1.038
B. P.=29.46
STATIC P.=-0.52
% O2=17.8
% CO2=4.
ML'S H2O=166.4
% H2O= 18.59
CP= 0.84
TIME= 120.00
NOZZLE D.=0.146
NET VOL.=34.5425
64
DS VOL.= 34.321
STACK P= 29.421
AVE M T= 63.333
FMP= 1.038
DH= 0.240
ST T.= 296.416
DRY MW= 29.352
WET MW= 27.241
% ISO= 101.303
STACK V.= 4345

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. 0-2-3
Sample Date 10-22-81
Recovery Date 10-22-81
Cleanup Person Caldwell

Filter No. 136
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]	263	97	1	—	
Initial Volume (wt)[b]	100	100	0	—	
Net Volume (wt)[b]	163	-3	1	—	
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 166.4

SILICA GEL

	739.7	
	734.3	
	5.4	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN D-2-3

MRI Project Number 4991-L83
Field Dates
Plant Bowin Const Co.
Sampling Location Outlet/Cyd. 3
Sampling Date 10-27-81

FIELD CREW

Crew Chief: Walker, T

Testing Engineer: 1 Cobb, D.
2
3

Engr. Technician: 1
2
3

Lab Technician: 1 Gabriel, M.
2
3

Process Engineer: 1
2

Other: 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen Const Co
Sampling Location Outlet Quad 3
Test No. 0-2-3

Date 10-27-81
Initial DC

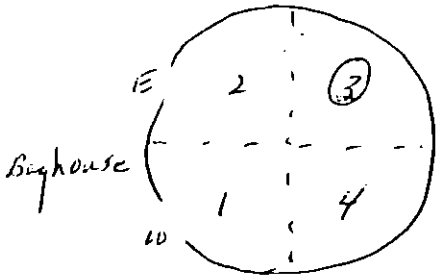
Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	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. 0-2-3
DATE 10-27-
PS=1.5
TS=300.
B.P.=29.19
PS=29.15892
%H2O=18.
MF=0.82
MD=29.3448
MS=27.304376
VS=5155.2013..7
DNC=1.331885.925
-01
TM=70.
FS=0.4987777
FM=2.8421844 -F-
01
VISCOSITY=23..7
55856

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Dawson Const. Co.
DATE 10-27-21
SAMPLING LOCATION Outlet/Unit 3
SAMPLE TYPE Part. Sizing
RUN NUMBER 0-1-3
OPERATOR Cobb
AMBIENT TEMPERATURE 60
BAROMETRIC PRESURE 29.19
STATIC PRESSURE, (P_g) -.42
FILTER SET 38



CALCULATED ACFM (DESIRED) .285
PROBE TIP DIAMETER .137
CO_2 4.6
O_2 17.67
CO 0
N_2 78.33
% H_2O 18 Assumed
METER CORRECTION (ΔY) 1.038
TEMP. METER NO. 2518
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM 0.0
Final at 1" Hg, CFM 0.001

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 0805	989.608										
Unit 3	10 / 0815	992.46	992.32	1.5	.23	.23	305	65	60	1	N/A	N/A
	20 / 0825	995.31	995.02	1.6		.23	313	72	66	1		
	30 / 0835	998.16	997.84	1.7		.23	312	71	69	1		
	40 / 0845	1001.01	1000.73	1.5		.24	307	74	72	1		
	50 / 0855	3.86	3.62	1.5		.24	303	72	74	1		
	60 / 0905	6.71	6.51	1.6		.25	299	67	72	1		
	70 / 0915	9.56	9.37	1.6		.24	302	67	71	1		
	80 / 0925	12.41	12.23	1.5		.24	302	66	70	1		
	90 / 0935	15.26	—	1.5		.24	301	66	69	1		
	100 / 0945	18.11	17.93	1.5		.24	300	68	70	1		
	110 / 0955	20.96	—	1.5		.24	303	68	71	1		
	120 / 1005	1023.81	1023.612	1.5		.24	304	67	70	1		

COMMENTS:

EPA (Dun) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Const Co. Date 10-27-81
Sampling Location outlet 10 and 3 Name RC
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.)

T. VOL=959.639
P. VOL.=1023.812
M FACTOR=1.068
B. P.=29.19
STATIC P.=-0.42
% O2=17.67
% CO2=4.
ML'S H2O=199.2
% H2O= 21.34
CP= 0.84
TIME= 120.00
NOZZLE D.=0.137
NET VOL.=35.50375
2
DS VOL.= 34.575
STACK P= 29.189
AVE M T= 68.083
FIP= 1.241
DH= 0.258
ST T.= 304.033
DRY MW= 29.546
WET MW= 26.924
% ISO= 100.709
STACK V.= 5276

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type Mark III

Run No. D-2-3
Sample Date 10-27-81
Recovery Date 10-27-81
Cleanup Person Gabriel

Filter No. 38
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]	289	100	2	2	
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	189	0	2	2	
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 193.2

SILICA GEL

	720.9
709.	714.7
	6.2

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen N/K III

RUN 0-2-1

MRI Project Number 4591-253
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-26-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Cobb, D
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M.
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen Const Co
Sampling Location Outlet / Quad 4
Test No. 0-2-4

Date 10-26-81
Initial GE

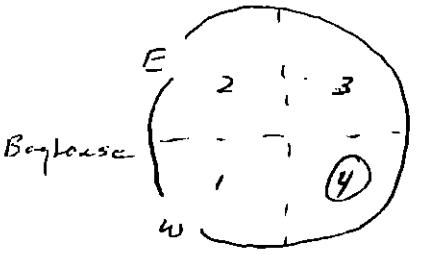
Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume		
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
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.	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. 0-2-4
DATE 10/26/8
DPS=0.9
TS=288.
B.P.=29.18
PS=29.1356
%H2O=1.8
MF=0.82
MD=29.212
MS=27.19384
VS=3971.182591
DNC=1.497083925E
-01
TM=65.
FS=4.854444[illegible]E-
01
FM=2.7886503[illegible]E-
01
VISCOSITY=204.08
58869

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Bowen Const. Co
DATE 10-26-81
SAMPLING LOCATION Outlet / Aug. 4
SAMPLE TYPE Part. 3:2 Vg
RUN NUMBER 0-2-4
OPERATOR Cobb
AMBIENT TEMPERATURE 60
BAROMETRIC PRESURE 29.18
STATIC PRESSURE, (P_g) -.6
FILTER SET 37



CALCULATED ACFM (DESIRED) .279
PROBE TIP DIAMETER .456
CO_2 3.2
O_2 12.5
CO 0
N_2 79.3
% H_2O 18 @ 55 condensed
METER CORRECTION (ΔY) 1.038
TEMP. METER NO. 9518
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM .010
Final at 1" Hg, CFM .000

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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
	0	1000	Desired 947.104	Actual		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
Run 4	10	1010	949.89	949.87	.88	.25	.25	285	62	62	1	N/A	N/A
	20	1020	952.68	—	.90		.24	286	69	64	1		
	30	1030	955.47	955.48	.90		.25	286	70	66	1		
	40	1040	958.26	958.31	.91		.25	286	75	69	1		
	50	1050	961.05	961.24	.95		.25	285	80	73	1		
	60	1100	963.84	964.07	.95		.24	286	83	77	1		
	70	1110	966.63	966.93	.94		.24	293	83	78	1		
	80	1120	969.42	969.78	.90		.24	293	85	80	1		
	90	1130	972.21	—	.90		.23	294	86	81	1		
	100	1140	975.00	—	.93		.23	298	85	82	1		
	110	1150	977.79	978.12	.92		.23	295	86	83	1		
	120	1200	980.58	980.96 [a]	.89		.23	294	84	82	1		
	130	1210	983.37	—	.85		.23	299	90	85	1		
	140	1220	986.16	986.53	.92		.23	303	88 [b]	86	1		
	150	1230	988.95	989.338	.92		.23	301	88	86	1		
			Avg.	42.234	.9107		0.238	292.267		78.93			

COMMENTS:
[a] 980.96
[b] 88

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Dawson Coal Co. Date 10-26-81
Sampling Location Outlet Quad 4 Name EW
Run Number 0-2-4

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.)

```
324
  0.91  0.23 292
  T8  T8

I. VOL=947.104
F. VOL.=989.553
M FACTOR=1.038
B. P.=29.18
STATIC P.=-0.6
% O2=17.5
% CO2=3.2
ML'S H2O=177.
% H2O=  16.59
CP=   0.84
TIME= 150.00
NOZZLE D.=0.256
NET VOL.=43.8388
92
DS VOL.=  41.295
STACK P=  29.135
AVE M T=  78.930
VP=   0.954
DH=   0.258
ST T.= 292.2ET
DRY MW=  29.212
WET MW=  27.351
% ISO=  92.49
STACK V.= 3994
```

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 Bowen | Run No. C-2-4
Sample Location outlet | Sample Date 10-26-81
Sample Box No. | Recovery Date 10-26-81
Sample Type | Cleanup Person MG-ABW

Filter No. 37
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]	342.5	59.5	1	1	
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	242.5	-40.5	1	1	
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked | Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 177.0

SILICA GEL

714.7
239.7
- 25.0
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 | Date Shipped:
Remarks:

Date of laboratory custody | Seal(s) broken by
Personnel accepting custody | Date broken
Remarks:

UNUSED ACCEPTABLE METHOD 5 RUN

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-2-H

MRI Project Number 4891-L83
Field Dates
Plant
Sampling Location baghouse inlet
Sampling Date 10-19-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Shultz, B
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabrael, M
2
3

Process Engineer 1
2

Other 1 Lacy, D.
2.

NOMOGRAPH DATA

PLANT Bowen

DATE 10-19-81

SAMPLING LOCATION Baghouse Inlet
I-1-A

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	21
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.38
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O) -7.05" H_2O	P_s	29.16
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.992
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	353
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.91
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.40
C FACTOR		.75
CALCULATED NOZZLE DIAMETER, in.		.250
ACTUAL NOZZLE DIAMETER, in. #10		.250
REFERENCE Δp, in. H_2O		.91

EPA (Dur) 234
4 72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Inlet
Test Number I-1 (A)

Date 10-19-81
Initial BCS

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

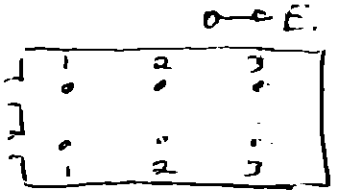
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	85
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	2
Mole fraction dry gas	Mf	.79
Nozzle diameter, inches	Dn	.25
Barometric pressure, inches Hg	Pb	29.38
$\frac{5.168\ (85 + 460)\ (.84)\ (2)\ (.79)\ (.25^2)}{\sqrt{29.38}}$	K	43.106

FIELD DATA

PLANT Bowen
DATE 10-19-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Particulate
RUN NUMBER 1-1 (A)
OPERATOR RLS
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE 29.38
STATIC PRESSURE, (P_s) -3.05
FILTER NUMBER (s)



PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. #10 .250
ASSUMED MOISTURE, % 21
SAMPLE BOX NUMBER 3
METER BOX NUMBER 2
METER $\Delta H_@$ 1.84
C FACTOR .75
PROBE HEATER SETTING Max
HEATER BOX SETTING 300
REFERENCE Δp .91

Leak CK: Initial at 15" Hg, CFM Zero
Final at Hg, CFM .004

SCHEMATIC OF TRAVERSE POINT LAYOUT
READ AND RECORD ALL DATA EVERY 2 MINUTES

$VM = 43.106 \times \sqrt{\frac{Ps}{Ts + 460}}$

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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
~~1-1~~	0	1032		700.990	~~1.20~~			~~345~~					
~~1-2~~													
~~1-3~~													
1-3	2	1034	702.65	702.57	1.20	2.4	2.4	345	62	65	8	185	
#					1.05	2.1	2.1	355	64	65	6	163	
1-2	4	1036	704.20	704.13									
1-1	6	1038	705.21	705.25	.44	.91	.95	341	66	65	4	151	
		Stop											
	Start	1045											
2-3	8	1047	706.88	706.49	1.20	2.4	2.4	343	65	65	5.5	118	
2-2	10	1049	708.24	707.85	.85	1.75	1.8	339	67	65	7		
2-1	12	1051	709.31	709.096	.45	.92	1.1	343	68	65	5	107	
			V_m=	8.106		ΔH_{avg}=	1.685	$T_{s\,avg}$=	344.3	$T_{m\,avg}$=	65.2		
					$\sqrt{\Delta p_s}_{avg}$= .912								

COMMENTS

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/9/81
Sampling Location INLET Name RGS
Run Number I-1 (B)

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. VOL=700.99
F. VOL=709.056
M FACTOR=1.034
LK CK=0.004
B. P=29.38
STATIC P=-3.05
%02=14.7
%CO2=5.
MLS H2O=43.7
% H2O= 19.85
CP= 0.84
TIME= 12.00
NOZZLE D=0.25
NET VOL=8.381604
DS VOL= 8.305
STACK P= 29.153
AVE M T= 65.166
TDP= 0.911
DH= 1.658
ST T= 344.333
DRY MW= 29.388
WET MW= 27.126
% ISO= 99.979
STACK V= 3962

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 Bowen
Sample Location mid F
Sample Box No. 3
Sample Type

Run No. I-2 (A)
Sample Date 10-19-81
Recovery Date
Cleanup Person

Filter No. 105
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	dry		
Final Volume (wt)[b]	135	125	0		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	35	5	0		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 43.7

SILICA GEL

	722.1	
	723.8	
	1.7	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

UNACCEPTABLE METHOD 5 RUNS

MIDWEST RESEARCH INSTITUTE

Method 5

RUN I-28

MRI Project Number 4891-L83
Field Dates
Plant Rowen
Sampling Location inlet
Sampling Date 10-19-81

FIELD CREW

Crew Chief Wickes, T

Testing Engineer 1 Bob Stutz
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-19-81

SAMPLING LOCATION Baghouse Inlet
I-1-B

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	21
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.24
STATIC PRESSURE IN STACK, in. Hg $-3"$ H_2O ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.02
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.992
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	344
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.87
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.20
C FACTOR		.74
CALCULATED NOZZLE DIAMETER, in.		.250
ACTUAL NOZZLE DIAMETER, in.		.251
REFERENCE Δp, in. H_2O		.92

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Baghouse Inlet
Test Number I-1 B

Date 10-19-81
Initial RCS

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

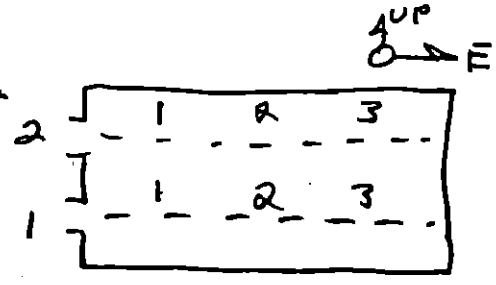
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	2
Mole fraction dry gas	Mf	.79
Nozzle diameter, inches	Dn	.251
Barometric pressure, inches Hg	Pb	29.24
$\frac{5.168\ (70 + 460)\ (.84)\ (2)\ (.91)\ (.251^2)}{\sqrt{29.24}}$	K	52.007

FIELD DATA

PLANT Bowen
DATE 10-19-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Particulate
RUN NUMBER I-1B
OPERATOR RCS
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 29.24
STATIC PRESSURE (P_s) -3.0
FILTER NUMBER(s)



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. # .251
ASSUMED MOISTURE, % 21
SAMPLE BOX NUMBER 10
METER BOX NUMBER 2
TEMPERATURE METER NO.
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR .74
REFERENCE Δp .92

LEAK CK: Initial at 15" Hg, CFM .002 Read and Record All Data
Final at 12" Hg, CFM .002 Every 2 Minutes

VM = 52.007 x $\sqrt{\frac{\Delta Ps}{Ts + 460}}$

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 1500		717.550									
1-3	2 1502	719.04	718.78	.62	1.25	1.3	298	70	71	8	114	
1-2	4 1504	720.77	720.19	.85	1.7	1.9	308	73	72	11		
1-1	6 1506	721.90	721.33	.35	.72	.9	286	75	72	6	120	
	Start 1510											
2-3	8 1512	723.59	722.78	.88	1.8	2.0	298	76	73	12	130	
2-2	10 1514	725.13	724.18	.68	1.4	1.6	312	78	73	11	131	
2-1	12			.32	.67	1.0						
							300.4	73.3				
					ΔH=	1.45						
		Vm=	7.154									
				.617								

COMMENTS: Stop 1514:30 Vol. = 724.704

EPA Dwg 235
3 77

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOILER Date 10/19/81
Sampling Location INLET Name RCS
Run Number I-1-B

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-1-1(B
  0.61  1.45 300
  73  73

I. VOL=717.55
F. VOL.=724.704
M FACTOR=1.037
B. P.=29.24
STATIC P.=-3.
% O2=14.7
% CO2=5.07
ML% H2O=29.6
% H2O=  16.21
CP=   0.84
TIME=  14.50
NOZZLE D.=0.251
NET VOL.=7.41869
8
DS VOL.=   7.201
STACK P=  29.019
AVE M T=  73.500
√DP=   0.795
DH=   1.450
ST T.= 300.400
DRY MW=  29.399
WET MW=  27.550
% ISO=  77.619
STACK V.= 3300
```

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 Bowen
Sample Location inlet
Sample Box No. 10
Sample Type

Run No. I-1-B
Sample Date 10-19-81
Recovery Date 10-19-81
Cleanup Person M. Gabriel

Filter No. MS-2
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	dry		
Final Volume (wt)[b]	148	77	0		
Initial Volume (wt)[b]	100	100	0		
Net Volume (wt)[b]	48	-23			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 29.6

SILICA GEL

	764.8	
	760.2	
	4.6	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

MIDWEST RESEARCH INSTITUTE

MOA 5

RUN I-6A

MRI Project Number 4591-L83
Field Dates
Plant BOWEN
Sampling Location inlet
Sampling Date 10-26-81

FIELD CREW

Crew Chief T WALKER

Testing Engineer 1 STULTZ
2
3

Engr. Technician 1
2
3

Lab Technician 1 GABRIEL
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-26-81

SAMPLING LOCATION Baghouse Inlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	60
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.18
STATIC PRESSURE IN STACK, in. Hg -2.1 "H_2O ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.99
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	320
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.8
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.1
C FACTOR		.72
CALCULATED NOZZLE DIAMETER, in.		.259
ACTUAL NOZZLE DIAMETER, in. #10		.250
REFERENCE Δp, in. H_2O		.90

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen — Date 10-26-81
Sampling Location Baghouse Inlet — Initial RCC
Test Number I-6 (A)

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

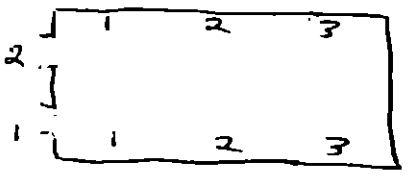
ΔPs = Velocity head of S pitot, inches H_2O

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	.8
Nozzle diameter, inches	Dn	.250
Barometric pressure, inches Hg	Pb	29.18
$\frac{5.168\ (60 + 460)\ (.84)\ (3)\ (.8)\ (.25^2)}{\sqrt{29.18}}$	K	62.682

FIELD DATA

PLANT Bowen
DATE 10-26-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE Meth. 5
RUN NUMBER I-6(A)
OPERATOR RCS
AMBIENT TEMPERATURE 55
BAROMETRIC PRESSURE 29.18
STATIC PRESSURE (P_s) -2.1
FILTER NUMBER(s) 189 BEAKER 16.1



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 6' SS
NOZZLE I.D. .250 #10
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 2
METER BOX NUMBER 2
TEMPERATURE METER NO. 9516
METER ΔH@ 1.84
METER CORRECTION 1.037
C FACTOR .72
REFERENCE Δp .90

LEAK CK: Initial at 15" Hg, CFM .0025 Read and Record All Data
None Final at [redacted] Hg, CFM [redacted] Every 3 Minutes

$VM = 62.682 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
				832.236					INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0	1058	Desired	Actual		DESIRED	ACTUAL						
2-3	3	1101	834.26	834.28	.84	1.75	1.8	346	54	55	6	332	
2-2	6	1104	836.03	836.12	.64	1.31	1.3	346	59	56	6	322	
2-1	9	1107	837.34	837.57	.35	.86	.80	336	62	56	5	354	
	START	1110											
1-3	12	1113	839.47	839.80	.91	2.20	2.1	329	66	58	8	361	
1-2	15	1116	841.58	841.89	.93	2.10	1.7	363	68	60	7	347	
1-1	18	1119	842.79	843.121	.29	.67	.5	311	66	60	4	329	
				Avg =	.66		1.367	338.5	62.5	57.5			

COMMENTS: Cyclone bypass broken at end of Test. No leak ck possible.

Moisture = [redacted] 27.9

EPA Dwg 235
4 77

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-26-81
Sampling Location Baghouse Inlet Name BCS
Run Number I-6(B)

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-6
  0.66  1.36 338
  62  57

I. VOL=832.238
F. VOL.=843.121
M FACTOR=1.037
B. P.=29.18
STATIC P.=-2.1
% O2=17.5
% CO2=3.2
MLS H2O=27.9
% H2O=  10.49
DP=   0.84
TIME=  18.00
NOZZLE D.=0.25
NET VOL.=11.2877
45
DS VOL.=  11.211
STACK P=  29.025
AVE M T=  60.000
TDP=   0.812
DH=   1.367
ST T.= 338.500
DRY MW=  29.212
WET MW=  28.035
% ISO=  91.793
STACK V.= 3467
```

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 Bowen
Sample Location inlet
Sample Box No. 2
Sample Type

Run No. I-Lo(B)
Sample Date 10-26-81
Recovery Date 10-26-81
Cleanup Person Caldwell

Filter No. 189
~~Beaker~~ No. 1
Sample Material Description

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]	M	S	M	M	
Impinger Solution	HC	H_2O	—		
Final Volume (wt)[b]	121	104	1		
Initial Volume (wt)[b]	100	100	—		
Net Volume (wt)[b]	21	4	1		
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 27.9

SILICA GEL

	736.6
	734.7
	1.9
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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

UNACCEPTABLE AND SUSPECT ANDERSEN HCSS RUNS

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-2(A)

MRI Project Number 4891-L83
Field Dates /
Plant Bowen
Sampling Location Inlet
Sampling Date 10-19-81

FIELD CREW

Crew Chief T. Crowder

Testing Engineer 1 Stultz
2
3

Engr. Technician 1 DL
2
3

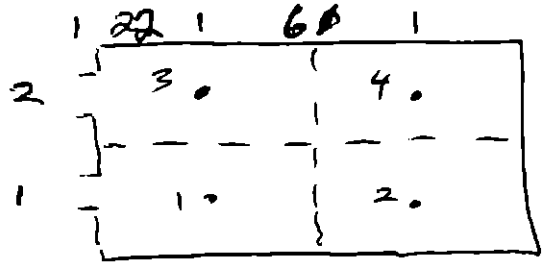
Lab Technician 1
2
3

Process Engineer 1
2

Other 1
2

PRELIMINARY VELOCITY TRAVERSE

PLANT Bowen
DATE 10-19-81
LOCATION Baghouse Inlet
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O -3.05"
OPERATORS RCS - DL



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
~~1-3~~	~~.67~~	~~355~~
~~1-4~~	~~1.25~~	~~356~~
~~Avg~~		
~~1-9~~	~~1.15~~	~~357~~
~~1-10~~	~~1.15~~	~~358~~
~~Avg~~		
1-1	.80	334
1-2	1.05	~~332~~ 340
AVERAGE		

FYRITE
Time 11:55

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
~~2-3~~	~~.86~~	354
~~2-4~~	.69	~~353~~
~~Avg~~		
~~2-9~~	~~.95~~	353
~~2-10~~	~~1.05~~	~~350~~
~~Avg~~		
2-3	.53	333
2-4	.78	328
AVERAGE		

~~CO_2~~
~~4.3~~
6.1
5.0
5.1
Avg 5.07 % X.44 = 2.231

O_2
15
14.5
14.5
Avg 14.7 % X.32 = 4.704

$N_2 = 80.23\% \times .28 \quad 22.464$
$M_d = 29.40$

EPA (Dur) 233
4 72

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-1-1 (a)

Date 10-19-81
Initial BCS

Velocity head at sampling location, in. H_2O	ΔPs	.80
Stack temperature at sample point, °F	Ts	334
Barometric pressure, in. Hg	Pb	29.30
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -3.0	Ps	29.08
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. #60 - 4.0	D_{n_a}	.156
Assumed meter temperature, °F	Tm	80
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.537
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.286

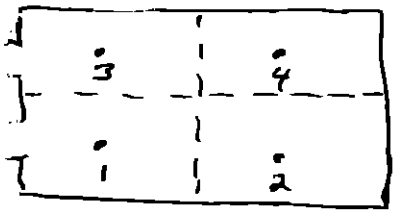
RUN I.D. I-1-1
DATE 10/19/8
^PS=0.8
TS=334.
B.P.=29.3
PS=29.078
%H20=21.
MF=0.79
MD=29.3992
MS=27.005368
VS=3874.743681
DNC=1.5933902826E-01
TM=80.
FS=5.3655555555E-01
FM=2.8609611246E-01
VISCOSITY=239.31
11111

Viscosity = 239.31

WATERPROOF PAPER

FIELD DATA – ANDERSEN

PLANT Bowen
DATE 10-19-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER 1-1-1 & (A)
OPERATOR RCS
AMBIENT TEMPERATURE ~65
BAROMETRIC PRESURE 29.30
STATIC PRESSURE, (P_g) -3.0
FILTER SET T-6



CALCULATED ACFM (DESIRED) .286
PROBE TIP DIAMETER #60-4.0 .156"
CO_2 5.07
O_2 14.7
CO 0
N_2 80.23
% H_2O 21
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 9576
METER BOX NO. 2

Leak CK: Initial at 15" Hg, CFM .004
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 1329	712.97	~~710.651~~ 712.403									
1-1	2 / 1331	~~712.69~~	713.04	.38	.30	.30	349	66	67	>1		
	4 / 1333	713.54		.39	.30	.30	348	67	68	>1		
	6 / 1335	714.11	714.26	.34	.30	.30	335	67	66	>1		
	8 / 1337	714.68	714.87	.44	.30	.30	342	68	67	>1		
	10 / 1339	715.25	715.48	.45	.30	.30	361	69	68	>1		
	12 / 1341	715.82	716.08	.42	.30	.30	350	70	68	>1		
	14 / 1343	716.40	716.69	.51	.30	.30	349	70	68	>1		
	16 / 1345	716.97	717.320	.46	.30	.30	368	71	68	>1		
			4.917	.430		.30	350.25	68.0				

COMMENTS: Impactor removed from duct while sampling, before shut-off.

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/19/81
Sampling Location INLET Name RCS
Run Number I-1-1 (A)

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-1-1
  0.43  0.30 350
  68   68

I. VOL=712.403
F. VOL.=717.32
M FACTOR=1.037
B. P.=29.3
STATIC P.=-3.
% O2=14.7
% CO2=5.07
ML% H2O=1.3
% H2O=   1.21
CP=   0.84
TIME=  16.00
NOZZLE D.=0.156
NET VOL.=5.098929
DS VOL.=   4.995
STACK P=  29.079
AVE M T=  68.000
DP=   0.655
DH=   0.300
ST T.= 350.250
DRY MW=  29.399
WET MW=  29.261
% ISO= 136.366
STACK V.= 2756
```

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 Brown
Sample Location Tk: F
Sample Box No. _____
Sample Type _____

Run No. I-2-7(A)
Sample Date 10-19-81
Recovery Date 10-19-81
Cleanup Person W. Gallwitz

Filter No. T-1c
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	dry	dry	
Final Volume (wt)[b]	100	100	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 _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 1.3 gm

SILICA GEL

	767.4
	766.1
	1.3
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 _____ 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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-1(A)

MRI Project Number 4897-L83
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Bob Seltz
2
3

Engr. Technician 1
2
3

Lab Technician 1 Cabrul, M
2
3

Process Engineer 1
2

Other 1
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen — Date 10-20-81
Sampling Location Baghouse Inlet — Initial RCS
Test No. I-2-1(A)

Velocity head at sampling location, in. H_2O	ΔPs	.43
Stack temperature at sample point, °F	Ts	350
Barometric pressure, in. Hg	Pb	29.06
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -3.0	Ps	28.84
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.40
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	29.26
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	2875 ~~2768~~
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.188
Actual nozzle diameter, in.	D_{n_a}	.195 ~~.188~~
Assumed meter temperature, °F	Tm	60
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.596 ~~.564~~
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.304 .283

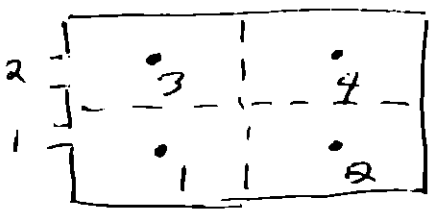
Viscosity = 242.87

WATERPROOF PAPER

FIELD DATA - ANDERSEN

HCSS

PLANT Bowen
DATE 10-20-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-2-1(A)
OPERATOR RCS
AMBIENT TEMPERATURE 55
BAROMETRIC PRESURE 29.06
STATIC PRESSURE, (P_s) -3.0
FILTER SET I-19



CALCULATED ACFM (DESIRED) .283
PROBE TIP DIAMETER #6 - 5/16 .195"
CO_2 5.07
O_2 14.7
CO 0
N_2 80.23
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 4516
METER BOX NO. 2
Calculated ΔH = .25

Leak CK: Initial at 15" Hg, CFM .003
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 0819		736.292									
1-1	2 / 0821	726.86	726.87	.81	.25	.25	346	59	60	>1		
	4 / 0823	727.98	727.48	.80	.25	.25	347	59	60	>1		
	6 / 0825	727.99	728.01	.80	.25	.25	347	60	60	>1		
	8 / 0827	728.55	728.58	.75	.25	.25	347	60	60	>1		
	10 / 0829	729.12	729.15	.78	.25	.25	347	61	60	>1		
	12 / 0831	729.69	729.71	.75	.25	.25	348	62	60	>1		
	14 / 0833	730.25	730.28	.77	.25	.25	359	62	61	>1		
	16 / 0835	730.82	730.86	.76	.25	.25	350	63	61	>1		
	18 / 0837	731.38	731.43	.68	.25	.25	343	64	61	>1		
	20 / 0839	731.95	732.005	.73	.25	.25	348	64	62	>1		

RUN I.D. I-2-1
DATE 10-20-8
^PS=0.43
TS=350.
B.P.=29.06
PS=28.838
%H20=20.
MF=0.8
MD=29.3992
MS=27.11936
VS=2875.077132
DNC=1.6801697136-01
TM=60.
FS=5.543333335E-01
FM=2.825197634E-01
VISCOSITY=242.966667

COMMENTS:

I-258

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10/20/81
Sampling Location INLET Name ECS
Run Number I-2-1(A)

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-2-1
  0.76  0.25 348
  60  60
```

```
I. VOL=726.292
F. VOL.=732.005
M FACTOR=1.037
B. P.=29.06
STATIC P.=-3.
% O2=14.7
% CO2=5.07
MLS H2O=20.2
% H2O=  14.02
CP=   0.84
TIME=  20.00
NOZZLE D.=0.195
NET VOL.=5.92438
1
DS VOL.=   5.833
STACK P=  28.939
AVE M T=  60.950
VDP=   0.873
DH=   0.250
ST T.= 348.200
DRY MW=  29.399
WET MW=  27.800
% ISO=  68.772
STACK V.= 3777
```

Measured

```
I. VOL=726.292
F. VOL.=732.005
M FACTOR=1.037
B. P.=29.06
STATIC P.=-3.
% O2=14.7
% CO2=5.07
% H2O=  20.00
CP=   0.84
TIME=  20.00
NOZZLE D.=0.195
NET VOL.=5.92438
1
DS VOL.=   5.833
STACK P=  28.939
AVE M T=  60.950
VDP=   0.872
DH=   0.250
ST T.= 348.000
DRY MW=  29.399
WET MW=  27.119
% ISO=  73.016
STACK V.= 3822
```

Assumed

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 Bowen
Sample Location inlet
Sample Box No. _____
Sample Type _____

Run No. T-2-1(A)
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M. Gabriel

Filter No. T-28 T-19
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]	119	100			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	19	0			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 20.2

SILICA GEL

768.6
2674
1.2
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN I-2-1B

MRI Project Number 4891-L83
Field Dates
Plant Belden
Sampling Location Inlet
Sampling Date 10-30-91

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Exit
Test No. I-2-1 B

Date 10-30-81
Initial BCS

Velocity head at sampling location, in. H_2O	ΔPs	.80
Stack temperature at sample point, °F	Ts	342
Barometric pressure, in. Hg	Pb	29.06
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) -2.2	Ps	28.90
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.36
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.09
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	3900.4
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.160
Actual nozzle diameter, in.	D_{n_a}	.155
Assumed meter temperature, °F.	Tm	75
Isokinetic sample rate, stack conditions, ft^3/min Vs (0.00694) $(\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.545
Calculated meter flow rate, ft^3/min Fs $\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)$ (Mf)	Fm	.289

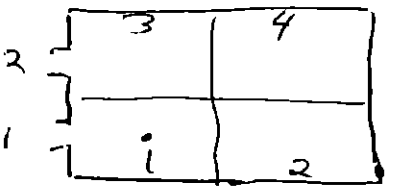
Misc. = 241.09

WATERPROOF PAPER

FIELD DATA - ANDERSEN

HCSS

PLANT: Bowen
DATE: 10-30-81
SAMPLING LOCATION: Baghouse Inlet
SAMPLE TYPE: HCSS
RUN NUMBER: I-2-1B
OPERATOR: RCS
AMBIENT TEMPERATURE: 70
BAROMETRIC PRESURE: 29.06
STATIC PRESSURE (P_s): -3.2
FILTER SET: 1-18 SP #M



CALCULATED ACFM (DESIRED): .289
PROBE TIP DIAMETER: .155 #60-4.0
CO_2: 4
O_2: 18
CO: 0
N_2: 78
% H_2O: 20
METER CORRECTION (ΔY): 1.034
TEMP. METER NO.: 9516
METER BOX NO.: 10
Δ Calculated Δ H = .256

Leak CK: Initial at 15" Hg, CFM .003
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

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 / 1146	266.800										
1-1	3 / 1149	267.67	267.67	.66	.256	.26	346	75	75	<1		
	6 / 1152	268.53	268.55	.74			339	76	76	<1		
	9 / 1155	269.40	269.43	.65			358	77	77	<1		
	12 / 1158	270.27	270.30	.63			326	79	77	<1		
	15 / 1201	271.14	271.18	.64			343	80	78	<1		
	18 / 1204	272.00	272.06	.65			319	80	78	<1		
	21 / 1207	272.87	272.94	.68			324	81	78	<1		
	24 / 1210	273.74	273.80	.77			328	81	79	<1		
	27 / 1213	274.60	274.68	.78			339	81	79	1		
	30 / 1216	275.47	275.558	.75			330	80	79	1		
				~~.618~~								
			Avg =	.695		.26	335.2	79	77.6			

RUN I.D. I-2-1B
DATE 10/30/8
^PB=0.8
TS=342.
B.P.=29.06
PS=28.8872
%H2O=20.
MF=0.8
MD=29.36
MS=27.088
VS=3900.415515
DND=1.601238889E-01
TM=75.
FS=5.454444445E-01
FM=2.894543477E-01
VISCOSITY=241.0688889

COMMENTS: Pitot Leak CK at 7" H_2O = Zero
Nozzle may have been turned 90° to flow

EPA (Dur) 235
4 72

I-263

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-30-81
Sampling Location Baghouse Inlet Name RCS
Run Number I-2-1B

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-2-1B
  0.69  0.26 335
  79   77

I. VOL=266.8
F. VOL.=275.558
M FACTOR=1.034
B. P.=29.06
STATIC P.=-2.2
% O2=18.
% CO2=4.
% H2O=  20.00
CP=   0.84
TIME=  30.00
NOZZLE D.=0.155
NET VOL.=9.055772
DS VOL.=   8.629
STACK P=  28.838
AVE M T=  78.300
TIP=   0.833
DH=   0.260
ST T.= 335.200
DRY MW=  29.360
WET MW=  27.088
% ISO= 118.202
STACK V.= 3619
```

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 Bowen Constr. Co. Run No. I-2-1(B)
Sample Location inlet Sample Date 10-30-81
Sample Box No. Recovery Date 10-30-81
Sample Type HCSS Cleanup Person Gabriel

Filter No. I-18
Sample No.
Sample Material Description

MOISTURE AND/OR SAMPLE

Impinger Sequence	1	2	3	4	5
Impinger Type[a]	I	S			
Impinger Solution	H2O				
Final Volume (wt)[b]	154	480			
Initial Volume (wt)[b]	100	0			
Net Volume (wt)[b]	54	43			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm 135.9

SILICA GEL

739.9	
731.0	
8.9	

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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks: I-18- Set #19 RUN #5 I-4-1, I-4-3, I-4-4, I-2-1B WERE ALL RUN WITH THE SAME IMPINGER TRAIN. THE % MOISTURE WAS AVERAGED AND USED FOR ALL FOUR RUNS

$T_m = (63.562 + 78.3 + 73.05 + 70.9) \div 4$
$T_m = (29.01 + 29.00 + 29.04 + 29.01) \div 4$
$P_m = 6.9278 + 9.055 + 8.65 + 8.951$
$P_m = 135.9$

84
43
8.9
135.9

$$\%H_2O = \frac{100}{1 + \left[375 \frac{P_m V_{m1}}{(T_m + 460) W_m} \right]} = 16.41\%$$

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen HCSS

RUN ~~I~~-2-2(A)

MRI Project Number 4891-C83
Field Dates
Plant Bowen
Sampling Location inlet
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Stultz, R
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1 Lacy, D
2

ANDERSEN SAMPLING CALCULATIONS

Plant Bowen
Sampling Location Baghouse Inlet
Test No. I-2-2(A)

Date 10-20-81
Initial BCS

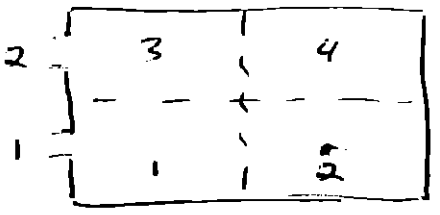
Velocity head at sampling location, in. H_2O	ΔPs	.90
Stack temperature at sample point, °F	Ts	300
Barometric pressure, in. Hg	Pb	29.08
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O) $-3"H_2O$	Ps	
Percent moisture in gas stream by volume	% H_2O	20
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$	Mf	.8
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	29.40
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.12
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps}\right)\sqrt{\frac{Ts + 460}{Ps \times Ms}}$	Vs	4028
Calculated nozzle diameter, in. $24\sqrt{\frac{Fs/Vs}{\pi}}$, where Fs = 0.5 to 0.75 ft^3/min	D_{n_c}	.151
Actual nozzle diameter, in. #61-4.0	D_{n_a}	.156"
Assumed meter temperature, °F	Tm	70
Isokinetic sample rate, stack conditions, ft^3/min $Vs\ (0.00694)\ (\pi)\left(\frac{Dn_a}{2}\right)^2$	Fs	.499
Calculated meter flow rate, ft^3/min $Fs\left(\frac{Tm+460}{Ts+460}\right)\left(\frac{Ps}{Pb}\right)(Mf)$	Fm	.276

WATERPROOF PAPER

FIELD DATA – ANDERSEN

HCSS

PLANT Bowen
DATE 10-20-81
SAMPLING LOCATION Baghouse Inlet
SAMPLE TYPE HCSS
RUN NUMBER I-2-2(A)
OPERATOR RCS
AMBIENT TEMPERATURE 70
BAROMETRIC PRESURE 29.08
STATIC PRESSURE, (P_s) -3.0 "
FILTER SET T-28 SET 3



CALCULATED ACFM (DESIRED) .276
PROBE TIP DIAMETER ~~.256~~ .195
CO_2 ~~5.67~~ 5.77
O_2 ~~11.7~~ 10.0
CO 0
N_2 ~~80.23~~ 84.23
% H_2O 20
METER CORRECTION (ΔY) 1.037
TEMP. METER NO. 9576
METER BOX NO. 2
Calculated ΔH = ~~.255~~ .23

Leak CK: Initial at 15" Hg, CFM Zero
Final at ___ Hg, CFM ___

SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 745.455 Desired	GAS METER READING Actual	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL 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
	0	1139											
1-2	3	1142	746.28	746.30	1.1	.23	.23	359	68	69	~~<~~ 1		
	6	1145	747.11	747.11	1.1	.23	.23	344	70	70	< 1		
	9	1148	747.94	747.93	1.1	.23	.23	352	71	71	< 1		
	12	1151	748.76	748.75	1.1	.23	.23	356	71	71	< 1		
	15	1154	749.59	749.58	1.1	.23	.23	348	72	71	< 1		
	18	1157	750.42	750.37	1.1	.23	.23	356	72	71	< 1		
	21	1200	751.25	751.184	1.1	.23	.23	357	73	72	< 1		
								353.1	71	70.7			

COMMENTS:

Moisture Collected = 34.5

EPA (Dur) 235
4 72

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN CONSTRUCTION Date 10/20/81
Sampling Location INLET Name STULTZ
Run Number I-2-2 (A)

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.)

ASSUMED H_2O
CHANGED O_2

```
I-2-2 A
  1.09  0.23 353
  70  70

I. VOL=745.455
F. VOL.=751.189
M FACTOR=1.037
B. P.=29.08
STATIC P.=-3.
% O2=14.7
% CO2=5.
% H2O=  20.00
CP=   0.84
TIME=  21.00
NOZZLE D.=0.195
NET VOL.=5.94615
8
DS VOL.=   5.749
STACK P=  28.659
AVE M T=  70.850
FDP=   1.048
DH=   0.230
ST T.= 353.100
DRY MW=  29.388
WET MW=  27.110
% ISO=  57.238
STACK V.= 4602
```

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 Bowen
Sample Location inlet
Sample Box No. _____
Sample Type _____

Run No. I-2-2(A)
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M. Gabriel

Filter No. F-28 ~~F-24~~ T-28
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	H_2O	H_2O	—	—	
Final Volume (wt)[b]	132	100	—	—	
Initial Volume (wt)[b]	100	100	—	—	
Net Volume (wt)[b]	32	0	0	0	
Sample No.(s)					

Combined Impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 34.5

SILICA GEL

771.1
760.6
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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

UNUSED ACCEPTABLE METHOD 17 RUNS

MIDWEST RESEARCH INSTITUTE

Method 17

RUN 0-1-3A

MRI Project Number 4598-83
Field Dates 10-12-81
Plant BOWEN
Sampling Location OUTLET
Sampling Date 10-15-81

FIELD CREW

Crew Chief: T. Walker

Testing Engineer: 1 E. Whitfield; 2; 3

Engr. Technician: 1; 2; 3

Lab Technician: 1 Gabriel, M; 2; 3

Process Engineer: 1; 2

Other: 1; 2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-13-81

SAMPLING LOCATION Outlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	0.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	50
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	17
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.38
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in. H_2O)	P_s	29.31
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.998
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	314
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.09
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR		0.780
CALCULATED NOZZLE DIAMETER, in.		~~0.425~~ 0.238
ACTUAL NOZZLE DIAMETER, in. #30		0.247
REFERENCE Δp, in. H_2O		0.900

ISOKINETIC SAMPLING WORKSHEET

Plant Dowell
Sampling Location Outlet
Test Number O-1-3A

Date 10-15-81
Initial CTL

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

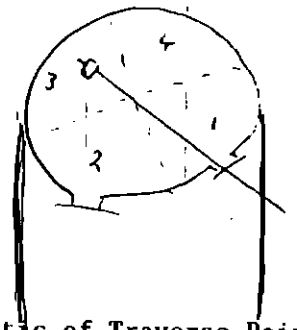
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	50
Pitot coefficient	Cp	0.84
Sampling time interval, minutes	θi	10.0
Mole fraction dry gas	Mf	0.93
Nozzle diameter, inches	Dn	0.247
Barometric pressure, inches Hg	Pb	29.38
$\frac{5.168\ (50 + 460)\ (0.84)\ (10)\ (.93)\ (.247^2)}{\sqrt{29.38}}$	K	38.16 Dec. 83

FIELD DATA

PLANT Bowen
DATE 10-15-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-1-3A
OPERATOR Wm. Ted
AMBIENT TEMPERATURE 40
BAROMETRIC PRESSURE 29.38
STATIC PRESSURE (P_s) -.94
FILTER NUMBER(s) 17-3



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 4'
NOZZLE I.D. 0.247 = 70
ASSUMED MOISTURE, % 17%
SAMPLE BOX NUMBER
METER BOX NUMBER 4
TEMPERATURE METER NO.
METER ΔH@ 1.84
METER CORRECTION
C FACTOR 0.765
REFERENCE Δp 0.90

LEAK CK: Initial at 15" Hg, CFM 0.05 Read and Record All Data
Final at 17 Hg, CFM 0.000 Every 10 Minutes

$VM = \frac{206.93}{35.46} \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	1050	922.453 ft		0.25								
3	1034/1100	931.23	931.20	1.40	2.5	2.9	317	58	62	6		
2	1110	940.00	940.43	1.40	2.9	2.9	311	67	62	7		
	1120	948.15	948.90	1.2	2.5	2.5	313	75	63	7		
	1130	956.66	957.43	1.3	2.8	2.6	308	75	63	7½		
	1140	964.88	964.89	1.2	2.5	2.2	300	75	65	9		
↓	1145-OFF	973.79	973.990	1.3	2.8	2.7	296	75	65	16		
5 min to	Leak Check		Shut off 96	9.992	- 970.028							
	1155 on	0.070										
↑	~~1200~~ 1200	973.88	972.23	~~1.7~~ 1.2	~~2.5~~ 2.5	~~2.7~~ 2.7	~~288~~ 289	~~73~~ 73	~~65~~ 65	~~16~~ 16		
	1210	982.108	↓	1.2	2.5	2.7	289	73	65	16		
↓	1206-OFF		979.70	- 980.354 = 0.654 ft								
	1216 ON	982.76										
	1220	982.76	982.952	1.2	2.5	2.7	289	73	65	16		
	END											
			Leak									
			(V_m)	ΔP_s			T_s		T_m			
			60.52	1.286			304.86		62.36			

COMMENTS

ISOKINETIC PERFORMANCE WORKSHEET

Plant BOWEN
Sampling Location OUTLET
Test Number 0-1-3-A

Date 10-15-81
Initial CS

Isokinetic equation:

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

Average stack temperature, °F	Ts_{avg}	304.86
Meter volume (std), $\frac{17.64(Vm)\left(Pb+\frac{\Delta H_{avg}}{13.6}\right)}{Tm+460}$ Vm - 60.52 Pb - 29.38 Tm - 67.36	Vm_{std}	59.75
Mole fraction dry gas, $\frac{100-\%\ H_2O}{100}$ 17%	Mf	0.83
Molecular wt. dry stack gas, lb/lb-mole $(\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + (\%N_2 + \%CO \times 0.28)$ 4.3 14.8 80.9	Md	29.28
Molecular wt. stack gas, lb/lb-mole (Md) (Mf) + 18(1 - Mf)	Ms	27.36
Static pressure in stack, absolute, in. Hg (Pb) ± (0.074 x stack gage pressure, in H_2O)	Ps	29.31
Stack velocity, fpm $5{,}128.8\ (Cp)\left(\sqrt{\Delta Ps_{avg}}\right)\sqrt{\frac{Ts+460}{PsxMs}}$ Ts = 304 ΔP = 1.286	Vs	4768
Total sample time, minutes	θ	70
Nozzle diameter, inches	Dn	.247
$\frac{1{,}039\ (304 + 460)(59.75)}{(4768)(70)(29.31)(.83)(.247^2)}$	% I	95.7

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant BOWEN Date 10-19-81
Sampling Location OUTLET Name E. White
Run Number 0-1-3-4

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.)

```
0-1-3
  1.28  2.64 304
  67  67

I. VOL=922.433
F. VOL.=982.953
M FACTOR=1.006
B. P.=29.38
STATIC P.=-0.94
% O2=14.8
% CO2=4.3
MLS H2O=306.8
% H2O=  19.34
CP=   0.84
TIME=  80.00
NOZZLE D.=0.247
NET VOL.=60.8831
2
DS VOL.=  60.228
STACK P=  29.310
AVE M T=  67.360
VDP=   1.131
DH=   2.642
ST T.= 304.860
DRY MW=  29.380
WET MW=  27.097
% ISO=  86.730
STACK V.= 4783
```

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 Bowen
Sample Location Outlet
Sample Box No. _____
Sample Type _____

Run No. ~~7-1-7~~ 8-1-3A
Sample Date 10-19-81
Recovery Date _____
Cleanup Person _____

Filter No. 17-3
Sample No. _____
Sample Material Description _____

MOISTURE AND/OR SAMPLE

	1	2	3	4	5
Impinger Sequence					
Impinger Type[a]		S	M	M	
Impinger Solution					
Final Volume (wt)[b]	300	300	0	0	
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	200	200	0	0	
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 3016.8

SILICA GEL

7600		
1654.2		
1945.8		

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 _____ 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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Meth. 17

RUN O-2-2(A)

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date 10-21-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Whited
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-21-81

SAMPLING LOCATION Outlet
0-2-2(A)

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	73
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	19.5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.28
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.21
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.998
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	300
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.85
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR		0.77
CALCULATED NOZZLE DIAMETER, in.		.250
ACTUAL NOZZLE DIAMETER, in.		.250
REFERENCE Δp, in. H_2O		0.85

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Outlet
Test Number 0-2-2 (A)

Date 10-21-81
Initial CW

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

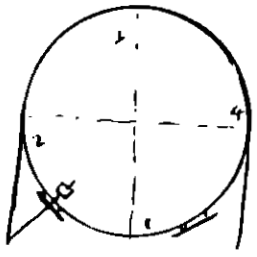
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	73
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.81
Nozzle diameter, inches	Dn	.25
Barometric pressure, inches Hg	Pb	29.28
$\frac{5.168\ (73 + 460)\ (.84)\ (5)\ (.81)\ (.25^2)}{\sqrt{29.28}}$	K	108,238

FIELD DATA

PLANT Bowen
DATE 10-[illegible]-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER O-2-2(A)
OPERATOR Unified
AMBIENT TEMPERATURE 45
BAROMETRIC PRESSURE 29.28
STATIC PRESSURE (P_s) -.9
FILTER NUMBER(s) 17-B



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 7½
NOZZLE I.D. 0.25
ASSUMED MOISTURE, % 19%
SAMPLE BOX NUMBER
METER BOX NUMBER 4
TEMPERATURE METER NO. 9519
METER ΔH@ 1.84
METER CORRECTION 1.006
C FACTOR 0.77
REFERENCE Δp 0.85

LEAK CK: Initial at 15" Hg, CFM 0.00
Final at 0.00 Hg, CFM 21"

Read and Record All Data
Every 5 Minutes

$VM = 108.238 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 106.248 Desired	GAS METER READING (V_m), ft^3 106.248 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
	0850											
	0855	109.93	109.80	.888	1.9	1.9	295	55	55	4		
	0900	113.67	113.75	.80	2.0	2.1	292	60	58	4		
	0905	117.27	117.18	.84	1.6	1.5	297	65	60	4		
	0910	121.21	121.14	1.0	2.2	2.2	295	70	60	4		
	0915	125.34	125.40	1.1	2.4	2.4	295	74	63	5½		
	0720	129.48	129.59	1.1	2.4	2.4	292	77	64	7½		
	0925	133.82	133.85	1.2	2.6	2.5	286	79	68	9½		
	0930	137.98	138.15	1.1	2.4	2.3	285	81	68	11½		
	0935	141.95	141.89	1.0	2.2	2.0	284	81	69	13		
	0940	146.08	146.173	1.1	2.4	2.3	289	81	69	17		

COMMENTS

O_2 = 16.833%
CO_2 = 4%

EPA Dun 235
4-17

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-24-81
Sampling Location Outlet Name United
Run Number 0-2-2(R)

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. VOL=106.248
F. VOL.=146.173
M FACTOR=1.006
B. P.=29.28
STATIC P.=-0.84
% O2=16.933
% CO2=4.
ML'S H2O=218.6
% H2O=  20.67
DP=   0.84
TIME=  50.00
NOZZLE D.=0.25
NET VOL.=40.1845
S
DS VOL.=  39.514
STACK P=  29.210
AVE M T=  67.550
TDP=   1.009
DH=   2.160
ST T.= 291.000
DRY MW=  29.313
WET MW=  26.974
% ISO= 100.298
STACK V.= 4245
```

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. 0-2-2A
Sample Date 10-21-81
Recovery Date 10-21-81
Cleanup Person Gabriel

Filter No. 17-8
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]	282	122			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	182	22			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 218.6

SILICA GEL

	720.0	
	705.4	
	14.6	

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 _____ 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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

99
102
41
282

182
22
14.6
218.6

MIDWEST RESEARCH INSTITUTE

Meth. 17

RUN O-2-4(A)

MRI Project Number 4891-L83
Field Dates
Plant Bowen
Sampling Location Outlet
Sampling Date 10-21-81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Whited
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-~~20~~ 21 - 81

SAMPLING LOCATION Outlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	19
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.38
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.074$ STACK GAUGE PRESSURE in in. H_2O)	P_s	29.31
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.998
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	~~300~~ 290
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.1
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR	0.77	
CALCULATED NOZZLE DIAMETER, in.	0.233	
ACTUAL NOZZLE DIAMETER, in.	0.249	
REFERENCE Δp, in. H_2O	0.825	

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location Outlet
Test Number 0-2-4 (A)

Date 10-21-81
Initial CW

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

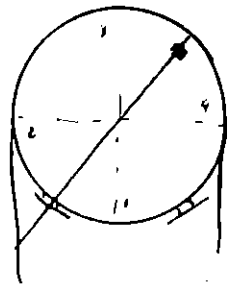
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	70
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.81
Nozzle diameter, inches	Dn	.249
Barometric pressure, inches Hg	Pb	29.38
$\frac{5.168\ (70 + 460)\ (.84)\ (5)\ (.81)\ (.249^2)}{\sqrt{29.38}}$	K	106.587

FIELD DATA

PLANT Bowen
DATE 10-3-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-2 4(A)
OPERATOR W.H. Ted
AMBIENT TEMPERATURE 48
BAROMETRIC PRESSURE 29.38
STATIC PRESSURE (P_s) -.94
FILTER NUMBER(s) 1-5



Schematic of Traverse Point Layout

PROBE LENGTH AND TYPE 40 1/4
NOZZLE I.D. 0.249
ASSUMED MOISTURE, % 19
SAMPLE BOX NUMBER
METER BOX NUMBER 4
TEMPERATURE METER NO. 5919
METER ΔH@ ~~1.87~~ 1.947
METER CORRECTION 1.006
C FACTOR 0.77
REFERENCE Δp 0.825

LEAK CK: Initial at 15" Hg, CFM 0.00
Final at 11 1/2 Hg, CFM 0.01
Read and Record All Data Every 5 Minutes

$VM = 106.587 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 146.450 Desired	GAS METER READING 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
	1240			.7								
	1245	149.70	149.80	.7	1.6	1.6	291	60	60	4		
	1250	152.91	153.15	.68	1.6	1.5	287	68	60	4		
	1255	155.97	156.20	.62	1.5	1.3	293	70	64	4		
	1200	159.18	159.25	.68	1.6	1.3	288	72	68			
	1205	162.31	162.33	.65	1.5	1.4	291	72	68	5		
	1210	165.44	165.48	.65	1.5	1.4	294	72	68	5 1/2		
	1215	168.61	168.69	.67	1.5	1.4	295	74	69	6 1/2		
	1220	171.78	171.85	.67	1.5	~~1.4~~ 1.3	296	76	70	7 1/2		
	1225	174.96	174.99	.67	1.5	1.3	293	78	70	8		
	1230	178.21	178.33	.70	1.7	1.6	292	78	70	10 1/2		
	1235	181.33	181.49	.65	1.5	1.3	280	80	70	11		
	1240	184.46	184.577	.65	1.5	1.2	293	80	70	11 1/2		
			164.577									

COMMENTS $O_2 = 16.833\ \%$
$CO_2 = 4\ \%$

EPA (Dun 235
3 77

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Dayton Date 10-31-81
Sampling Location OUTLET Name White
Run Number 0-2-4(A)

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. VOL.=146.47
F. VOL.=184.577
M FACTOR=1.006
B. P.=29.38
STATIC P.=-0.94
% O2=16.833
% CO2=4.
MLS H2O=219.9
% H2O= 21.58
CP= 0.84
TIME= 60.00
NOZZLE D.=0.249
NET VOL.=38.35757
62
DS VOL.= 37.815
STACK P= 29.310
AVE M T= 70.291
FDP= 0.815
DH= 1.383
ST T.= 291.916
DRY MW= 29.513
WET MW= 26.370
% ISO= 100.031
STACK V.= 3454

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. 0-2-4(A)
Sample Date 10-21-81
Recovery Date 10-21-81
Cleanup Person Gabriel

Filter No. 17-9
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]	300	110			
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	200	10			
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 219.9

SILICA GEL

	768.4	
	750.5	
	9.9	

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 _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

MIDWEST RESEARCH INSTITUTE

Meth 17

RUN 0-2-4B

MRI Project Number 4891-C83
Field Dates
Plant Bowen
Sampling Location outlet
Sampling Date ~~[illegible]~~ 10/30/81

FIELD CREW

Crew Chief Walker, T

Testing Engineer 1 Whited, E
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

NOMOGRAPH DATA

PLANT Bowen

DATE 10-30-81

SAMPLING LOCATION Outlet

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.84
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	80
PERCENT MOISTURE IN GAS STREAM BY VOLUME	% H_2O	20
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) $-.43"H_2O$	P_s	28.99
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	0.999
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	290
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.70
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	
C FACTOR	0.76	
CALCULATED NOZZLE DIAMETER, in.	0.255	
ACTUAL NOZZLE DIAMETER, in.	0.249	
REFERENCE Δp, in. H_2O	0.55	

EPA (Dur) 234
4/72

ISOKINETIC SAMPLING WORKSHEET

Plant Bowen
Sampling Location OUTLET
Test Number 0-2-4-B

Date 10-30-81
Initial EW

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

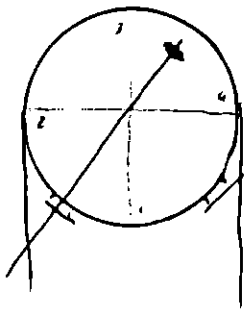
ΔPs = Velocity head of S pitot, inches H_2O

Ts = Stack temperature, °F

Assumed average meter temperature, °F	Tm_{avg}	80
Pitot coefficient	Cp	.84
Sampling time interval, minutes	θi	5
Mole fraction dry gas	Mf	.80
Nozzle diameter, inches	Dn	.249
Barometric pressure, inches Hg	Pb	29.02
$\frac{5.168\ (80 + 460)\ (.84)\ (.8)\ (5)\ (.249^2)}{\sqrt{29.02}}$	K	107.886

FIELD DATA

PLANT Bowen
DATE 10-30-81
SAMPLING LOCATION Outlet
SAMPLE TYPE Total Particulate
RUN NUMBER 0-2-4-B
OPERATOR Whited
AMBIENT TEMPERATURE 55
BAROMETRIC PRESSURE 29.02
STATIC PRESSURE (P_s) -.43 "H_2O
FILTER NUMBER(s) 17-14



Schematic of Traverse Point Layout
Read and Record All Data
Every 5 Minutes

PROBE LENGTH AND TYPE 4' ¼
NOZZLE I.D. 0.249
ASSUMED MOISTURE, % 20%
SAMPLE BOX NUMBER -
METER BOX NUMBER 4
TEMPERATURE METER NO. 9519
METER ΔH@ 1.94
METER CORRECTION 1.006
C FACTOR 0.76
REFERENCE Δp 0.85

LEAK CK: Initial at ~~15~~ 20" Hg, CFM .000
Final at 21 Hg, CFM .000

$VM = 107.586 \times \sqrt{\frac{\Delta Ps}{Ts + 460}}$

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
		423.470						INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 0810	Desired	Actual		DESIRED	ACTUAL						
	5 / 0815	428.99	429.1	.80	1.7	1.7	289	60	60	4½		
	10 / 0820	432.41	432.32	.75	1.6	1.6	286	69	72	5		
	15 / 0825	435.94	435.84	.80	1.7	1.7	287	70	73	5		
	20 / 0830	439.49	439.44	.81	1.8	1.7	287	72	75	6		
	25 / 0835	443.01	442.92	.80	1.7	1.6	289	72	75	6½		
	30 / 0840	446.5	446.34	.78	1.7	1.6	288	72	75	7		
	35 / 0845	449.88	449.78	.78	1.7	1.6	287	70	78	8		
	40 / 0850	453.47	453.33	.78	1.7	1.7	287	70	78	9		
	45 / 0855	456.91	456.95	.76	1.7	1.7	285	70	78	11		
	50 / 0900	460.34	460.36	.76	1.7	1.55	289	70	78	11½		
	55 / 0905	463.68	463.67	.72	1.6	1.4	288	70	79	11½		
	60 / 0910	467.15	466.97	.76	1.7	1.5	287	71	80	11½		
	65 / 0915	470.48	470.29	.71	1.5	1.3	290	71	80	13		
	70 / 0920	473.86	473.78	.74	1.6	1.5	288	71	81	15		
	75 / 0925	477.36	477.10	.79	1.7	~~1.7~~ 1.5	289	72	81	16½		
	80 / 0930	480.83	480.49	.78	1.7	1.5	292	72	79	18		
	85 / 0935	484.41	483.888	.83	1.8	1.5	292	72	79	21		
				.7711		1.52	290.29		78			

COMMENTS $O_2 = 16833$ #1. 1.5
$CO_2 = 2.533$

EPA Dwg 235
1 17

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Date 10-30-81
Sampling Location Outlet Name W. Tell
Run Number 0-2-4-B

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.)

```
024B
  0.77  1.57 288
  73  73

I. VOL=425.47
F. VOL.=483.888
M FACTOR=1.006
B. P.=29.02
STATIC P.=-0.43
% O2=16.8333
% CO2=3.8333
ML'S H2O=288.85
% H2O=  19.37
CP=   0.84
TIME=  85.00
NOZZLE D.=0.249
NET VOL.=58.7685
08
DS VOL.=  56.628
STACK P=  28.988
AVE M T=  73.380
√DP=   0.879
DH=   1.573
ST T.= 288.290
DRY MW=  29.286
WET MW=  27.100
% ISO=  96.617
STACK V.= 3699
```

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 Bowen
Sample Location outlet
Sample Box No.
Sample Type Meth. 17

Run No. 0-2-4B
Sample Date 10-30-81
Recovery Date 10-30-81
Cleanup Person Collard

Filter No. 17-14
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	H_2O	H_2O	—	—	
Final Volume (wt)[b]	270	159	43.5	1	
Initial Volume (wt)[b]	100	100			
Net Volume (wt)[b]	170	59			
Sample No.(s)					

Combined impinger contents, Sample No.
Liquid Level Marked Container(s) Sealed
Description of Impinger Solution
Total Moisture, gm

SILICA GEL

231.35
215.9
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 Date Shipped:
Remarks:

Date of laboratory custody Seal(s) broken by
Personnel accepting custody Date broken
Remarks:

1 2 3 4
100 100 43.5 1
100 59
70

UNACCEPTABLE ANDERSEN MARK III RUN

MIDWEST RESEARCH INSTITUTE

Particle Sizing - Andersen MK III

RUN ~~C-2-1~~ NIG
C-1-1-17

MRI Project Number 4691-L03
Field Dates /
Plant Fountain County Co.
Sampling Location Cu Hot / Cu Cold
Sampling Date 10-20-81

FIELD CREW

Crew Chief Walker, T.

Testing Engineer 1 Cobb, D.
2
3

Engr. Technician 1
2
3

Lab Technician 1 Gabriel, M
2
3

Process Engineer 1
2

Other 1
2

MRI - Form PO (10/72)

ANDERSEN SAMPLING CALCULATIONS

Plant Brown Const. Co. Date 10-20-81
Sampling Location outlet quad. I Initial DC.
Test No. 0-1-1A

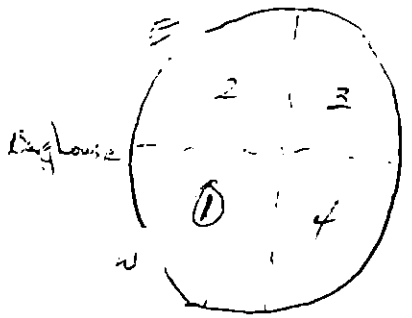
Velocity head at sampling location, in. H_2O	ΔPs	
Stack temperature at sample point, °F	Ts	
Barometric pressure, in. Hg	Pb	
Static pressure in stack, in. Hg (Pb) $\pm$ (0.074 x gage pressure, in. H_2O)	Ps	
Percent moisture in gas stream by volume	% H_2O	
Mole fraction, dry gas $\frac{100 - \% H_2O}{100}$		
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. 0-1-1 A
DATE 10-20-8
^PS=1.2
TS=300.
B.P.=29.07
PS=29.00044
%H2O=18.
MF=0.82
MD=29.28
MS=27.2496
VS=4628.178598
DNC=1.405674604E-01
TM=65.
FS=0.498777778
FM=2.818553061E-01
VISCOSITY=231.75
55556

WATERPROOF PAPER

FIELD DATA - ANDERSEN

PLANT Bowen Coal Co
DATE 10-20-81
SAMPLING LOCATION Outlet / Duct 1
SAMPLE TYPE Part. Sizing
RUN NUMBER 0-1-1A 8
OPERATOR Cobb
AMBIENT TEMPERATURE 65
BAROMETRIC PRESURE 29.07
STATIC PRESSURE, (P_g) -.44
FILTER SET 33



SCHEMATIC OF TRAVERSE POINT LAYOUT WITH DIMENSIONS

CALCULATED ACFM (DESIRED) 1.252 / 2 Ri/10 min
PROBE TIP DIAMETER .136
CO_2 4.33
O_2 14.83
CO 0
N_2 80.84
% H_2O 18 assumed
METER CORRECTION (ΔY) 1.638
TEMP. METER NO. 9518
METER BOX NO. 3

Leak CK: Initial at 15" Hg, CFM .017
Final at 1 Hg, CFM 0.0

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3 626.79 Desired	GAS METER READING (V_m), ft^3 626.79 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
	0 / 1218											
	10 / 1228	632.61	629.63	.72	.24	.24	306	70	68	1	N/A	N/A
	20 / 1238	637.43	632.85	.19		.23	306	72	70	1		
	30 / 1248	642.25	635.31	.186		.24	314	73	70	1		
	40 / 1258	647.07	638.18	.183		.24	312	76	73	1		
	50 / 1308	651.89	641.61	.184		.23	313	75	74	1		
	60 / 1318	656.71	—	.180		.23	309	78	76	1		
	60 / 1325	660.53	645.962	.180		.23	305	76	76	1		
	~~80~~	~~662.35~~										
	~~5~~											
	~~10~~											
	~~15~~											
	~~20~~											
	~~25~~											
	~~30~~											
	~~35~~											

COMMENTS: at only 7 min on last pt. plant down

EPA (Dur) 235
4 72

I-300

ONSITE ISOKINETIC PERFORMANCE DETERMINATION

Computations made on the Radio Shack TRS80 Pocket Computer

Plant Bowen Const. Co. Date 11-20-91
Sampling Location Outlet/Quad 1 Name D.C.
Run Number 0-1-17

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. VOL=826.79
F. VOL.=845.962
M FACTOR=1.038
B. P.=29.07
STATIC P.=-0.94
% O2=14.85
% CO2=4.33
MLS H2O=89.4
% H2O= 10.02
CP= 0.84
TIME= 67.00
NOZZLE D.=0.136
NET VOL.=19.9005
36
DS VOL.= 19.144
STACK P= 29.000
AVE M T= 73.357
√DP= 0.921
DH= 0.234
ST T.= 309.285
DRY MW= 29.286
WET MW= 27.251
% ISO= 132.591
STACK V.= 3917

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 Bowen
Sample Location outlet
Sample Box No. _____
Sample Type _____

Run No. 0-1-1A
Sample Date 10-20-81
Recovery Date 10-20-81
Cleanup Person M. Gabriel

Filter No. 33
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]	197	86	3	1	
Initial Volume (wt)[b]	100	100	0	0	
Net Volume (wt)[b]	97	-14	3	1	
Sample No.(s)					

Combined impinger contents, Sample No. _____
Liquid Level Marked _____ Container(s) Sealed _____
Description of Impinger Solution _____
Total Moisture, gm 89.4

SILICA GEL

288.6 _____
786.2 ~~788.6~~
2.4 _____
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. _____	Dry Catch:	Sample No. _____
	Liquid Level Marked _____		Description _____
	Sealed _____		Sealed _____
Impinger Rinse:	Sample No. _____	Acetone Blank:	Sample No. _____
	Liquid Level Marked _____		Liquid Level Marked _____
	Sealed _____		Sealed _____
Water Blank:	Sample No. _____	Filter Blank:	Sample No. _____
	Liquid Level Marked _____		Sealed _____

Sample Disposition _____
Carrier _____ Date Shipped: _____
Remarks: _____

Date of laboratory custody _____ Seal(s) broken by _____
Personnel accepting custody _____ Date broken _____
Remarks: _____

97
3
1
2.4
103.4
14
89.4

APPENDIX J

MASS AND PARTICLE SIZING COMPUTER PRINTOUTS

	Page
Method 5 (Inlet Mass).	J-3
Andersen HCSS (Inlet Particle Sizing).	J-29
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Unacceptable and Suspect Andersen HCSS Runs. . .	J-95
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Unacceptable Andersen Mark III Run	J-115

METHOD 5 (INLET MASS)

FILE NAME - I1CM5
RUN # - I-1-C
LOCATION - BOWEN ASPHALT
DATE - 10/21/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	767.202
FINAL METER VOLUME (CUBIC FEET)=	778.066
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.004
NET METER VOLUME (CUBIC FEET)=	11.266
GAS VOLUME (DRY STANDARD CUBIC FEET)=	11.276
BAROMETRIC PRESSURE (IN. HG)=	29.34
STATIC PRESSURE (INCHES H20)=	-3.00
PERCENT OXYGEN=	15.31
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	61.5
PERCENT WATER=	20.44
AVERAGE METER TEMPERATURE (F.)=	58.8
AVERAGE DELTA H (IN. H20)=	1.34
AVERAGE DELTA P (IN. H20)=	0.70
AVERAGE STACK TEMPERATURE (F.)=	317.7
DRY MOLECULAR WEIGHT=	29.412
WET MOLECULAR WEIGHT=	27.080
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.8209
% ISOKINETIC=	102.0
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2470
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,512
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	62,777
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	41,483
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	33,004

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	21.1902
PARTICULATE LOADING, DRY STD. (GR./SCF)=	28.9400
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	15.2087
EMISSION RATE (LB/HR)=	8185.57

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	21.1902
PARTICULATE LOADING, DRY STD. (GR./SCF)=	28.9400
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	15.2087
EMISSION RATE (LB/HR)=	8185.57
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I1CM5
RUN # - I-1-C
LOCATION - BOWEN ASPHALT
DATE - 10/21/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	21.724
FINAL METER VOLUME (CUBIC METERS)=	22.032
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.319
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.319
BAROMETRIC PRESSURE (MM HG)=	745.24
STATIC PRESSURE (MM H2O)=	-76.2
PERCENT OXYGEN=	15.31
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	61.5
PERCENT WATER=	20.44
AVERAGE METER TEMPERATURE (C.)=	14.9
AVERAGE DELTA H (MM H2O)=	34.1
AVERAGE DELTA P (MM H2O)=	17.7
AVERAGE STACK TEMPERATURE (C.)=	158.7
DRY MOLECULAR WEIGHT=	29.412
WET MOLECULAR WEIGHT=	27.080
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.1371
% ISOKINETIC=	102.0
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.27
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,070
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,778
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,175
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	935

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	21.1902
PARTICULATE LOADING, DRY STD. (G/CU. M)=	66.3661
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	34.8769
EMISSION RATE (KG/HR)=	3716.25

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	21.1902
PARTICULATE LOADING, DRY STD. (G/CU. M)=	66.3661
PARTICULATE LOADING, ACTUAL (G/CU. M)=	34.8769
EMISSION RATE (KG/HR)=	3716.25
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I1CM5
RUN # - I-1-C
LOCATION - BOWEN ASPHALT
DATE - 10/21/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.87	1.80	328	55	56
2	0.72	1.40	333	60	56
3	0.31	0.60	308	60	57
4	1.00	1.90	317	61	58
5	0.80	1.50	319	63	58
6	0.48	0.85	301	63	59

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	13.1056	3.5492	0.0001	9.5563

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	108.6000	96.9650	250.0	11.6339
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I2M5
RUN # - I-2
LOCATION - BOWEN ASPHALT
DATE - 10/22/01
PROJECT # - 4091L-83

INITIAL METER VOLUME (CUBIC FEET)=	790.700
FINAL METER VOLUME (CUBIC FEET)=	800.751
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.002
NET METER VOLUME (CUBIC FEET)=	10.423
GAS VOLUME (DRY STANDARD CUBIC FEET)=	10.798
BAROMETRIC PRESSURE (IN. HG)=	29.46
STATIC PRESSURE (INCHES H2O)=	-3.00
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	51.1
PERCENT WATER=	18.23
AVERAGE METER TEMPERATURE (F.)=	43.1
AVERAGE DELTA H (IN. H2O)=	1.18
AVERAGE DELTA P (IN. H2O)=	0.57
AVERAGE STACK TEMPERATURE (F.)=	317.3
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	27.185
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.7444
% ISOKINETIC=	99.8
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2530
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,171
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	56,688
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	37,629
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	30,771

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	18.4207
PARTICULATE LOADING, DRY STD. (GR./SCF)=	26.2704
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	14.2541
EMISSION RATE (LB/HR)=	6927.71

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	18.4207
PARTICULATE LOADING, DRY STD. (GR./SCF)=	26.2704
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	14.2541
EMISSION RATE (LB/HR)=	6927.71
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I2M5
RUN # - I-2
LOCATION - BOWEN ASPHALT
DATE - 10/22/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	22.389
FINAL METER VOLUME (CUBIC METERS)=	22.674
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.295
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.306
BAROMETRIC PRESSURE (MM HG)=	748.28
STATIC PRESSURE (MM H2O)=	-76.2
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	51.1
PERCENT WATER=	18.23
AVERAGE METER TEMPERATURE (C.)=	6.2
AVERAGE DELTA H (MM H2O)=	30.1
AVERAGE DELTA P (MM H2O)=	14.5
AVERAGE STACK TEMPERATURE (C.)=	158.5
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	27.185
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.7516
% ISOKINETIC=	99.8
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.43
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	967
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,605
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,066
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	871

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	18.4207
PARTICULATE LOADING, DRY STD. (G/CU. M)=	60.2440
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	32.6880
EMISSION RATE (KG/HR)=	3145.18

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	18.4207
PARTICULATE LOADING, DRY STD. (G/CU. M)=	60.2440
PARTICULATE LOADING, ACTUAL (G/CU. M)=	32.6880
EMISSION RATE (KG/HR)=	3145.18
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I2M5
RUN # - I-2
LOCATION - BOWEN ASPHALT
DATE - 10/22/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.68	1.50	315	41	41
2	0.48	1.00	323	43	41
3	0.29	0.50	316	44	41
4	0.80	1.60	317	44	41
5	0.74	1.60	323	48	42
6	0.43	0.90	310	49	42

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	14.1952	3.5447	0.0008	10.6497

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	105.2640	97.4919	250.0	7.7710
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I3M5
RUN # - I3M5
LOCATION - BOWEN ASPHALT
DATE - 10/20/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	732.085
FINAL METER VOLUME (CUBIC FEET)=	743.476
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.003
NET METER VOLUME (CUBIC FEET)=	11.812
GAS VOLUME (DRY STANDARD CUBIC FEET)=	11.514
BAROMETRIC PRESSURE (IN. HG)=	29.06
STATIC PRESSURE (INCHES H20)=	-3.00
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	55.1
PERCENT WATER=	10.39
AVERAGE METER TEMPERATURE (F.)=	67.8
AVERAGE DELTA H (IN. H20)=	1.43
AVERAGE DELTA P (IN. H20)=	0.71
AVERAGE STACK TEMPERATURE (F.)=	304.8
DRY MOLECULAR WEIGHT=	29.313
WET MOLECULAR WEIGHT=	27.232
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.8252
% ISOKINETIC=	100.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2470
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,508
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	62,714
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	41,731
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	34,055

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	14.4033
PARTICULATE LOADING, DRY STD. (GR./SCF)=	19.2652
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	10.4571
EMISSION RATE (LB/HR)=	5622.51

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	14.4033
PARTICULATE LOADING, DRY STD. (GR./SCF)=	19.2652
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	10.4571
EMISSION RATE (LB/HR)=	5622.51
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I3M5
RUN # - I3M5
LOCATION - BOWEN ASPHALT
DATE - 10/20/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	20.730
FINAL METER VOLUME (CUBIC METERS)=	21.052
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.334
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.326
BAROMETRIC PRESSURE (MM HG)=	738.12
STATIC PRESSURE (MM H2O)=	-76.2
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	55.1
PERCENT WATER=	18.39
AVERAGE METER TEMPERATURE (C.)=	19.9
AVERAGE DELTA H (MM H2O)=	36.4
AVERAGE DELTA P (MM H2O)=	18.1
AVERAGE STACK TEMPERATURE (C.)=	151.6
DRY MOLECULAR WEIGHT=	29.313
WET MOLECULAR WEIGHT=	27.232
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.1590
% ISOKINETIC=	100.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.27
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,069
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,776
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,182
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	964

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	14.4033
PARTICULATE LOADING, DRY STD. (G/CU. M)=	44.1795
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	23.9806
EMISSION RATE (KG/HR)=	2552.62

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	14.4033
PARTICULATE LOADING, DRY STD. (G/CU. M)=	44.1795
PARTICULATE LOADING, ACTUAL (G/CU. M)=	23.9806
EMISSION RATE (KG/HR)=	2552.62
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I3M5
RUN # - I3M5
LOCATION - BOWEN ASPHALT
DATE - 10/20/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.10	2.30	307	65	65
2	0.85	1.80	310	69	66
3	0.35	0.70	301	71	67
4	0.93	1.85	299	68	67
5	0.68	1.30	303	70	67
6	0.36	0.65	309	71	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	10.1590	3.5478	0.0008	6.6104

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	116.7370	108.9430	250.0	7.7929
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I4M5
RUN # - I-4
LOCATION - BOWEN ASPHALT
DATE - 10/20/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	751.280
FINAL METER VOLUME (CUBIC FEET)=	758.012
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.002
NET METER VOLUME (CUBIC FEET)=	6.981
GAS VOLUME (DRY STANDARD CUBIC FEET)=	6.689
BAROMETRIC PRESSURE (IN. HG)=	29.06
STATIC PRESSURE (INCHES H2O)=	-3.00
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	36.4
PERCENT WATER=	20.40
AVERAGE METER TEMPERATURE (F.)=	77.3
AVERAGE DELTA H (IN. H2O)=	1.65
AVERAGE DELTA P (IN. H2O)=	0.80
AVERAGE STACK TEMPERATURE (F.)=	319.3
DRY MOLECULAR WEIGHT=	29.313
WET MOLECULAR WEIGHT=	27.005
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.8791
% ISOKINETIC=	98.8
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	10.0
NOZZLE DIAMETER (INCHES)=	0.2510
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,789
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	67,721
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	44,229
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	35,205

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	5.5428
PARTICULATE LOADING, DRY STD. (GR./SCF)=	12.7614
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	6.6315
EMISSION RATE (LB/HR)=	3850.24

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	5.5428
PARTICULATE LOADING, DRY STD. (GR./SCF)=	12.7614
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	6.6315
EMISSION RATE (LB/HR)=	3850.24
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I4M5
RUN # - I-4
LOCATION - BOWEN ASPHALT
DATE - 10/20/81
PROJECT # - 4091L-83

INITIAL METER VOLUME (CUBIC METERS)=	21.273
FINAL METER VOLUME (CUBIC METERS)=	21.464
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.198
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.189
BAROMETRIC PRESSURE (MM HG)=	738.12
STATIC PRESSURE (MM H2O)=	-76.2
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	36.4
PERCENT WATER=	20.40
AVERAGE METER TEMPERATURE (C.)=	25.1
AVERAGE DELTA H (MM H2O)=	41.9
AVERAGE DELTA P (MM H2O)=	20.4
AVERAGE STACK TEMPERATURE (C.)=	159.6
DRY MOLECULAR WEIGHT=	29.313
WET MOLECULAR WEIGHT=	27.005
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.4308
% ISOKINETIC=	98.8
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	10.0
NOZZLE DIAMETER (MM)=	6.38
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,155
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,918
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,252
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	997

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	5.5428
PARTICULATE LOADING, DRY STD. (G/CU. M)=	29.2648
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	15.2075
EMISSION RATE (KG/HR)=	1748.01

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	5.5428
PARTICULATE LOADING, DRY STD. (G/CU. M)=	29.2648
PARTICULATE LOADING, ACTUAL (G/CU. M)=	15.2075
EMISSION RATE (KG/HR)=	1748.01
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I4M5
RUN # - I-4
LOCATION - BOWEN ASPHALT
DATE - 10/20/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.10	2.30	344	76	75
2	0.88	1.90	317	80	75
3	0.35	0.70	310	80	76
4	0.88	1.70	306	80	76

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	7.1730	3.5386	0.0008	3.6336

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	97.8027	95.8924	250.0	1.9092
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - ISM5
RUN # - I-5
LOCATION - BOWEN ASPHALT
DATE - 10/22/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	807.380
FINAL METER VOLUME (CUBIC FEET)=	818.966
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.001
NET METER VOLUME (CUBIC FEET)=	12.015
GAS VOLUME (DRY STANDARD CUBIC FEET)=	12.354
BAROMETRIC PRESSURE (IN. HG)=	29.46
STATIC PRESSURE (INCHES H2O)=	-2.40
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	84.6
PERCENT WATER=	24.39
AVERAGE METER TEMPERATURE (F.)=	47.4
AVERAGE DELTA H (IN. H2O)=	1.60
AVERAGE DELTA P (IN. H2O)=	0.80
AVERAGE STACK TEMPERATURE (F.)=	331.5
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	26.493
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.8830
% ISOKINETIC=	106.1
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2500
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,842
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	68,683
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	44,843
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	33,907

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	19.8211
PARTICULATE LOADING, DRY STD. (GR./SCF)=	24.7081
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	12.1928
EMISSION RATE (LB/HR)=	7179.67

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	19.8211
PARTICULATE LOADING, DRY STD. (GR./SCF)=	24.7081
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	12.1928
EMISSION RATE (LB/HR)=	7179.67
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I5M5
RUN # - I-5
LOCATION - BOWEN ASPHALT
DATE - 10/22/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	22.862
FINAL METER VOLUME (CUBIC METERS)=	23.190
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.340
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.350
BAROMETRIC PRESSURE (MM HG)=	748.28
STATIC PRESSURE (MM H2O)=	-61.0
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	84.6
PERCENT WATER=	24.39
AVERAGE METER TEMPERATURE (C.)=	8.6
AVERAGE DELTA H (MM H2O)=	40.6
AVERAGE DELTA P (MM H2O)=	20.4
AVERAGE STACK TEMPERATURE (C.)=	166.4
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	26.493
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.4502
% ISOKINETIC=	106.1
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.35
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,171
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,945
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,270
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	960

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	19.8211
PARTICULATE LOADING, DRY STD. (G/CU. M)=	56.6613
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	27.9608
EMISSION RATE (KG/HR)=	3259.57

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	19.8211
PARTICULATE LOADING, DRY STD. (G/CU. M)=	56.6613
PARTICULATE LOADING, ACTUAL (G/CU. M)=	27.9608
EMISSION RATE (KG/HR)=	3259.57
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I5M5
RUN # - I-5
LOCATION - BOWEN ASPHALT
DATE - 10/22/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.10	2.30	331	46	45
2	0.87	1.70	331	49	46
3	0.68	1.30	332	50	46
4	1.10	2.20	345	48	46
5	0.67	1.30	336	50	46
6	0.39	0.80	314	51	46

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	14.0482	3.5562	0.0008	10.4912

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	108.3880	99.0570	250.0	9.3299
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I6BM5
RUN # - I-6-B
LOCATION - BOWEN ASPHALT
DATE - 10/27/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	218.634
FINAL METER VOLUME (CUBIC FEET)=	230.313
METER FACTOR= 1.034	
FINAL LEAK RATE (CU FT/MIN)=	0.003
NET METER VOLUME (CUBIC FEET)=	12.076
GAS VOLUME (DRY STANDARD CUBIC FEET)=	11.785
BAROMETRIC PRESSURE (IN. HG)=	29.20
STATIC PRESSURE (INCHES H2O)=	-2.90
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	80.4
PERCENT WATER=	24.32
AVERAGE METER TEMPERATURE (F.)=	69.8
AVERAGE DELTA H (IN. H2O)=	1.52
AVERAGE DELTA P (IN. H2O)=	0.79
AVERAGE STACK TEMPERATURE (F.)=	326.2
DRY MOLECULAR WEIGHT=	29.308
WET MOLECULAR WEIGHT=	26.558
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.8657
% ISOKINETIC=	106.0
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2470
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,769
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	67,367
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	43,833
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	33,174

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	15.3899
PARTICULATE LOADING, DRY STD. (GR./SCF)=	20.1110
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	9.8993
EMISSION RATE (LB/HR)=	5717.50

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	15.3899
PARTICULATE LOADING, DRY STD. (GR./SCF)=	20.1110
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	9.8993
EMISSION RATE (LB/HR)=	5717.50
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I6BM5
RUN # - I-6-B
LOCATION - BOWEN ASPHALT
DATE - 10/27/81
PROJECT # - 4691L-83

INITIAL METER VOLUME (CUBIC METERS)=	6.191
FINAL METER VOLUME (CUBIC METERS)=	6.522
METER FACTOR= 1.034	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.342
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.334
BAROMETRIC PRESSURE (MM HG)=	741.68
STATIC PRESSURE (MM H2O)=	-73.7
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	80.4
PERCENT WATER=	24.32
AVERAGE METER TEMPERATURE (C.)=	21.0
AVERAGE DELTA H (MM H2O)=	38.5
AVERAGE DELTA P (MM H2O)=	19.9
AVERAGE STACK TEMPERATURE (C.)=	163.4
DRY MOLECULAR WEIGHT=	29.308
WET MOLECULAR WEIGHT=	26.558
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.3628
% ISOKINETIC=	106.0
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.27
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,149
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,908
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,241
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	939

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	15.3899
PARTICULATE LOADING, DRY STD. (G/CU. M)=	46.1190
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	22.7014
EMISSION RATE (KG/HR)=	2595.74

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	15.3899
PARTICULATE LOADING, DRY STD. (G/CU. M)=	46.1190
PARTICULATE LOADING, ACTUAL (G/CU. M)=	22.7014
EMISSION RATE (KG/HR)=	2595.74
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I6BM5
RUN # - I-6-B
LOCATION - BOWEN ASPHALT
DATE - 10/27/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.95	2.00	332	66	66
2	0.82	1.65	362	70	67
3	0.39	0.75	324	72	67
4	1.10	2.00	340	72	68
5	1.10	1.90	306	75	69
6	0.35	0.80	293	76	70

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	11.6246	3.8048	0.0008	7.8190

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	118.2490	110.6770	250.0	7.5709
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I7M5
RUN # - I-7
LOCATION - BOWEN ASPHALT
DATE - 10/26/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	849.775
FINAL METER VOLUME (CUBIC FEET)=	862.145
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.002
NET METER VOLUME (CUBIC FEET)=	12.820
GAS VOLUME (DRY STANDARD CUBIC FEET)=	12.573
BAROMETRIC PRESSURE (IN. HG)=	29.18
STATIC PRESSURE (INCHES H20)=	-2.10
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	3.50
MOISTURE COLLECTED (ML)=	83.1
PERCENT WATER=	23.74
AVERAGE METER TEMPERATURE (F.)=	67.4
AVERAGE DELTA H (IN. H20)=	1.72
AVERAGE DELTA P (IN. H20)=	0.87
AVERAGE STACK TEMPERATURE (F.)=	339.0
DRY MOLECULAR WEIGHT=	29.228
WET MOLECULAR WEIGHT=	26.563
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.9202
% ISOKINETIC=	104.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2490
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	4,036
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	72,140
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	46,247
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	35,268

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	20.2125
PARTICULATE LOADING, DRY STD. (GR./SCF)=	24.7565
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	12.0982
EMISSION RATE (LB/HR)=	7482.58

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	20.2125
PARTICULATE LOADING, DRY STD. (GR./SCF)=	24.7565
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	12.0982
EMISSION RATE (LB/HR)=	7482.58
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I7M5
RUN # - I-7
LOCATION - BOWEN ASPHALT
DATE - 10/26/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	24.062
FINAL METER VOLUME (CUBIC METERS)=	24.412
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.363
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.356
BAROMETRIC PRESSURE (MM HG)=	741.17
STATIC PRESSURE (MM H2O)=	-53.3
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	3.50
MOISTURE COLLECTED (ML)=	83.1
PERCENT WATER=	23.74
AVERAGE METER TEMPERATURE (C.)=	19.7
AVERAGE DELTA H (MM H2O)=	43.6
AVERAGE DELTA P (MM H2O)=	22.1
AVERAGE STACK TEMPERATURE (C.)=	170.6
DRY MOLECULAR WEIGHT=	29.228
WET MOLECULAR WEIGHT=	26.563
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.6377
% ISOKINETIC=	104.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.32
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,230
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,043
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,310
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	999

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	20.2125
PARTICULATE LOADING, DRY STD. (G/CU. M)=	56.7722
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	27.7440
EMISSION RATE (KG/HR)=	3397.09

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	20.2125
PARTICULATE LOADING, DRY STD. (G/CU. M)=	56.7722
PARTICULATE LOADING, ACTUAL (G/CU. M)=	27.7440
EMISSION RATE (KG/HR)=	3397.09
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I7M5
RUN # - I-7
LOCATION - BOWEN ASPHALT
DATE - 10/26/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.10	2.20	338	63	62
2	1.20	2.30	347	69	63
3	0.50	1.00	353	71	64
4	1.05	2.10	323	71	64
5	0.88	1.70	338	75	65
6	0.50	1.00	335	76	66

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	13.7615	3.7506	0.0008	10.0101

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	106.9260	96.7225	250.0	10.2024
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I8M5
RUN # - I-6
LOCATION - BOWEN ASPHALT
DATE - 10/27/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	198.800
FINAL METER VOLUME (CUBIC FEET)=	211.558
METER FACTOR= 1.034	
FINAL LEAK RATE (CU FT/MIN)=	0.002
NET METER VOLUME (CUBIC FEET)=	13.192
GAS VOLUME (DRY STANDARD CUBIC FEET)=	12.946
BAROMETRIC PRESSURE (IN. HG)=	29.20
STATIC PRESSURE (INCHES H2O)=	-2.90
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	80.4
PERCENT WATER=	22.63
AVERAGE METER TEMPERATURE (F.)=	67.3
AVERAGE DELTA H (IN. H2O)=	1.81
AVERAGE DELTA P (IN. H2O)=	0.89
AVERAGE STACK TEMPERATURE (F.)=	315.8
DRY MOLECULAR WEIGHT=	29.308
WET MOLECULAR WEIGHT=	26.749
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.9212
% ISOKINETIC=	104.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2500
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,970
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	70,963
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	46,788
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	36,199

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	15.8272
PARTICULATE LOADING, DRY STD. (GR./SCF)=	18.8271
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	9.6002
EMISSION RATE (LB/HR)=	5840.72

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	15.8272
PARTICULATE LOADING, DRY STD. (GR./SCF)=	18.8271
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	9.6002
EMISSION RATE (LB/HR)=	5840.72
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I8M5
RUN # - I-8
LOCATION - BOWEN ASPHALT
DATE - 10/27/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	5.629
FINAL METER VOLUME (CUBIC METERS)=	5.990
METER FACTOR= 1.034	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.374
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.367
BAROMETRIC PRESSURE (MM HG)=	741.68
STATIC PRESSURE (MM H2O)=	-73.7
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	80.4
PERCENT WATER=	22.63
AVERAGE METER TEMPERATURE (C.)=	19.6
AVERAGE DELTA H (MM H2O)=	45.9
AVERAGE DELTA P (MM H2O)=	22.5
AVERAGE STACK TEMPERATURE (C.)=	157.7
DRY MOLECULAR WEIGHT=	29.308
WET MOLECULAR WEIGHT=	26.749
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.6427
% ISOKINETIC=	104.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.35
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,210
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,009
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,325
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,025

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	15.8272
PARTICULATE LOADING, DRY STD. (G/CU. M)=	43.1749
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	22.0155
EMISSION RATE (KG/HR)=	2651.69

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	15.8272
PARTICULATE LOADING, DRY STD. (G/CU. M)=	43.1749
PARTICULATE LOADING, ACTUAL (G/CU. M)=	22.0155
EMISSION RATE (KG/HR)=	2651.69
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I8M5
RUN # - I-8
LOCATION - BOWEN ASPHALT
DATE - 10/27/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.30	2.60	297	63	65
2	1.20	2.50	324	68	65
3	0.42	0.90	327	70	65
4	1.10	2.20	310	69	66
5	0.84	1.70	323	71	66
6	0.46	0.95	314	72	67

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	10.7346	3.7078	0.0001	7.0267

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	101.8020	93.0004	250.0	8.8005
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

ANDERSEN HCSS (INLET PARTICLE SIZING)

INPUT DATA FOR FILE I11BMC
TEST DATE - 10/26/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-1-1B

% WATER= 20.64
% CARBON DIOXIDE= 3.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.70

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	341.1 DEGREES F.	SAMPLING TIME=	24.0 MIN.
BAR. PRESSURE=	29.12 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	-2.10 INCHES H20	SAMPLER TEMP. =	341.1 DEGREES F.
AVE. DELTA P=	1.13 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	7.144 CUBIC FEET
METER TEMP.=	63.8 DEGREES F.	DELTA H=	0.25 INCHES H20
PROBE DIA.=	0.155 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	7.010 CU. FT.	DRY MOLECULAR WT.=	29.23
SAMPLE VOL.-WET STD.=	8.833 CU. FT.	WET MOLECULAR WT.=	26.91
STACK VELOCITY=	4640.8 FT./MIN.	% ISOKINETIC=	94.9
NOZZLE VELOCITY=	4403.9 FT./MIN.	SAMPLING RATE-ACTUAL=	0.577 CU. FT/MIN
MASS COLLECTED=	6836.900 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	11.94459 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	15.05115 GRAIN/SCF	FILTER BLANK=	0.400 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.565 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	6215.20	1548.60	2063.30	2472.80	24310.80
TARE WT (MG)	1440.00	1453.40	1445.80	1381.80	24052.40
NET WT (MG) CORRECTED	4775.20	95.20	617.50	1091.00	258.00
FRACTION % OF TOTAL	69.84	1.39	9.03	15.96	3.77
CUM. % WITH FILTER	69.84	71.24	80.27	96.23	100.00
FRACTION % WITHOUT FILTER	72.58	1.45	9.39	16.58	
CUM. % WITHOUT FILTER	72.58	74.03	83.42	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	14.79	11.37	6.34	1.86	<1.86
DM/DLOGD (GRAINS/SCF)		1.45391	4.25395	3.58408	
GEO MEAN (MICRONS)		12.97	8.49	3.44	<3.44
PARTICLE COUNT		1.39D+07	6.20D+07	1.29D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I12HC
TEST DATE - 10/21/81
PROJECT # - 4091-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-1-2

% WATER= 17.26
% CARBON DIOXIDE= 5.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 15.31

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	323.0 DEGREES F.	SAMPLING TIME=	21.0 MIN.
BAR. PRESSURE=	29.38 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	-3.00 INCHES H20	SAMPLER TEMP. =	323.0 DEGREES F.
AVE. DELTA P=	0.97 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	5.909 CUBIC FEET
METER TEMP.=	58.0 DEGREES F.	DELTA H=	0.23 INCHES H20
PROBE DIA.=	0.156 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	5.915 CU. FT.	DRY MOLECULAR WT.=	29.41
SAMPLE VOL.-WET STD.=	7.149 CU. FT.	WET MOLECULAR WT.=	27.44
STACK VELOCITY=	4189.0 FT./MIN.	% ISOKINETIC=	93.2
NOZZLE VELOCITY=	3904.4 FT./MIN.	SAMPLING RATE-ACTUAL=	0.518 CU. FT/MIN
MASS COLLECTED=	8121.600 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	17.53098 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	21.18803 GRAIN/SCF	FILTER BLANK=	0.400 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.544 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	7476.50	1514.00	1957.40	2525.20	24003.00
TARE WT (MG)	1387.80	1389.00	1390.80	1381.90	23804.60
NET WT (MG) CORRECTED	6088.70	125.00	566.60	1143.30	198.00
FRACTION % OF TOTAL	74.97	1.54	6.98	14.08	2.44
CUM. % WITH FILTER	74.97	76.51	83.48	97.56	100.00
FRACTION % WITHOUT FILTER	76.84	1.58	7.15	14.43	
CUM. % WITHOUT FILTER	76.84	78.42	85.57	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.46	11.75	6.65	1.94	<1.94
DM/DLOGD (GRAINS/SCF)		2.26449	4.94171	4.61746	
GEO MEAN (MICRONS)		13.48	8.84	3.59	<3.59
PARTICLE COUNT		2.08D+07	6.92D+07	1.59D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I13HC
TEST DATE - 10/22/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-1-3

% WATER= 20.00
% CARBON DIOXIDE= 3.33
% CARBON MONOXIDE= 0.00
% OXYGEN= 17.50

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 335.9 DEGREES F.
BAR. PRESSURE= 29.46 INCHES HG
STATIC PRESSURE= -3.00 INCHES H20
AVE. DELTA P= 0.42 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 39.6 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 335.9 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.643 CUBIC FEET
DELTA H= 0.22 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.914 CU. FT.
SAMPLE VOL.-WET STD.= 8.643 CU. FT.
STACK VELOCITY= 2816.7 FT./MIN.
NOZZLE VELOCITY= 2679.3 FT./MIN.
MASS COLLECTED= 7854.501 MG.
LOADING= 14.02477 GRAIN/SCF
LOADING(DRY)= 17.53096 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.558 CU. FT/MIN

DRY MOLECULAR WT.= 29.23
WET MOLECULAR WT.= 26.99
% ISOKINETIC= 95.1
SAMPLING RATE-ACTUAL= 0.556 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	7784.20	1520.00	1841.00	2289.20	24523.90
TARE WT (MG)	1438.70	1451.50	1441.60	1382.40	24389.20
NET WT (MG) CORRECTED	6345.50	68.50	399.40	906.80	134.30
FRACTION % OF TOTAL	80.79	0.87	5.08	11.54	1.71
CUM. % WITH FILTER	80.79	81.66	86.75	98.29	100.00
FRACTION % WITHOUT FILTER	82.19	0.89	5.17	11.75	
CUM. % WITHOUT FILTER	82.19	83.08	88.25	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.05	11.51	6.45	1.89	<1.89
DM/DLOGD (GRAINS/SCF)		1.04955	2.83693	3.04010	
GEO MEAN (MICRONS)		13.16	8.61	3.49	<3.49
PARTICLE COUNT		9.87D+06	4.08D+07	1.08D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I14HC
TEST DATE - 10/21/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-1-4

% WATER= 20.00
% CARBON DIOXIDE= 5.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 15.31

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 333.1 DEGREES F.
BAR. PRESSURE= 29.24 INCHES HG
STATIC PRESSURE= -3.00 INCHES H20
AVE. DELTA P= 0.87 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 55.5 DEGREES F.
PROBE DIA.= 0.156 INCHES

SAMPLING TIME= 21.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 333.1 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 5.899 CUBIC FEET
DELTA H= 0.23 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 5.906 CU. FT.
SAMPLE VOL.-WET STD.= 7.382 CU. FT.
STACK VELOCITY= 4038.9 FT./MIN.
NOZZLE VELOCITY= 4103.5 FT./MIN.
MASS COLLECTED= 12872.400 MG.
LOADING= 26.90952 GRAIN/SCF
LOADING(DRY)= 33.63690 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.555 CU. FT/MIN

DRY MOLECULAR WT.= 29.41
WET MOLECULAR WT.= 27.13
% ISOKINETIC= 101.6
SAMPLING RATE-ACTUAL= 0.545 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	12054.00	1567.50	2131.70	2368.50	24716.60
TARE WT (MG)	1446.40	1388.00	1380.80	1390.60	24359.70
NET WT (MG) CORRECTED	10607.60	179.50	750.90	977.90	356.50
FRACTION % OF TOTAL	82.41	1.39	5.83	7.60	2.77
CUM. % WITH FILTER	82.41	83.80	89.63	97.23	100.00
FRACTION % WITHOUT FILTER	84.75	1.43	6.00	7.81	
CUM. % WITHOUT FILTER	84.75	86.19	92.19	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.18	11.58	6.51	1.91	<1.91
DM/DLOGD (GRAINS/SCF)		3.18780	6.27206	3.83696	
GEO MEAN (MICRONS)		13.26	8.68	3.52	<3.52
PARTICLE COUNT		2.98D+07	8.94D+07	1.35D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I21CHC
TEST DATE - 11/6/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-2-1C

% WATER= 17.00
% CARBON DIOXIDE= 4.80
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.00

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 359.3 DEGREES F.
BAR. PRESSURE= 29.40 INCHES HG
STATIC PRESSURE= -3.00 INCHES H20
AVE. DELTA P= 1.13 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 57.0 DEGREES F.
PROBE DIA.= 0.155 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 359.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.789 CUBIC FEET
DELTA H= 0.24 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.814 CU. FT.
SAMPLE VOL.-WET STD.= 8.210 CU. FT.
STACK VELOCITY= 4630.1 FT./MIN.
NOZZLE VELOCITY= 4155.1 FT./MIN.
MASS COLLECTED= 2903.601 MG.
LOADING= 5.45791 GRAIN/SCF
LOADING(DRY)= 6.57580 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.585 CU. FT/MIN

DRY MOLECULAR WT.= 29.41
WET MOLECULAR WT.= 27.47
% ISOKINETIC= 89.7
SAMPLING RATE-ACTUAL= 0.544 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.600 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3521.10	1432.30	1608.60	1835.50	24189.10
TARE WT (MG)	1392.00	1386.70	1386.80	1389.20	24127.70
NET WT (MG) CORRECTED	2129.10	45.60	221.80	446.30	60.80
FRACTION % OF TOTAL	73.33	1.57	7.64	15.37	2.09
CUM. % WITH FILTER	73.33	74.90	82.54	97.91	100.00
FRACTION % WITHOUT FILTER	74.89	1.60	7.80	15.70	
CUM. % WITHOUT FILTER	74.89	76.50	84.30	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.70	11.72	6.59	1.98	<1.98
DM/DLOGD (GRAINS/SCF)		0.67498	1.66553	1.60631	
GEO MEAN (MICRONS)		13.56	8.78	3.61	<3.61
PARTICLE COUNT		6.16D+06	2.35D+07	5.51D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I22BHC
TEST DATE - 10/22/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-2-2B

% WATER= 20.00
% CARBON DIOXIDE= 3.33
% CARBON MONOXIDE= 0.00
% OXYGEN= 17.50

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	336.8 DEGREES F.	SAMPLING TIME=	24.0 MIN.
BAR. PRESSURE=	29.47 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	-2.40 INCHES H2O	SAMPLER TEMP. =	336.8 DEGREES F.
AVE. DELTA P=	0.92 INCHES H2O	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	6.406 CUBIC FEET
METER TEMP.=	47.1 DEGREES F.	DELTA H=	0.21 INCHES H2O
PROBE DIA.=	0.156 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	6.571 CU. FT.	DRY MOLECULAR WT.=	29.23
SAMPLE VOL.-WET STD.=	8.213 CU. FT.	WET MOLECULAR WT.=	26.99
STACK VELOCITY=	4139.0 FT./MIN.	% ISOKINETIC=	96.0
NOZZLE VELOCITY=	3975.4 FT./MIN.	SAMPLING RATE-ACTUAL=	0.528 CU. FT/MIN
MASS COLLECTED=	7913.000 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	14.86839 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	18.58548 GRAIN/SCF	FILTER BLANK=	0.400 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.560 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	7262.50	1517.40	2004.10	2449.80	24499.40
TARE WT (MG)	1381.20	1390.40	1383.00	1388.80	24276.40
NET WT (MG) CORRECTED	5881.30	127.00	621.10	1061.00	222.60
FRACTION % OF TOTAL	74.32	1.60	7.85	13.41	2.81
CUM. % WITH FILTER	74.32	75.93	83.78	97.19	100.00
FRACTION % WITHOUT FILTER	76.48	1.65	8.08	13.80	
CUM. % WITHOUT FILTER	76.48	78.13	86.20	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.56	11.74	6.63	1.96	<1.96
DM/DLOGD (GRAINS/SCF)		1.94991	4.69574	3.76255	
GEO MEAN (MICRONS)		13.52	8.82	3.60	<3.60
PARTICLE COUNT		1.79D+07	6.59D+07	1.29D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I23HC
TEST DATE -- 10/26/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-2-3

% WATER= 20.64
% CARBON DIOXIDE= 3.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.70

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 332.3 DEGREES F.
BAR. PRESSURE= 29.17 INCHES HG
STATIC PRESSURE= -2.10 INCHES H20
AVE. DELTA P= 0.35 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 52.0 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 332.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.494 CUBIC FEET
DELTA H= 0.23 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.530 CU. FT.
SAMPLE VOL.-WET STD.= 8.229 CU. FT.
STACK VELOCITY= 2582.3 FT./MIN.
NOZZLE VELOCITY= 2558.9 FT./MIN.
MASS COLLECTED= 5390.001 MG.
LOADING= 10.10869 GRAIN/SCF
LOADING(DRY)= 12.73776 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.554 CU. FT/MIN

DRY MOLECULAR WT.= 29.23
WET MOLECULAR WT.= 26.91
% ISOKINETIC= 99.1
SAMPLING RATE-ACTUAL= 0.531 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	5606.00	1439.60	1741.90	2141.20	24607.40
TARE WT (MG)	1448.30	1379.20	1379.20	1394.40	24544.60
NET WT (MG) CORRECTED	4157.70	60.40	362.70	746.80	62.40
FRACTION % OF TOTAL	77.14	1.12	6.73	13.86	1.16
CUM. % WITH FILTER	77.14	78.26	84.99	98.84	100.00
FRACTION % WITHOUT FILTER	78.04	1.13	6.81	14.02	
CUM. % WITHOUT FILTER	78.04	79.17	85.98	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.42	11.69	6.59	1.94	<1.94
DM/DLOGD (GRAINS/SCF)		0.94260	2.73331	2.63341	
GEO MEAN (MICRONS)		13.43	8.78	3.57	<3.57
PARTICLE COUNT		8.69D+06	3.85D+07	9.12D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I24HC
TEST DATE - 10/22/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-2-4

% WATER= 20.48
% CARBON DIOXIDE= 3.33
% CARBON MONOXIDE= 0.00
% OXYGEN= 17.50

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 338.6 DEGREES F.
BAR. PRESSURE= 29.45 INCHES HG
STATIC PRESSURE= -2.40 INCHES H20
AVE. DELTA P= 0.75 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 48.2 DEGREES F.
PROBE DIA.= 0.156 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 338.6 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.792 CUBIC FEET
DELTA H= 0.23 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.947 CU. FT.
SAMPLE VOL.-WET STD.= 8.736 CU. FT.
STACK VELOCITY= 3746.4 FT./MIN.
NOZZLE VELOCITY= 4241.5 FT./MIN.
MASS COLLECTED= 11763.302 MG.
LOADING= 20.77934 GRAIN/SCF
LOADING(DRY)= 26.13096 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.562 CU. FT/MIN

DRY MOLECULAR WT.= 29.23
WET MOLECULAR WT.= 26.93
% ISOKINETIC= 113.2
SAMPLING RATE-ACTUAL= 0.563 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	10453.30	1790.40	2206.50	2490.00	24272.80
TARE WT (MG)	1384.40	1383.80	1439.20	1451.20	23790.70
NET WT (MG) CORRECTED	9068.90	406.60	767.30	1038.80	481.70
FRACTION % OF TOTAL	77.09	3.46	6.52	8.83	4.09
CUM. % WITH FILTER	77.09	80.55	87.07	95.91	100.00
FRACTION % WITHOUT FILTER	80.39	3.60	6.80	9.21	
CUM. % WITHOUT FILTER	80.39	83.99	90.79	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	14.98	11.46	6.41	1.88	<1.88
DM/DLOGD (GRAINS/SCF)		6.18490	5.37576	3.44925	
GEO MEAN (MICRONS)		13.10	8.58	3.48	<3.48
PARTICLE COUNT		5.84D+07	7.76D+07	1.23D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I31HC
TEST DATE - 10/27/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-3-1

% WATER= 17.27
% CARBON DIOXIDE= 4.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.50

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	347.4 DEGREES F.	SAMPLING TIME=	24.0 MIN.
BAR. PRESSURE=	29.18 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	-2.90 INCHES H20	SAMPLER TEMP. =	347.4 DEGREES F.
AVE. DELTA P=	1.07 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	6.784 CUBIC FEET
METER TEMP.=	60.5 DEGREES F.	DELTA H=	0.24 INCHES H20
PROBE DIA.=	0.155 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	6.713 CU. FT.	DRY MOLECULAR WT.=	29.38
SAMPLE VOL.-WET STD.=	8.114 CU. FT.	WET MOLECULAR WT.=	27.41
STACK VELOCITY=	4487.2 FT./MIN.	% ISOKINETIC=	90.9
NOZZLE VELOCITY=	4076.9 FT./MIN.	SAMPLING RATE-ACTUAL=	0.534 CU. FT/MIN
MASS COLLECTED=	7362.500 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	14.00250 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	16.92554 GRAIN/SCF	FILTER BLANK=	0.400 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.572 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	7163.00	1754.60	1581.50	2350.60	24487.00
TARE WT (MG)	1445.00	1389.80	1381.00	1375.50	24382.50
NET WT (MG) CORRECTED	5718.00	364.80	200.50	975.10	104.10
FRACTION % OF TOTAL	77.66	4.95	2.72	13.24	1.41
CUM. % WITH FILTER	77.66	82.62	85.34	98.59	100.00
FRACTION % WITHOUT FILTER	78.78	5.03	2.76	13.43	
CUM. % WITHOUT FILTER	78.78	83.80	86.57	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.65	11.74	6.61	1.97	<1.97
DM/DLOGD (GRAINS/SCF)		5.55442	1.52983	3.52471	
GEO MEAN (MICRONS)		13.56	8.81	3.61	<3.61
PARTICLE COUNT		5.07D+07	2.15D+07	1.21D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I32HC
TEST DATE - 10/26/81
PROJECT # - 4091-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-3-2

% WATER= 20.64
% CARBON DIOXIDE= 3.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.70

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 344.0 DEGREES F.
BAR. PRESSURE= 29.18 INCHES HG
STATIC PRESSURE= -2.10 INCHES H2O
AVE. DELTA P= 0.95 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 69.4 DEGREES F.
PROBE DIA.= 0.156 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 344.0 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.717 CUBIC FEET
DELTA H= 0.22 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.534 CU. FT.
SAMPLE VOL.-WET STD.= 8.233 CU. FT.
STACK VELOCITY= 4252.8 FT./MIN.
NOZZLE VELOCITY= 4058.3 FT./MIN.
MASS COLLECTED= 7992.001 MG.
LOADING= 14.98075 GRAIN/SCF
LOADING(DRY)= 18.87695 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.568 CU. FT/MIN

DRY MOLECULAR WT.= 29.23
WET MOLECULAR WT.= 26.91
% ISOKINETIC= 95.4
SAMPLING RATE-ACTUAL= 0.539 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	7493.60	1468.90	1886.90	2380.70	24883.80
TARE WT (MG)	1380.60	1387.90	1381.20	1383.20	24588.60
NET WT (MG) CORRECTED	6113.00	81.00	505.70	997.50	294.80
FRACTION % OF TOTAL	76.49	1.01	6.33	12.48	3.69
CUM. % WITH FILTER	76.49	77.50	83.83	96.31	100.00
FRACTION % WITHOUT FILTER	79.42	1.05	6.57	12.96	
CUM. % WITHOUT FILTER	79.42	80.47	87.04	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.51	11.69	6.58	1.95	<1.95
DM/DLOGD (GRAINS/SCF)		1.23580	3.79580	3.54261	
GEO MEAN (MICRONS)		13.46	8.77	3.58	<3.58
PARTICLE COUNT		1.14D+07	5.36D+07	1.22D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I33HC
TEST DATE - 10/27/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID -- I-3-3

% WATER= 17.27
% CARBON DIOXIDE= 4.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.50

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 349.1 DEGREES F.
BAR. PRESSURE= 29.20 INCHES HG
STATIC PRESSURE= -2.90 INCHES H2O
AVE. DELTA P= 0.46 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 65.9 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 349.1 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 7.050 CUBIC FEET
DELTA H= 0.26 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.910 CU. FT.
SAMPLE VOL.-WET STD.= 8.352 CU. FT.
STACK VELOCITY= 2954.8 FT./MIN.
NOZZLE VELOCITY= 2655.3 FT./MIN.
MASS COLLECTED= 4638.899 MG.
LOADING= 8.57138 GRAIN/SCF
LOADING(DRY)= 10.36066 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.574 CU. FT/MIN

DRY MOLECULAR WT.= 29.38
WET MOLECULAR WT.= 27.41
% ISOKINETIC= 89.9
SAMPLING RATE-ACTUAL= 0.551 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	4470.20	1453.40	1832.00	2388.90	24569.20
TARE WT (MG)	1384.10	1391.20	1438.20	1451.50	24409.40
NET WT (MG) CORRECTED	3086.10	62.20	393.80	937.40	159.40
FRACTION % OF TOTAL	66.53	1.34	8.49	20.21	3.44
CUM. % WITH FILTER	66.53	67.87	76.36	96.56	100.00
FRACTION % WITHOUT FILTER	68.89	1.39	8.79	20.93	
CUM. % WITHOUT FILTER	68.89	70.28	79.07	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.39	11.61	6.52	1.94	<1.94
DM/DLOGD (GRAINS/SCF)		0.93989	2.89963	3.28839	
GEO MEAN (MICRONS)		13.37	8.70	3.55	<3.55
PARTICLE COUNT		8.70D+06	4.12D+07	1.15D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I34HC
TEST DATE - 10/26/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-3-4

% WATER= 20.64
% CARBON DIOXIDE= 3.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.70

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 341.5 DEGREES F.
BAR. PRESSURE= 29.08 INCHES HG
STATIC PRESSURE= -2.10 INCHES H20
AVE. DELTA P= 0.93 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 71.7 DEGREES F.
PROBE DIA.= 0.156 INCHES

SAMPLING TIME= 22.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 341.5 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.349 CUBIC FEET
DELTA H= 0.24 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.129 CU. FT.
SAMPLE VOL.-WET STD.= 7.723 CU. FT.
STACK VELOCITY= 4204.5 FT./MIN.
NOZZLE VELOCITY= 4154.3 FT./MIN.
MASS COLLECTED= 12903.399 MG.
LOADING= 25.78501 GRAIN/SCF
LOADING(DRY)= 32.49119 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.565 CU. FT/MIN

DRY MOLECULAR WT.= 29.23
WET MOLECULAR WT.= 26.91
% ISOKINETIC= 98.8
SAMPLING RATE-ACTUAL= 0.551 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	11724.20	1549.10	2264.60	2454.00	24631.70
TARE WT (MG)	1377.50	1378.60	1375.90	1391.80	24196.00
NET WT (MG) CORRECTED	10346.70	170.50	888.70	1062.20	435.30
FRACTION % OF TOTAL	80.19	1.32	6.89	8.23	3.37
CUM. % WITH FILTER	80.19	81.51	88.39	96.63	100.00
FRACTION % WITHOUT FILTER	82.99	1.37	7.13	8.52	
CUM. % WITHOUT FILTER	82.99	84.35	91.48	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.23	11.57	6.49	1.92	<1.92
DM/DLOGD (GRAINS/SCF)		2.85170	7.07458	4.00642	
GEO MEAN (MICRONS)		13.27	8.66	3.53	<3.53
PARTICLE COUNT		2.66D+07	1.01D+08	1.41D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I41HC
TEST DATE - 10/30/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-4-1

% WATER= 16.41
% CARBON DIOXIDE= 2.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 333.3 DEGREES F.
BAR. PRESSURE= 29.01 INCHES HG
STATIC PRESSURE= -2.20 INCHES H2O
AVE. DELTA P= 0.71 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 63.6 DEGREES F.
PROBE DIA.= 0.155 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 333.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 6.928 CUBIC FEET
DELTA H= 0.24 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.775 CU. FT.
SAMPLE VOL.-WET STD.= 8.106 CU. FT.
STACK VELOCITY= 3648.5 FT./MIN.
NOZZLE VELOCITY= 4018.1 FT./MIN.
MASS COLLECTED= 3348.601 MG.
LOADING= 6.37549 GRAIN/SCF
LOADING(DRY)= 7.62709 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.556 CU. FT/MIN

DRY MOLECULAR WT.= 29.13
WET MOLECULAR WT.= 27.30
% ISOKINETIC= 110.1
SAMPLING RATE-ACTUAL= 0.527 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)	3587.20	1498.40	1746.80	2067.80	24182.40
TARE WT (MG)	1437.80	1450.00	1445.00	1395.90	24005.20
NET WT (MG) CORRECTED	2149.40	48.40	301.80	671.90	177.10
FRACTION % OF TOTAL	64.19	1.45	9.01	20.07	5.29
CUM. % WITH FILTER	64.19	65.63	74.65	94.71	100.00
FRACTION % WITHOUT FILTER	67.77	1.53	9.52	21.19	
CUM. % WITHOUT FILTER	67.77	69.30	78.81	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.52	11.73	6.62	1.95	<1.95
DM/DLOGD (GRAINS/SCF)		0.75903	2.31289	2.40897	
GEO MEAN (MICRONS)		13.49	8.81	3.59	<3.59
PARTICLE COUNT		6.96D+06	3.25D+07	8.30D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I42HC
TEST DATE - 10/27/81
PROJECT # - 4091L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-4-2

% WATER= 17.27
% CARBON DIOXIDE= 4.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.50

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 341.6 DEGREES F.
BAR. PRESSURE= 29.16 INCHES HG
STATIC PRESSURE= -2.90 INCHES H20
AVE. DELTA P= 0.74 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 73.9 DEGREES F.
PROBE DIA.= 0.155 INCHES

SAMPLING TIME= 24.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 341.6 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 7.112 CUBIC FEET
DELTA H= 0.25 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 6.857 CU. FT.
SAMPLE VOL.-WET STD.= 8.288 CU. FT.
STACK VELOCITY= 3719.3 FT./MIN.
NOZZLE VELOCITY= 4137.2 FT./MIN.
MASS COLLECTED= 4487.200 MG.
LOADING= 8.35544 GRAIN/SCF
LOADING(DRY)= 10.09964 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.565 CU. FT/MIN

DRY MOLECULAR WT.= 29.38
WET MOLECULAR WT.= 27.41
% ISOKINETIC= 111.2
SAMPLING RATE-ACTUAL= 0.542 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	4618.00	1470.00	1746.00	2034.00	24099.00
TARE WT (MG)	1376.00	1391.60	1397.20	1391.20	23923.40
NET WT (MG) CORRECTED	3242.00	78.40	348.80	642.80	175.20
FRACTION % OF TOTAL	72.25	1.75	7.77	14.33	3.90
CUM. % WITH FILTER	72.25	74.00	81.77	96.10	100.00
FRACTION % WITHOUT FILTER	75.19	1.82	8.09	14.91	
CUM. % WITHOUT FILTER	75.19	77.00	85.09	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.40	11.65	6.55	1.94	<1.94
DM/DLOGD (GRAINS/SCF)		1.20361	2.59749	2.26218	
GEO MEAN (MICRONS)		13.39	8.73	3.56	<3.56
PARTICLE COUNT		1.11D+07	3.68D+07	7.86D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I43HC
TEST DATE - 10/30/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-4-3

% WATER= 16.41
% CARBON DIOXIDE= 2.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 337.7 DEGREES F.
BAR. PRESSURE= 29.01 INCHES HG
STATIC PRESSURE= -2.20 INCHES H20
AVE. DELTA P= 0.41 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 70.9 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 30.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 337.7 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 8.951 CUBIC FEET
DELTA H= 0.25 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 8.634 CU. FT.
SAMPLE VOL.-WET STD.= 10.329 CU. FT.
STACK VELOCITY= 2779.0 FT./MIN.
NOZZLE VELOCITY= 2602.2 FT./MIN.
MASS COLLECTED= 9765.099 MG.
LOADING= 14.59045 GRAIN/SCF
LOADING(DRY)= 17.45478 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.561 CU. FT/MIN

DRY MOLECULAR WT.= 29.13
WET MOLECULAR WT.= 27.30
% ISOKINETIC= 93.6
SAMPLING RATE-ACTUAL= 0.540 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)	9178.00	1469.40	1935.00	2264.20	24641.50
TARE WT (MG)	1383.60	1380.10	1384.40	1390.00	24184.80
NET WT (MG) CORRECTED	7794.40	89.30	550.60	874.20	456.60
FRACTION % OF TOTAL	79.82	0.91	5.64	8.95	4.68
CUM. % WITH FILTER	79.82	80.73	86.37	95.32	100.00
FRACTION % WITHOUT FILTER	83.73	0.96	5.92	9.39	
CUM. % WITHOUT FILTER	83.73	84.69	90.61	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.36	11.64	6.55	1.93	<1.93
DM/DLOGD (GRAINS/SCF)		1.10839	3.29333	2.46238	
GEO MEAN (MICRONS)		13.38	8.73	3.56	<3.56
PARTICLE COUNT		1.03D+07	4.67D+07	8.57D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I44HC
TEST DATE - 10/30/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-4-4

% WATER= 16.41
% CARBON DIOXIDE= 2.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	340.8 DEGREES F.	SAMPLING TIME=	30.0 MIN.
BAR. PRESSURE=	29.04 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	-2.20 INCHES H20	SAMPLER TEMP. =	340.8 DEGREES F.
AVE. DELTA P=	0.73 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	8.850 CUBIC FEET
METER TEMP.=	73.1 DEGREES F.	DELTA H=	0.25 INCHES H20
PROBE DIA.=	0.155 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	8.510 CU. FT.	DRY MOLECULAR WT.=	29.13
SAMPLE VOL.-WET STD.=	10.181 CU. FT.	WET MOLECULAR WT.=	27.30
STACK VELOCITY=	3716.7 FT./MIN.	% ISOKINETIC=	109.5
NOZZLE VELOCITY=	4071.3 FT./MIN.	SAMPLING RATE-ACTUAL=	0.533 CU. FT/MIN
MASS COLLECTED=	12200.101 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	18.49296 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	22.12341 GRAIN/SCF	FILTER BLANK=	0.100 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.564 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	10975.50	1571.30	2308.40	2233.00	25097.80
TARE WT (MG)	1389.60	1392.80	1435.00	1448.00	24320.40
NET WT (MG) CORRECTED	9585.90	178.50	873.40	785.00	777.30
FRACTION % OF TOTAL	78.57	1.46	7.16	6.43	6.37
CUM. % WITH FILTER	78.57	80.04	87.19	93.63	100.00
FRACTION % WITHOUT FILTER	83.92	1.56	7.65	6.87	
CUM. % WITHOUT FILTER	83.92	85.48	93.13	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.54	11.71	6.60	1.95	<1.95
DM/DLOGD (GRAINS/SCF)		2.20463	5.31310	2.25075	
GEO MEAN (MICRONS)		13.49	8.79	3.59	<3.59
PARTICLE COUNT		2.02D+07	7.48D+07	7.76D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

METHOD 17 (OUTLET MASS)

FILE NAME - 011
RUN # - 0-1-1
LOCATION - BAGHOUSE OUTLET
DATE - 10/22/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	185.830
FINAL METER VOLUME (CUBIC FEET)=	256.245
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	70.829
GAS VOLUME (DRY STANDARD CUBIC FEET)=	70.042
BAROMETRIC PRESSURE (IN. HG)=	29.46
STATIC PRESSURE (INCHES H20)=	-0.94
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	318.6
PERCENT WATER=	17.64
AVERAGE METER TEMPERATURE (F.)=	67.2
AVERAGE DELTA H (IN. H20)=	1.27
AVERAGE DELTA P (IN. H20)=	0.61
AVERAGE STACK TEMPERATURE (F.)=	285.1
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	27.251
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.7781
% ISOKINETIC=	95.6
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	115.0
NOZZLE DIAMETER (INCHES)=	0.2510
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,233
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	40,631
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	28,284
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	23,293

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2630
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0578
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0331
EMISSION RATE (LB/HR)=	11.54

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2630
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0578
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0331
EMISSION RATE (LB/HR)=	11.54
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 011
RUN # - 0-1-1
LOCATION - BAGHOUSE OUTLET
DATE - 10/22/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	5.262
FINAL METER VOLUME (CUBIC METERS)=	7.256
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	2.006
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.983
BAROMETRIC PRESSURE (MM HG)=	748.28
STATIC PRESSURE (MM H2O)=	-23.9
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	318.6
PERCENT WATER=	17.64
AVERAGE METER TEMPERATURE (C.)=	19.5
AVERAGE DELTA H (MM H2O)=	32.1
AVERAGE DELTA P (MM H2O)=	15.4
AVERAGE STACK TEMPERATURE (C.)=	140.6
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	27.251
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	3.9216
% ISOKINETIC=	95.6
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	115.0
NOZZLE DIAMETER (MM)=	6.38
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	986
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,151
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	801
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	660

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2630
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1326
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0760
EMISSION RATE (KG/HR)=	5.24

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2630
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1326
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0760
EMISSION RATE (KG/HR)=	5.24
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 011
RUN # - 0-1-1
LOCATION - BAGHOUSE OUTLET
DATE - 10/22/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.60	1.50	284	48	48
2	0.65	1.50	281	68	51
3	0.60	1.30	286	68	53
4	0.63	1.30	289	72	58
5	0.62	1.20	292	73	58
6	0.60	1.20	285	74	60
7	0.63	1.40	287	73	60
8	0.65	1.40	290	76	62
9	0.62	1.20	284	76	63
10	0.62	1.40	281	76	63
11	0.58	1.10	286	75	62
12	0.61	1.30	290	75	63
13	0.61	1.20	288	74	63
14	0.60	1.30	283	75	63
15	0.60	1.30	282	74	63
16	0.60	1.20	281	74	63
17	0.58	1.10	280	76	64
18	0.56	1.10	281	80	65
19	0.60	1.30	284	78	64
20	0.60	1.30	285	76	64
21	0.61	1.20	284	74	62
22	0.58	1.10	287	76	63
23	0.58	1.20	287	80	64

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.7722	1.5200	0.0000	0.2522

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.2164	68.2055	20.0	0.0108
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 012
RUN # - 0-1-2
LOCATION - BAGHOUSE OUTLET
DATE - 10/20/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	35.220
FINAL METER VOLUME (CUBIC FEET)=	66.661
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.005
NET METER VOLUME (CUBIC FEET)=	31.630
GAS VOLUME (DRY STANDARD CUBIC FEET)=	31.006
BAROMETRIC PRESSURE (IN. HG)=	29.06
STATIC PRESSURE (INCHES H20)=	-0.94
PERCENT OXYGEN=	4.00
PERCENT CARBON DIOXIDE=	16.83
MOISTURE COLLECTED (ML)=	152.4
PERCENT WATER=	18.80
AVERAGE METER TEMPERATURE (F.)=	66.5
AVERAGE DELTA H (IN. H20)=	2.70
AVERAGE DELTA P (IN. H20)=	1.07
AVERAGE STACK TEMPERATURE (F.)=	300.8
DRY MOLECULAR WEIGHT=	30.853
WET MOLECULAR WEIGHT=	28.437
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.0348
% ISOKINETIC=	97.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (INCHES)=	0.2500
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	4,283
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	53,817
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	36,192
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	29,388

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1017
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0505
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0276
EMISSION RATE (LB/HR)=	12.72

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1017
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0505
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0276
EMISSION RATE (LB/HR)=	12.72
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 012
RUN # - 0-1-2
LOCATION - BAGHOUSE OUTLET
DATE - 10/20/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	0.997
FINAL METER VOLUME (CUBIC METERS)=	1.888
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.896
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.878
BAROMETRIC PRESSURE (MM HG)=	738.12
STATIC PRESSURE (MM H2O)=	-23.9
PERCENT OXYGEN=	4.00
PERCENT CARBON DIOXIDE=	16.83
MOISTURE COLLECTED (ML)=	152.4
PERCENT WATER=	16.80
AVERAGE METER TEMPERATURE (C.)=	19.2
AVERAGE DELTA H (MM H2O)=	68.6
AVERAGE DELTA P (MM H2O)=	27.2
AVERAGE STACK TEMPERATURE (C.)=	149.3
DRY MOLECULAR WEIGHT=	30.953
WET MOLECULAR WEIGHT=	28.437
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	5.2153
% ISOKINETIC=	97.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (MM)=	6.35
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,305
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,524
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,025
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	832

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1017
PARTICULATE LOADING, DRY STD, (G/CU. M)=	0.1158
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0632
EMISSION RATE (KG/HR)=	5.78

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1017
PARTICULATE LOADING, DRY STD, (G/CU. M)=	0.1158
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0632
EMISSION RATE (KG/HR)=	5.78
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 012
RUN # - 0-1-2
LOCATION - BAGHOUSE OUTLET
DATE - 10/20/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.00	2.60	302	60	60
2	0.99	2.20	303	68	62
3	1.20	3.00	301	68	68
4	1.10	3.00	297	78	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	1.6221	1.5238	0.0000	0.0983

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	66.8452	66.8417	20.0	0.0034
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 013B
RUN # - 0-1-3B
LOCATION - BAGHOUSE OUTLET
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	983.440		
FINAL METER VOLUME (CUBIC FEET)=	1034.540		
METER FACTOR= 1.006			
FINAL LEAK RATE (CU FT/MIN)=	0.025	LEAK CORRECTION=	0.0050
NET METER VOLUME (CUBIC FEET)=	51.108		
GAS VOLUME (DRY STANDARD CUBIC FEET)=	50.073		
BAROMETRIC PRESSURE (IN. HG)=	29.38		
STATIC PRESSURE (INCHES H20)=	-0.94		
PERCENT OXYGEN=	4.30		
PERCENT CARBON DIOXIDE=	14.80		
MOISTURE COLLECTED (ML)=	261.4		
PERCENT WATER=	19.74		
AVERAGE METER TEMPERATURE (F.)=	72.3		
AVERAGE DELTA H (IN. H20)=	2.53		
AVERAGE DELTA P (IN. H20)=	1.13		
AVERAGE STACK TEMPERATURE (F.)=	305.2		
DRY MOLECULAR WEIGHT=	30.540		
WET MOLECULAR WEIGHT=	28.065		
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.0640		
% ISOKINETIC=	102.9		
PITOT COEFFICIENT=	0.8400		
SAMPLING TIME (MINUTES)=	60.0		
NOZZLE DIAMETER (INCHES)=	0.2490		
STACK AXIS #1 (INCHES)=	48.00		
STACK AXIS #2 (INCHES)=	48.00		
CIRCULAR STACK			
STACK AREA (SQUARE FEET)=	12.566		
STACK VELOCITY (ACTUAL, FEET/MIN)=	4,421		
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	55,555		
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	37,555		
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	30,143		

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2090
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0643
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0349
EMISSION RATE (LB/HR)=	16.61

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2090
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0643
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0349
EMISSION RATE (LB/HR)=	16.61
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 013B
RUN # - 0-1-3B
LOCATION - BAGHOUSE OUTLET
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	27.847		
FINAL METER VOLUME (CUBIC METERS)=	29.294		
METER FACTOR= 1.006			
FINAL LEAK RATE (CU M/MIN)=	0.0007	LEAK CORRECTION=	0.0001
NET METER VOLUME (CUBIC METERS)=	1.447		
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.418		
BAROMETRIC PRESSURE (MM HG)=	746.25		
STATIC PRESSURE (MM H2O)=	-23.9		
PERCENT OXYGEN=	4.30		
PERCENT CARBON DIOXIDE=	14.80		
MOISTURE COLLECTED (ML)=	261.4		
PERCENT WATER=	19.74		
AVERAGE METER TEMPERATURE (C.)=	22.4		
AVERAGE DELTA H (MM H2O)=	64.3		
AVERAGE DELTA P (MM H2O)=	28.8		
AVERAGE STACK TEMPERATURE (C.)=	151.8		
DRY MOLECULAR WEIGHT=	30.540		
WET MOLECULAR WEIGHT=	28.065		
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	5.3624		
% ISOKINETIC=	102.9		
PITOT COEFFICIENT=	0.8400		
SAMPLING TIME (MINUTES)=	60.0		
NOZZLE DIAMETER (MM)=	6.32		
STACK AXIS #1 (METERS)=	1.219		
STACK AXIS #2 (METERS)=	1.219		
CIRCULAR STACK			
STACK AREA (SQUARE METERS)=	1.167		
STACK VELOCITY (ACTUAL, M/MIN)=	1,347		
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,573		
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,063		
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	854		

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2090
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1474
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0800
EMISSION RATE (KG/HR)=	7.54

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2090
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1474
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0800
EMISSION RATE (KG/HR)=	7.54
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 013B
RUN # - 0-1-3B
LOCATION - BAGHOUSE OUTLET
DATE - 10/19/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.20	2.80	303	65	67
2	1.00	2.10	297	77	68
3	1.20	2.50	306	77	70
4	1.10	2.30	307	77	70
5	1.20	2.70	308	78	69
6	1.10	2.80	310	80	70

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.7346	1.5298	0.0000	0.2048

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.4081	68.4038	20.0	0.0042
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 014
RUN # - 0-1-4
LOCATION - BAGHOUSE OUTLET
DATE - 10/20/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	83,203
FINAL METER VOLUME (CUBIC FEET)=	105,274
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0,007
NET METER VOLUME (CUBIC FEET)=	22,203
GAS VOLUME (DRY STANDARD CUBIC FEET)=	21,305
BAROMETRIC PRESSURE (IN, HG)=	29,08
STATIC PRESSURE (INCHES H20)=	-0,94
PERCENT OXYGEN=	16,83
PERCENT CARBON DIOXIDE=	4,00
MOISTURE COLLECTED (ML)=	0,0
PERCENT WATER=	19,48
AVERAGE METER TEMPERATURE (F,)=	77,3
AVERAGE DELTA H (IN, H20)=	1,95
AVERAGE DELTA P (IN, H20)=	0,84
AVERAGE STACK TEMPERATURE (F,)=	309,2
DRY MOLECULAR WEIGHT=	29,313
WET MOLECULAR WEIGHT=	27,109
AVERAGE SQUARE ROOT OF DELTA P (IN, H20)=	0,9180
% ISOKINETIC=	104,0
PITOT COEFFICIENT=	0,8400
SAMPLING TIME (MINUTES)=	28,0
NOZZLE DIAMETER (INCHES)=	0,2530
STACK AXIS #1 (INCHES)=	48,00
STACK AXIS #2 (INCHES)=	48,00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12,566
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,911
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	49,151
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	32,715
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	26,342

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0,0590
PARTICULATE LOADING, DRY STD, (GR,/SCF)=	0,0427
PARTICULATE LOADING, ACTUAL (GR,/CU, FT,)=	0,0229
EMISSION RATE (LB/HR)=	9,63

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0,0590
PARTICULATE LOADING, DRY STD, (GR,/SCF)=	0,0427
PARTICULATE LOADING, ACTUAL (GR,/CU, FT,)=	0,0229
EMISSION RATE (LB/HR)=	9,63
PERCENT IMPINGER CATCH=	0,0

* * METRIC UNITS * *

FILE NAME - 014
RUN # - 0-1-4
LOCATION - BAGHOUSE OUTLET
DATE - 10/20/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	2.356
FINAL METER VOLUME (CUBIC METERS)=	2.981
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0002
NET METER VOLUME (CUBIC METERS)=	0.629
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.603
BAROMETRIC PRESSURE (MM HG)=	738.63
STATIC PRESSURE (MM H2O)=	-23.9
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	0.0
PERCENT WATER=	19.48
AVERAGE METER TEMPERATURE (C.)=	25.1
AVERAGE DELTA H (MM H2O)=	49.5
AVERAGE DELTA P (MM H2O)=	21.4
AVERAGE STACK TEMPERATURE (C.)=	154.0
DRY MOLECULAR WEIGHT=	29.313
WET MOLECULAR WEIGHT=	27.109
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.6267
% ISOKINETIC=	104.0
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	28.0
NOZZLE DIAMETER (MM)=	6.43
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,192
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,392
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	926
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	746

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0590
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.0978
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0524
EMISSION RATE (KG/HR)=	4.37

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0590
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.0978
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0524
EMISSION RATE (KG/HR)=	4.37
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 014
RUN # - 0-1-4
LOCATION - BAGHOUSE OUTLET
DATE - 10/20/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.75	1.90	307	75	75
2	0.85	2.00	313	76	74
3	0.86	1.90	313	80	75
4	0.88	2.00	312	80	75
5	0.86	1.90	304	81	77
6	0.86	2.00	306	81	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	1.5809	1.5242	0.0000	0.0567

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	67.6448	67.6424	20.0	0.0023
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 021
RUN # - 0-2-1
LOCATION - BAGHOUSE OUTLET
DATE - 10/26/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	294.090
FINAL METER VOLUME (CUBIC FEET)=	374.210
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.015
NET METER VOLUME (CUBIC FEET)=	80.601
GAS VOLUME (DRY STANDARD CUBIC FEET)=	75.759
BAROMETRIC PRESSURE (IN. HG)=	29.18
STATIC PRESSURE (INCHES H20)=	-0.60
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.20
MOISTURE COLLECTED (ML)=	403.8
PERCENT WATER=	20.07
AVERAGE METER TEMPERATURE (F.)=	89.0
AVERAGE DELTA H (IN. H20)=	1.02
AVERAGE DELTA P (IN. H20)=	0.51
AVERAGE STACK TEMPERATURE (F.)=	294.5
DRY MOLECULAR WEIGHT=	29.212
WET MOLECULAR WEIGHT=	26.962
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.7154
% ISOKINETIC=	95.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	140.0
NOZZLE DIAMETER (INCHES)=	0.2510
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,021
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	37,959
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	25,868
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	20,677

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2654
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0539
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0294
EMISSION RATE (LB/HR)=	9.56

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2654
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0539
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0294
EMISSION RATE (LB/HR)=	9.56
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 021
RUN # - 0-2-1
LOCATION - BAGHOUSE OUTLET
DATE - 10/26/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	8.327
FINAL METER VOLUME (CUBIC METERS)=	10.596
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0004
NET METER VOLUME (CUBIC METERS)=	2.282
GAS VOLUME (DRY STANDARD CUBIC METERS)=	2.145
BAROMETRIC PRESSURE (MM HG)=	741.17
STATIC PRESSURE (MM H20)=	-15.2
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.20
MOISTURE COLLECTED (ML)=	403.8
PERCENT WATER=	20.07
AVERAGE METER TEMPERATURE (C.)=	31.7
AVERAGE DELTA H (MM H20)=	25.8
AVERAGE DELTA P (MM H20)=	13.0
AVERAGE STACK TEMPERATURE (C.)=	145.8
DRY MOLECULAR WEIGHT=	29.212
WET MOLECULAR WEIGHT=	26.962
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	3.6057
% ISOKINETIC=	95.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	140.0
NOZZLE DIAMETER (MM)=	6.38
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	921
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,075
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	733
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	586

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2654
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1237
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0674
EMISSION RATE (KG/HR)=	4.34

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2654
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1237
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0674
EMISSION RATE (KG/HR)=	4.34
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 021
RUN # - 0-2-1
LOCATION - BAGHOUSE OUTLET
DATE - 10/26/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.45	0.97	291	62	62
2	0.57	1.10	289	72	65
3	0.49	0.98	288	80	69
4	0.49	0.97	291	84	71
5	0.50	0.98	292	86	71
6	0.50	0.97	290	88	72
7	0.52	1.00	293	91	80
8	0.50	1.00	294	93	81
9	0.49	0.98	291	94	82
10	0.50	0.99	290	95	83
11	0.52	1.00	289	97	84
12	0.50	0.99	290	98	86
13	0.55	1.10	295	98	87
14	0.52	1.00	299	98	87
15	0.53	1.10	297	100	90
16	0.47	0.98	292	102	91
17	0.55	1.20	298	100	91
18	0.47	0.98	296	102	91
19	0.52	1.00	297	99	91
20	0.47	0.97	299	99	90
21	0.51	1.00	297	99	89
22	0.50	0.98	295	97	88
23	0.50	0.98	295	97	88
24	0.55	1.00	296	97	88
25	0.53	1.00	294	99	88
26	0.52	0.98	297	100	89
27	0.47	0.98	300	100	90
28	0.60	1.20	303	102	90
29	0.57	1.10	302	109	92

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.8461	1.5912	0.0000	0.2549

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	67.6215	67.6109	25.0	0.0105
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 022B
RUN # - 0-2-2B
LOCATION - BAGHOUSE OUTLET
DATE - 10/27/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	374.807
FINAL METER VOLUME (CUBIC FEET)=	425.135
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	50.630
GAS VOLUME (DRY STANDARD CUBIC FEET)=	48.902
BAROMETRIC PRESSURE (IN. HG)=	29.18
STATIC PRESSURE (INCHES H20)=	-0.42
PERCENT OXYGEN=	16.50
PERCENT CARBON DIOXIDE=	4.50
MOISTURE COLLECTED (ML)=	285.6
PERCENT WATER=	21.57
AVERAGE METER TEMPERATURE (F.)=	76.0
AVERAGE DELTA H (IN. H20)=	2.29
AVERAGE DELTA P (IN. H20)=	1.08
AVERAGE STACK TEMPERATURE (F.)=	308.3
DRY MOLECULAR WEIGHT=	29.380
WET MOLECULAR WEIGHT=	26.925
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	1.0361
% ISOKINETIC=	100.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	60.0
NOZZLE DIAMETER (INCHES)=	0.2530
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	4,416
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	55,495
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	37,158
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	29,142

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0932
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0294
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0154
EMISSION RATE (LB/HR)=	7.33

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0932
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0294
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0154
EMISSION RATE (LB/HR)=	7.33
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 022B
RUN # - 0-2-2B
LOCATION - BAGHOUSE OUTLET
DATE - 10/27/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	10.613
FINAL METER VOLUME (CUBIC METERS)=	12.038
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	1.434
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.385
BAROMETRIC PRESSURE (MM HG)=	741.17
STATIC PRESSURE (MM H2O)=	-10.7
PERCENT OXYGEN=	16.50
PERCENT CARBON DIOXIDE=	4.50
MOISTURE COLLECTED (ML)=	285.6
PERCENT WATER=	21.57
AVERAGE METER TEMPERATURE (C.)=	24.4
AVERAGE DELTA H (MM H2O)=	58.1
AVERAGE DELTA P (MM H2O)=	27.3
AVERAGE STACK TEMPERATURE (C.)=	153.5
DRY MOLECULAR WEIGHT=	29.380
WET MOLECULAR WEIGHT=	26.925
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	5.2216
% ISOKINETIC=	100.7
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	60.0
NOZZLE DIAMETER (MM)=	6.43
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,346
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,571
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,052
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	925

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0932
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.0673
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0353
EMISSION RATE (KG/HR)=	3.33

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0932
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.0673
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0353
EMISSION RATE (KG/HR)=	3.33
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 022B
RUN # - 0-2-2B
LOCATION - BAGHOUSE OUTLET
DATE - 10/27/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.00	2.30	310	58	58
2	1.00	2.30	312	62	60
3	1.10	2.60	312	84	65
4	1.20	2.60	307	87	68
5	1.00	2.00	305	87	70
6	1.20	2.60	310	87	70
7	1.20	2.10	310	88	72
8	1.00	2.00	307	91	72
9	1.00	2.05	308	91	75
10	1.00	2.00	309	88	74
11	1.10	2.50	304	82	75
12	1.10	2.40	305	85	75

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6720	1.5814	0.0000	0.0906

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.7091	68.7064	20.0	0.0026
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 023
RUN # - 0-2-3
LOCATION - BAGHOUSE OUTLET
DATE - 10/22/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	258.422
FINAL METER VOLUME (CUBIC FEET)=	293.785
METER FACTOR= 1.066	
FINAL LEAK RATE (CU FT/MIN)=	0.020
NET METER VOLUME (CUBIC FEET)=	37.697
GAS VOLUME (DRY STANDARD CUBIC FEET)=	36.936
BAROMETRIC PRESSURE (IN. HG)=	29.46
STATIC PRESSURE (INCHES H2O)=	-0.94
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	186.0
PERCENT WATER=	19.17
AVERAGE METER TEMPERATURE (F.)=	73.9
AVERAGE DELTA H (IN. H2O)=	2.69
AVERAGE DELTA P (IN. H2O)=	1.31
AVERAGE STACK TEMPERATURE (F.)=	297.3
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	27.079
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	1.1451
% ISOKINETIC=	102.5
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (INCHES)=	0.2490
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	4,812
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	60,472
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	41,419
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	33,479

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2065
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0861
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0477
EMISSION RATE (LB/HR)=	24.71

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2065
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0861
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0477
EMISSION RATE (LB/HR)=	24.71
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 023
RUN # - 0-2-3
LOCATION - BAGHOUSE OUTLET
DATE - 10/22/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	7.317
FINAL METER VOLUME (CUBIC METERS)=	8.319
METER FACTOR= 1.066	
FINAL LEAK RATE (CU M/MIN)=	0.0006
NET METER VOLUME (CUBIC METERS)=	1.067
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.046
BAROMETRIC PRESSURE (MM HG)=	748.28
STATIC PRESSURE (MM H2O)=	-23.9
PERCENT OXYGEN=	17.50
PERCENT CARBON DIOXIDE=	3.33
MOISTURE COLLECTED (ML)=	186.0
PERCENT WATER=	19.17
AVERAGE METER TEMPERATURE (C.)=	23.3
AVERAGE DELTA H (MM H2O)=	68.3
AVERAGE DELTA P (MM H2O)=	33.3
AVERAGE STACK TEMPERATURE (C.)=	147.4
DRY MOLECULAR WEIGHT=	29.233
WET MOLECULAR WEIGHT=	27.079
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	5.7713
% ISOKINETIC=	102.5
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	40.0
NOZZLE DIAMETER (MM)=	6.32
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,467
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,712
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,173
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	948

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2065
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1975
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.1093
EMISSION RATE (KG/HR)=	11.22

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2065
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1975
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.1093
EMISSION RATE (KG/HR)=	11.22
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 023
RUN # - 0-2-3
LOCATION - BAGHOUSE OUTLET
DATE - 10/22/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.30	2.80	295	62	62
2	1.40	3.00	290	76	66
3	1.20	2.50	299	80	66
4	1.40	2.80	298	83	70
5	1.30	2.60	300	82	70
6	1.40	2.80	301	83	71
7	1.30	2.60	297	85	72
8	1.20	2.40	298	84	71

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.7808	1.5780	0.0000	0.2028

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	69.6952	69.6914	20.0	0.0037
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 024C
RUN # - 0-2-4-C
LOCATION - BAGHOUSE OUTLET
DATE - 10-30-81
PROJECT # - 4891-L83

INITIAL METER VOLUME (CUBIC FEET)=	484.140
FINAL METER VOLUME (CUBIC FEET)=	539.662
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.001
NET METER VOLUME (CUBIC FEET)=	55.855
GAS VOLUME (DRY STANDARD CUBIC FEET)=	53.536
BAROMETRIC PRESSURE (IN. HG)=	29.06
STATIC PRESSURE (INCHES H2O)=	-0.43
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	2.83
MOISTURE COLLECTED (ML)=	280.5
PERCENT WATER=	19.79
AVERAGE METER TEMPERATURE (F.)=	76.9
AVERAGE DELTA H (IN. H2O)=	1.56
AVERAGE DELTA P (IN. H2O)=	0.77
AVERAGE STACK TEMPERATURE (F.)=	294.1
DRY MOLECULAR WEIGHT=	29.126
WET MOLECULAR WEIGHT=	26.924
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.8776
% ISOKINETIC=	96.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	80.0
NOZZLE DIAMETER (INCHES)=	0.2510
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,714
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	46,669
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	31,704
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	25,430

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1593
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0458
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0250
EMISSION RATE (LB/HR)=	9.99

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1593
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0458
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0250
EMISSION RATE (LB/HR)=	9.99
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 024C
RUN # - 0-2-4-C
LOCATION - BAGHOUSE OUTLET
DATE - 10-30-81
PROJECT # - 4891-L83

INITIAL METER VOLUME (CUBIC METERS)=	13.709
FINAL METER VOLUME (CUBIC METERS)=	15.281
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	1.582
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.516
BAROMETRIC PRESSURE (MM HG)=	738.12
STATIC PRESSURE (MM H20)=	-10.9
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	2.83
MOISTURE COLLECTED (ML)=	280.5
PERCENT WATER=	19.79
AVERAGE METER TEMPERATURE (C.)=	25.0
AVERAGE DELTA H (MM H20)=	39.6
AVERAGE DELTA P (MM H20)=	19.6
AVERAGE STACK TEMPERATURE (C.)=	145.6
DRY MOLECULAR WEIGHT=	29.126
WET MOLECULAR WEIGHT=	26.924
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	4.4230
% ISOKINETIC=	.96.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	80.0
NOZZLE DIAMETER (MM)=	6.38
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,132
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,322
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	898
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	720

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1593
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1051
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0572
EMISSION RATE (KG/HR)=	4.53

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1593
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1051
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0572
EMISSION RATE (KG/HR)=	4.53
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 024C
RUN # - 0-2-4-C
LOCATION - BAGHOUSE OUTLET
DATE - 10-30-81
PROJECT # - 4891-L83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.80	1.70	290	70	70
2	0.75	1.50	295	75	70
3	0.77	1.50	299	79	71
4	0.80	1.60	296	80	72
5	0.78	1.60	297	81	74
6	0.70	1.40	293	81	75
7	0.69	1.20	289	81	76
8	0.75	1.50	290	79	75
9	0.83	1.80	293	80	74
10	0.80	1.60	293	80	75
11	0.77	1.60	294	80	75
12	0.78	1.70	294	81	76
13	0.75	1.50	294	76	75
14	0.79	1.55	295	79	85
15	0.81	1.60	299	82	76
16	0.76	1.60	294	83	76

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.6840	1.5283	0.0002	0.1555

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	69.4755	69.4716	20.0	0.0038
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

ANDERSEN MARK III (OUTLET PARTICLE SIZING)

INPUT DATA FOR FILE 011BMK3
TEST DATE - 10/21/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-1-1B

% WATER= 19.59
% CARBON DIOXIDE= 5.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 15.31

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 285.7 DEGREES F.
BAR. PRESSURE= 29.32 INCHES HG
STATIC PRESSURE= -0.52 INCHES H2O
AVE. DELTA P= 0.76 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 67.0 DEGREES F.
PROBE DIA.= 0.146 INCHES

SAMPLING TIME= 120.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 285.7 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 34.651 CUBIC FEET
DELTA H= 0.23 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 34.025 CU. FT.
SAMPLE VOL.-WET STD.= 42.314 CU. FT.
STACK VELOCITY= 3645.2 FT./MIN.
NOZZLE VELOCITY= 4378.4 FT./MIN.
MASS COLLECTED= 65.590 MG.
LOADING= 0.02392 GRAIN/SCF
LOADING(DRY)= 0.02975 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.501 CU. FT/MIN

DRY MOLECULAR WT.= 29.41
WET MOLECULAR WT.= 27.18
% ISOKINETIC= 120.1
SAMPLING RATE-ACTUAL= 0.509 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= -0.950 MG.
FILTER BLANK= -1.070 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	271.10	374.45	366.40	373.20	366.62	384.24	375.94	382.98	358.76	430.76
TARE WT (MG)	233.14	374.99	366.01	370.50	362.27	376.74	371.18	381.86	359.38	431.46
NET WT (MG) CORRECTED	37.96	0.41	1.34	3.65	5.30	8.45	5.71	2.07	0.33	0.37
FRACTION % OF TOTAL	57.87	0.63	2.04	5.56	8.08	12.88	8.71	3.16	0.50	0.56
CUM. % WITH FILTER	57.87	58.50	60.54	66.11	74.19	87.07	95.78	98.93	99.44	100.00
FRACTION % WITHOUT FILTER	58.20	0.63	2.05	5.60	8.13	12.96	8.75	3.17	0.51	
CUM. % WITHOUT FILTER	58.20	58.83	60.89	66.48	74.61	87.57	96.32	99.49	100.00	
JET VEL. (CM/SEC)	0	45	83	139	229	407	985	1796	3039	
D50 SIZE (MICRONS)	14.85	14.67	9.14	6.19	4.21	2.69	1.33	0.80	0.59	<0.59
DM/DLOGD (GRAINS/SCF)		0.02802	0.00238	0.00785	0.01152	0.01586	0.00680	0.00347	0.00090	
GEO MEAN (MICRONS)		14.76	11.58	7.52	5.10	3.36	1.89	1.03	0.69	<0.69
PARTICLE COUNT		2.35D+05	2.54D+04	1.29D+05	2.80D+05	5.84D+05	4.45D+05	4.15D+05	1.62D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 012MK3
TEST DATE - 10/19/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-1-2

% WATER= 18.58
% CARBON DIOXIDE= 4.30
% CARBON MONOXIDE= 0.00
% OXYGEN= 14.83

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 298.9 DEGREES F.
BAR. PRESSURE= 29.38 INCHES HG
STATIC PRESSURE= -0.94 INCHES H20
AVE. DELTA P= 1.12 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 69.4 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 180.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 298.9 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 54.640 CUBIC FEET
DELTA H= 0.26 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 53.527 CU. FT.
SAMPLE VOL.-WET STD.= 65.742 CU. FT.
STACK VELOCITY= 4449.7 FT./MIN.
NOZZLE VELOCITY= 5237.0 FT./MIN.
MASS COLLECTED= 107.450 MG.
LOADING= 0.02522 GRAIN/SCF
LOADING(DRY)= 0.03098 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.516 CU. FT/MIN

DRY MOLECULAR WT.= 29.28
WET MOLECULAR WT.= 27.19
% ISOKINETIC= 117.7
SAMPLING RATE-ACTUAL= 0.536 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= -0.950 MG.
FILTER BLANK= -1.070 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	320.36	377.22	376.06	385.56	378.84	386.30	379.67	384.86	370.50	440.04
TARE WT (MG)	235.45	377.66	376.12	382.57	375.35	381.82	374.88	384.10	370.88	440.80
NET WT (MG) CORRECTED	84.91	0.51	0.89	3.94	4.44	5.43	4.74	1.71	0.57	0.31
FRACTION % OF TOTAL	79.02	0.47	0.83	3.67	4.13	5.05	4.41	1.59	0.53	0.29
CUM. % WITH FILTER	79.02	79.50	80.33	83.99	88.12	93.18	97.59	99.18	99.71	100.00
FRACTION % WITHOUT FILTER	79.25	0.48	0.83	3.68	4.14	5.07	4.42	1.60	0.53	
CUM. % WITHOUT FILTER	79.25	79.73	80.56	84.24	88.38	93.45	97.87	99.47	100.00	
JET VEL. (CM/SEC)	0	47	87	146	241	429	1038	1891	3201	
D50 SIZE (MICRONS)	14.65	14.38	8.96	6.06	4.12	2.63	1.30	0.78	0.58	<0.58
DM/DLOGD (GRAINS/SCF)		0.01503	0.00182	0.00545	0.00621	0.00655	0.00362	0.00183	0.00099	
GEO MEAN (MICRONS)		14.51	11.35	7.37	5.00	3.29	1.85	1.01	0.67	<0.67
PARTICLE COUNT		1.28D+05	1.11D+04	9.15D+04	1.54D+05	2.46D+05	2.43D+05	2.25D+05	1.83D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 013MK3
TEST DATE - 10/20/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-1-3

% WATER= 17.69
% CARBON DIOXIDE= 4.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 298.7 DEGREES F.
BAR. PRESSURE= 29.06 INCHES HG
STATIC PRESSURE= -0.94 INCHES H2O
AVE. DELTA P= 1.39 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 63.5 DEGREES F.
PROBE DIA.= 0.136 INCHES

SAMPLING TIME= 150.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 298.7 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 44.478 CUBIC FEET
DELTA H= 0.24 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 43.577 CU. FT.
SAMPLE VOL.-WET STD.= 52.943 CU. FT.
STACK VELOCITY= 4971.9 FT./MIN.
NOZZLE VELOCITY= 5190.4 FT./MIN.
MASS COLLECTED= 53.070 MG.
LOADING= 0.01547 GRAIN/SCF
LOADING(DRY)= 0.01879 GRAIN/SCF

DRY MOLECULAR WT.= 29.31
WET MOLECULAR WT.= 27.31
% ISOKINETIC= 104.4
SAMPLING RATE-ACTUAL= 0.524 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= -0.950 MG.
FILTER BLANK= -1.070 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.516 CU. FT/MIN

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	275.38	382.88	379.17	386.62	378.90	387.00	381.67	389.90	372.08	445.66
TARE WT (MG)	236.09	383.84	379.49	385.62	377.03	384.98	379.36	389.04	372.82	446.60
NET WT (MG) CORRECTED	39.29	0.00	0.63	1.95	2.82	2.97	3.26	1.81	0.21	0.13
FRACTION % OF TOTAL	74.03	0.00	1.19	3.67	5.31	5.60	6.14	3.41	0.40	0.24
CUM. % WITH FILTER	74.03	74.03	75.22	78.90	84.21	89.81	95.95	99.36	99.76	100.00
FRACTION % WITHOUT FILTER	74.22	0.00	1.19	3.68	5.33	5.61	6.16	3.42	0.40	
CUM. % WITHOUT FILTER	74.22	74.22	75.41	79.09	84.42	90.03	96.18	99.60	100.00	
JET VEL. (CM/SEC)	0	46	85	143	236	419	1014	1847	3126	
D50 SIZE (MICRONS)	14.86	14.55	9.07	6.14	4.17	2.66	1.31	0.79	0.58	<0.58
DM/DLOGD (GRAINS/SCF)		0.00000	0.00089	0.00335	0.00490	0.00445	0.00309	0.00241	0.00046	
GEO MEAN (MICRONS)		14.70	11.49	7.46	5.06	3.33	1.87	1.02	0.68	<0.68
PARTICLE COUNT		0.00D+00	9.64D+03	5.56D+04	1.20D+05	1.65D+05	2.05D+05	2.92D+05	8.29D+04	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 014MK3
TEST DATE - 10/22/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-1-4

% WATER= 17.83
% CARBON DIOXIDE= 3.33
% CARBON MONOXIDE= 0.00
% OXYGEN= 17.50

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 281.8 DEGREES F.
BAR. PRESSURE= 29.46 INCHES HG
STATIC PRESSURE= -0.52 INCHES H2O
AVE. DELTA P= 0.85 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 55.5 DEGREES F.
PROBE DIA.= 0.146 INCHES

SAMPLING TIME= 120.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 281.8 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 34.663 CUBIC FEET
DELTA H= 0.24 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 34.965 CU. FT.
SAMPLE VOL.-WET STD.= 42.552 CU. FT.
STACK VELOCITY= 3813.1 FT./MIN.
NOZZLE VELOCITY= 4359.6 FT./MIN.
MASS COLLECTED= 105.850 MG.
LOADING= 0.03839 GRAIN/SCF
LOADING(DRY)= 0.04672 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.497 CU. FT/MIN

DRY MOLECULAR WT.= 29.23
WET MOLECULAR WT.= 27.23
% ISOKINETIC= 114.3
SAMPLING RATE-ACTUAL= 0.507 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= -0.950 MG.
FILTER BLANK= -1.070 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	311.03	387.06	378.18	386.34	385.38	380.26	382.67	371.28	366.61	418.69
TARE WT (MG)	238.66	387.40	378.40	384.93	370.04	388.58	371.22	378.34	366.68	419.55
NET WT (MG) CORRECTED	72.37	0.61	0.73	2.36	16.29	0.00	12.40	0.00	0.88	0.21
FRACTION % OF TOTAL	68.37	0.58	0.69	2.23	15.39	0.00	11.71	0.00	0.83	0.20
CUM. % WITH FILTER	68.37	68.95	69.64	71.87	87.26	87.26	98.97	98.97	99.80	100.00
FRACTION % WITHOUT FILTER	68.51	0.58	0.69	2.23	15.42	0.00	11.74	0.00	0.83	
CUM. % WITHOUT FILTER	68.51	69.08	69.77	72.01	87.43	87.43	99.17	99.17	100.00	
JET VEL. (CM/SEC)	0	44	83	138	228	405	981	1788	3026	
D50 SIZE (MICRONS)	14.81	14.67	9.15	6.19	4.21	2.69	1.33	0.81	0.59	<0.59
DM/DLOGD (GRAINS/SCF)		0.05612	0.00129	0.00505	0.03523	0.00000	0.01469	0.00000	0.00239	
GEO MEAN (MICRONS)		14.74	11.59	7.53	5.11	3.37	1.89	1.04	0.69	<0.69
PARTICLE COUNT		4.71D+05	1.38D+04	8.30D+04	8.54D+05	0.00D+00	9.61D+05	0.00D+00	4.29D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 021MK3
TEST DATE - 10/30/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-2-1

% WATER= 17.28
% CARBON DIOXIDE= 2.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 293.7 DEGREES F.
BAR. PRESSURE= 29.06 INCHES HG
STATIC PRESSURE= -0.43 INCHES H20
AVE. DELTA P= 0.72 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 82.0 DEGREES F.
PROBE DIA.= 0.156 INCHES

SAMPLING TIME= 120.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 293.7 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 35.624 CUBIC FEET
DELTA H= 0.25 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 33.716 CU. FT.
SAMPLE VOL.-WET STD.= 40.760 CU. FT.
STACK VELOCITY= 3561.4 FT./MIN.
NOZZLE VELOCITY= 3766.4 FT./MIN.
MASS COLLECTED= 50.610 MG.
LOADING= 0.01916 GRAIN/SCF
LOADING(DRY)= 0.02316 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.510 CU. FT/MIN

DRY MOLECULAR WT.= 29.13
WET MOLECULAR WT.= 27.20
% ISOKINETIC= 105.8
SAMPLING RATE-ACTUAL= 0.500 CU. FT/MIN
CYCLONE BLANK= -1.520 MG.
STAGE BLANK= -1.100 MG.
FILTER BLANK= -1.090 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	279.64	411.83	405.02	394.31	393.40	391.71	378.52	408.18	382.21	446.14
TARE WT (MG)	259.23	411.33	404.24	391.08	389.94	387.13	374.53	406.68	381.77	445.83
NET WT (MG) CORRECTED	21.93	1.60	1.88	4.33	4.56	5.68	5.09	2.60	1.54	1.40
FRACTION % OF TOTAL	43.33	3.16	3.71	8.56	9.01	11.22	10.06	5.14	3.04	2.77
CUM. % WITH FILTER	43.33	46.49	50.21	58.76	67.77	79.00	89.05	94.19	97.23	100.00
FRACTION % WITHOUT FILTER	44.56	3.25	3.82	8.80	9.27	11.54	10.34	5.28	3.13	
CUM. % WITHOUT FILTER	44.56	47.82	51.64	60.43	69.70	81.24	91.59	96.87	100.00	
JET VEL. (CM/SEC)	0	44	82	136	225	400	968	1764	2985	
D50 SIZE (MICRONS)	15.19	14.86	9.26	6.27	4.26	2.72	1.34	0.81	0.60	<0.60
DM/DLOGD (GRAINS/SCF)		0.06265	0.00347	0.00967	0.01029	0.01106	0.00629	0.00452	0.00436	
GEO MEAN (MICRONS)		15.02	11.73	7.62	5.17	3.41	1.91	1.05	0.70	<0.70
PARTICLE COUNT		5.16D+05	3.66D+04	1.57D+05	2.46D+05	4.02D+05	4.07D+05	5.34D+05	7.74D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 022MK3
TEST DATE - 10/22/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-2-2

% WATER= 18.59
% CARBON DIOXIDE= 3.33
% CARBON MONOXIDE= 0.00
% OXYGEN= 17.50

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 296.4 DEGREES F.
BAR. PRESSURE= 29.46 INCHES HG
STATIC PRESSURE= -0.52 INCHES H20
AVE. DELTA P= 1.08 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 63.3 DEGREES F.
PROBE DIA.= 0.146 INCHES

SAMPLING TIME= 120.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 296.4 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 34.543 CUBIC FEET
DELTA H= 0.24 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 34.322 CU. FT.
SAMPLE VOL.-WET STD.= 42.159 CU. FT.
STACK VELOCITY= 4351.2 FT./MIN.
NOZZLE VELOCITY= 4404.2 FT./MIN.
MASS COLLECTED= 77.450 MG.
LOADING= 0.02835 GRAIN/SCF
LOADING(DRY)= 0.03482 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.513 CU. FT/MIN

DRY MOLECULAR WT.= 29.23
WET MOLECULAR WT.= 27.14
% ISOKINETIC= 101.2
SAMPLING RATE-ACTUAL= 0.512 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= -0.950 MG.
FILTER BLANK= -1.070 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	275.00	380.28	369.24	380.39	369.54	380.58	370.12	367.60	357.34	424.65
TARE WT (MG)	225.22	380.56	369.34	377.98	366.16	373.62	364.44	365.60	357.52	425.52
NET WT (MG) CORRECTED	49.78	0.67	0.85	3.36	4.33	7.91	6.63	2.95	0.77	0.20
FRACTION % OF TOTAL	64.27	0.87	1.10	4.34	5.59	10.21	8.56	3.81	0.99	0.26
CUM. % WITH FILTER	64.27	65.14	66.24	70.57	76.17	86.38	94.94	98.75	99.74	100.00
FRACTION % WITHOUT FILTER	64.44	0.87	1.10	4.35	5.61	10.24	8.58	3.82	1.00	
CUM. % WITHOUT FILTER	64.44	65.31	66.41	70.76	76.36	86.60	95.18	99.00	100.00	
JET VEL. (CM/SEC)	0	45	84	139	230	410	991	1806	3057	
D50 SIZE (MICRONS)	15.02	14.70	9.16	6.20	4.21	2.69	1.33	0.80	0.59	<0.59
DM/DLOGD (GRAINS/SCF)		0.02599	0.00152	0.00725	0.00945	0.01489	0.00791	0.00495	0.00211	
GEO MEAN (MICRONS)		14.86	11.61	7.54	5.11	3.37	1.89	1.03	0.69	<0.69
PARTICLE COUNT		2.16D+05	1.62D+04	1.19D+05	2.29D+05	5.47D+05	5.18D+05	5.93D+05	3.78D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 023MK3
TEST DATE - 10/27/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-2-3

% WATER= 21.34
% CARBON DIOXIDE= 4.50
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.50

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 304.1 DEGREES F.
BAR. PRESSURE= 29.19 INCHES HG
STATIC PRESSURE= -0.42 INCHES H2O
AVE. DELTA P= 1.54 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 69.1 DEGREES F.
PROBE DIA.= 0.137 INCHES

SAMPLING TIME= 120.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 304.1 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 35.504 CUBIC FEET
DELTA H= 0.24 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 34.574 CU. FT.
SAMPLE VOL.-WET STD.= 43.953 CU. FT.
STACK VELOCITY= 5271.7 FT./MIN.
NOZZLE VELOCITY= 5315.1 FT./MIN.
MASS COLLECTED= 91.560 MG.
LOADING= 0.03215 GRAIN/SCF
LOADING(DRY)= 0.04087 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.522 CU. FT/MIN

DRY MOLECULAR WT.= 29.38
WET MOLECULAR WT.= 26.95
% ISOKINETIC= 100.8
SAMPLING RATE-ACTUAL= 0.544 CU. FT/MIN
CYCLONE BLANK= -0.030 MG.
STAGE BLANK= -1.100 MG.
FILTER BLANK= -1.090 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	305.79	382.68	386.18	386.15	381.04	383.62	378.25	384.05	370.00	433.64
TARE WT (MG)	244.28	380.26	385.30	382.48	377.56	377.68	374.26	382.70	370.64	434.60
NET WT (MG) CORRECTED	61.54	3.52	1.98	4.77	4.58	7.04	5.09	2.45	0.46	0.13
FRACTION % OF TOTAL	67.21	3.84	2.16	5.21	5.00	7.69	5.56	2.68	0.50	0.14
CUM. % WITH FILTER	67.21	71.06	73.22	78.43	83.43	91.12	96.68	99.36	99.86	100.00
FRACTION % WITHOUT FILTER	67.31	3.85	2.17	5.22	5.01	7.70	5.57	2.68	0.50	
CUM. % WITHOUT FILTER	67.31	71.16	73.32	78.54	83.55	91.25	96.82	99.50	100.00	
JET VEL. (CM/SEC)	0	48	89	148	245	435	1053	1920	3249	
D50 SIZE (MICRONS)	14.61	14.31	9.92	6.03	4.10	2.62	1.29	0.78	0.57	<0.57
DM/DLOGD (GRAINS/SCF)		0.13355	0.00339	0.00987	0.00957	0.01269	0.00581	0.00392	0.00120	
GEO MEAN (MICRONS)		14.46	11.29	7.33	4.97	3.27	1.84	1.00	0.67	<0.67
PARTICLE COUNT		1.14D+06	3.71D+04	1.67D+05	2.38D+05	4.80D+05	3.92D+05	4.85D+05	2.22D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE 024MK3
TEST DATE - 10/26/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-2-4

% WATER= 16.59
% CARBON DIOXIDE= 3.20
% CARBON MONOXIDE= 0.00
% OXYGEN= 17.50

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 292.3 DEGREES F.
BAR. PRESSURE= 29.18 INCHES HG
STATIC PRESSURE= -0.60 INCHES H20
AVE. DELTA P= 0.91 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 78.9 DEGREES F.
PROBE DIA.= 0.156 INCHES

SAMPLING TIME= 150.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 292.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 43.838 CUBIC FEET
DELTA H= 0.24 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 41.895 CU. FT.
SAMPLE VOL.-WET STD.= 50.228 CU. FT.
STACK VELOCITY= 3993.0 FT./MIN.
NOZZLE VELOCITY= 3692.5 FT./MIN.
MASS COLLECTED= 113.740 MG.
LOADING= 0.03495 GRAIN/SCF
LOADING(DRY)= 0.04190 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.509 CU. FT/MIN

DRY MOLECULAR WT.= 29.21
WET MOLECULAR WT.= 27.35
% ISOKINETIC= 92.5
SAMPLING RATE-ACTUAL= 0.490 CU. FT/MIN
CYCLONE BLANK= -0.030 MG.
STAGE BLANK= -1.100 MG.
FILTER BLANK= -1.090 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	302.00	394.32	379.00	389.48	373.86	385.51	383.52	388.12	378.68	442.53
TARE WT (MG)	230.35	387.63	376.72	384.83	368.39	378.26	378.55	386.70	378.87	442.90
NET WT (MG) CORRECTED	71.68	7.79	3.38	5.75	6.57	8.35	6.07	2.52	0.91	0.72
FRACTION % OF TOTAL	63.02	6.85	2.97	5.06	5.78	7.34	5.34	2.22	0.80	0.63
CUM. % WITH FILTER	63.02	69.87	72.84	77.90	83.67	91.01	96.35	98.57	99.37	100.00
FRACTION % WITHOUT FILTER	63.42	6.89	2.99	5.09	5.81	7.39	5.37	2.23	0.81	
CUM. % WITHOUT FILTER	63.42	70.31	73.31	78.39	84.21	91.59	96.97	99.19	100.00	
JET VEL. (CM/SEC)	0	93	80	133	221	392	949	1729	2926	
D50 SIZE (MICRONS)	15.35	15.00	9.35	6.33	4.30	2.75	1.36	0.82	0.61	<0.61
DW/DLOGD (GRAINS/SCF)		0.23575	0.00506	0.01042	0.01204	0.01321	0.00609	0.00356	0.00210	
GEO MEAN (MICRONS)		15.17	11.84	7.69	5.22	3.44	1.93	1.06	0.71	<0.71
PARTICLE COUNT		1.92D+06	5.29D+04	1.68D+05	2.85D+05	4.75D+05	3.90D+05	4.16D+05	3.67D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

UNUSED ACCEPTABLE METHOD 5 RUN

FILE NAME - I1AM5
RUN # - I-1-A
LOCATION - BOWEN ASPHALT
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	700.990
FINAL METER VOLUME (CUBIC FEET)=	709.096
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.004
NET METER VOLUME (CUBIC FEET)=	8.406
GAS VOLUME (DRY STANDARD CUBIC FEET)=	8.330
BAROMETRIC PRESSURE (IN. HG)=	29.38
STATIC PRESSURE (INCHES H2O)=	-3.05
PERCENT OXYGEN=	14.70
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	43.7
PERCENT WATER=	19.81
AVERAGE METER TEMPERATURE (F.)=	65.2
AVERAGE DELTA H (IN. H2O)=	1.66
AVERAGE DELTA P (IN. H2O)=	0.87
AVERAGE STACK TEMPERATURE (F.)=	344.3
DRY MOLECULAR WEIGHT=	29.388
WET MOLECULAR WEIGHT=	27.132
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.9119
% ISOKINETIC=	100.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	12.0
NOZZLE DIAMETER (INCHES)=	0.2500
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,962
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	70,816
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	45,299
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	36,324

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	13.1035
PARTICULATE LOADING, DRY STD. (GR./SCF)=	24.2254
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	12.4210
EMISSION RATE (LB/HR)=	7541.21

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	13.1035
PARTICULATE LOADING, DRY STD. (GR./SCF)=	24.2254
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	12.4210
EMISSION RATE (LB/HR)=	7541.21
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I1AM5
RUN # - I-1-A
LOCATION - BOWEN ASPHALT
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	19.849
FINAL METER VOLUME (CUBIC METERS)=	20.079
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.238
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.236
BAROMETRIC PRESSURE (MM HG)=	746.25
STATIC PRESSURE (MM H20)=	-77.5
PERCENT OXYGEN=	14.70
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	43.7
PERCENT WATER=	19.81
AVERAGE METER TEMPERATURE (C.)=	18.4
AVERAGE DELTA H (MM H20)=	42.1
AVERAGE DELTA P (MM H20)=	22.0
AVERAGE STACK TEMPERATURE (C.)=	173.5
DRY MOLECULAR WEIGHT=	29.388
WET MOLECULAR WEIGHT=	27.132
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	4.5961
% ISOKINETIC=	100.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	12.0
NOZZLE DIAMETER (MM)=	6.35
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,208
FLOW RATE (ACTUAL, CUBIC M/MIN)=	2,005
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,263
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	1,029

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	13.1035
PARTICULATE LOADING, DRY STD. (G/CU. M)=	55.5544
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	28.4843
EMISSION RATE (KG/HR)=	3423.71

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	13.1035
PARTICULATE LOADING, DRY STD. (G/CU. M)=	55.5544
PARTICULATE LOADING, ACTUAL (G/CU. M)=	28.4843
EMISSION RATE (KG/HR)=	3423.71
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I1AM5
RUN # - I-1-A
LOCATION - BOWEN ASPHALT
DATE - 10/19/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.20	2.40	345	62	65
2	1.05	2.10	355	64	65
3	0.44	0.95	341	66	65
4	1.20	1.40	343	65	65
5	0.85	2.00	339	67	65
6	0.45	1.10	343	68	65

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	13.3181	3.7519	0.0008	9.5654

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	98.7750	95.2358	250.0	3.5381
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

UNACCEPTABLE METHOD 5 RUNS

FILE NAME - I1BM5
RUN # - I1B
LOCATION - BOWEN ASPHALT
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	717.550
FINAL METER VOLUME (CUBIC FEET)=	724.704
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.002
NET METER VOLUME (CUBIC FEET)=	7.419
GAS VOLUME (DRY STANDARD CUBIC FEET)=	7.196
BAROMETRIC PRESSURE (IN. HG)=	29.24
STATIC PRESSURE (INCHES H2O)=	-3.00
PERCENT OXYGEN=	14.70
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	29.6
PERCENT WATER=	16.23
AVERAGE METER TEMPERATURE (F.)=	73.7
AVERAGE DELTA H (IN. H2O)=	1.45
AVERAGE DELTA P (IN. H2O)=	0.62
AVERAGE STACK TEMPERATURE (F.)=	302.3
DRY MOLECULAR WEIGHT=	29.388
WET MOLECULAR WEIGHT=	27.540
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.7716
% ISOKINETIC=	79.1
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	14.5
NOZZLE DIAMETER (INCHES)=	0.2510
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,246
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	58,031
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	38,983
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	32,656

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.4161
PARTICULATE LOADING, DRY STD. (GR./SCF)=	9.4504
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	5.3160
EMISSION RATE (LB/HR)=	2644.83

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.4161
PARTICULATE LOADING, DRY STD. (GR./SCF)=	9.4504
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	5.3160
EMISSION RATE (LB/HR)=	2644.83
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I1BM5
RUN # - I1B
LOCATION - BOWEN ASPHALT
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	20.318
FINAL METER VOLUME (CUBIC METERS)=	20.521
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0001
NET METER VOLUME (CUBIC METERS)=	0.210
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.204
BAROMETRIC PRESSURE (MM HG)=	742.70
STATIC PRESSURE (MM H20)=	-76.2
PERCENT OXYGEN=	14.70
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	29.6
PERCENT WATER=	16.23
AVERAGE METER TEMPERATURE (C.)=	23.1
AVERAGE DELTA H (MM H20)=	36.8
AVERAGE DELTA P (MM H20)=	15.7
AVERAGE STACK TEMPERATURE (C.)=	150.2
DRY MOLECULAR WEIGHT=	29.388
WET MOLECULAR WEIGHT=	27.540
AVERAGE SQUARE ROOT OF DELTA P (MM H20)=	3.8885
% ISOKINETIC=	79.1
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	14.5
NOZZLE DIAMETER (MM)=	6.38
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	990
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,643
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,104
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	925

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	4.4161
PARTICULATE LOADING, DRY STD. (G/CU. M)=	21.6719
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	12.1908
EMISSION RATE (KG/HR)=	1200.75

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	4.4161
PARTICULATE LOADING, DRY STD. (G/CU. M)=	21.6719
PARTICULATE LOADING, ACTUAL (G/CU. M)=	12.1908
EMISSION RATE (KG/HR)=	1200.75
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I1BM5
RUN # - I1B
LOCATION - BOWEN ASPHALT
DATE - 10/19/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.62	1.30	298	70	71
2	0.85	1.90	308	73	72
3	0.35	0.90	286	75	72
4	0.88	2.00	298	76	73
5	0.68	1.60	312	78	73
6	0.32	1.00	312	78	73

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	5.2292	3.5781	0.0008	1.6503

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	97.8087	95.0418	250.0	2.7658
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - I6AM5
RUN # - I-6A
LOCATION - BOWEN ASPHALT
DATE - 10/26/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	832.236
FINAL METER VOLUME (CUBIC FEET)=	843.121
METER FACTOR= 1.037	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	11.288
GAS VOLUME (DRY STANDARD CUBIC FEET)=	11.212
BAROMETRIC PRESSURE (IN. HG)=	29.18
STATIC PRESSURE (INCHES H20)=	-2.10
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	3.50
MOISTURE COLLECTED (ML)=	27.9
PERCENT WATER=	10.49
AVERAGE METER TEMPERATURE (F.)=	60.0
AVERAGE DELTA H (IN. H20)=	1.37
AVERAGE DELTA P (IN. H20)=	0.66
AVERAGE STACK TEMPERATURE (F.)=	338.5
DRY MOLECULAR WEIGHT=	29.228
WET MOLECULAR WEIGHT=	28.050
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.7942
% ISOKINETIC=	93.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (INCHES)=	0.2500
STACK AXIS #1 (INCHES)=	78.00
STACK AXIS #2 (INCHES)=	33.00
RECTANGULAR STACK	
STACK AREA (SQUARE FEET)=	17.875
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,388
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	60,566
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	38,851
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	34,775

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	11.3494
PARTICULATE LOADING, DRY STD. (GR./SCF)=	15.5889
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.9472
EMISSION RATE (LB/HR)=	4645.90

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	11.3494
PARTICULATE LOADING, DRY STD. (GR./SCF)=	15.5889
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	8.9472
EMISSION RATE (LB/HR)=	4645.90
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - I6AM5
RUN # - I-6A
LOCATION - BOWEN ASPHALT
DATE - 10/26/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	23.566
FINAL METER VOLUME (CUBIC METERS)=	23.874
METER FACTOR= 1.037	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	0.320
GAS VOLUME (DRY STANDARD CUBIC METERS)=	0.317
BAROMETRIC PRESSURE (MM HG)=	741.17
STATIC PRESSURE (MM H2O)=	-53.3
PERCENT OXYGEN=	16.70
PERCENT CARBON DIOXIDE=	3.50
MOISTURE COLLECTED (ML)=	27.9
PERCENT WATER=	10.49
AVERAGE METER TEMPERATURE (C.)=	15.6
AVERAGE DELTA H (MM H2O)=	34.7
AVERAGE DELTA P (MM H2O)=	16.8
AVERAGE STACK TEMPERATURE (C.)=	170.3
DRY MOLECULAR WEIGHT=	29.228
WET MOLECULAR WEIGHT=	28.050
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.0024
% ISOKINETIC=	93.9
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	18.0
NOZZLE DIAMETER (MM)=	6.35
STACK AXIS #1 (METERS)=	1.981
STACK AXIS #2 (METERS)=	0.838
RECTANGULAR STACK	
STACK AREA (SQUARE METERS)=	1.661
STACK VELOCITY (ACTUAL, M/MIN)=	1,033
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,715
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,100
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	985

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	11.3494
PARTICULATE LOADING, DRY STD. (G/CU. M)=	35.7490
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	20.5180
EMISSION RATE (KG/HR)=	2109.24

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	11.3494
PARTICULATE LOADING, DRY STD. (G/CU. M)=	35.7490
PARTICULATE LOADING, ACTUAL (G/CU. M)=	20.5180
EMISSION RATE (KG/HR)=	2109.24
PERCENT IMPINGER CATCH=	0.0

FILE NAME - I6AM5
RUN # - I-6A
LOCATION - BOWEN ASPHALT
DATE - 10/26/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.84	1.80	346	54	55
2	0.64	1.30	346	59	56
3	0.35	0.80	336	62	56
4	0.91	2.10	329	66	58
5	0.93	1.70	363	68	60
6	0.29	0.50	311	66	60

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	9.4006	3.7294	0.0008	5.6704

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	100.4790	94.7989	250.0	5.6790
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

UNACCEPTABLE METHOD 5 RUNS

INPUT DATA FOR FILE I22HC A
TEST DATE - 10/20/81
PROJECT # - 4891-L83
TEST SITE - BOWEN ASPHALT
RUN ID - I-2-2A

% WATER= 22.03
% CARBON DIOXIDE= 4.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 353.1 DEGREES F.
BAR. PRESSURE= 29.08 INCHES HG
STATIC PRESSURE= -3.00 INCHES H2O
AVE. DELTA P= 1.10 INCHES H2O
PITOT COEFF.= .84
METER TEMP.= 70.9 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 21.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 353.1 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 5.946 CUBIC FEET
DELTA H= 0.23 INCHES H2O

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 5.749 CU. FT.
SAMPLE VOL.-WET STD.= 7.373 CU. FT.
STACK VELOCITY= 4626.9 FT./MIN.
NOZZLE VELOCITY= 2704.0 FT./MIN.
MASS COLLECTED= 7289.101 MG.
LOADING= 15.25584 GRAIN/SCF
LOADING(DRY)= 19.56630 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.578 CU. FT/MIN

DRY MOLECULAR WT.= 29.31
WET MOLECULAR WT.= 26.82
% ISOKINETIC= 58.4
SAMPLING RATE-ACTUAL= 0.561 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	7692.20	1513.30	1734.70	1973.50	24128.30
TARE WT (MG)	1387.30	1391.20	1438.10	1453.70	24082.20
NET WT (MG) CORRECTED	6304.90	122.10	296.60	519.80	45.70
FRACTION % OF TOTAL	86.50	1.68	4.07	7.13	0.63
CUM. % WITH FILTER	86.50	88.17	92.24	99.37	100.00
FRACTION % WITHOUT FILTER	87.04	1.69	4.09	7.18	
CUM. % WITHOUT FILTER	87.04	88.73	92.82	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.29	11.55	6.47	1.93	<1.93
DM/DLOGD (GRAINS/SCF)		2.09822	2.46295	2.06974	
GEO MEAN (MICRONS)		13.29	8.64	3.53	<3.53
PARTICLE COUNT		1.95D+07	3.53D+07	7.26D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I21HC
TEST DATE - 10/20/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-2-1

% WATER= 20.00
% CARBON DIOXIDE= 4.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 348.2 DEGREES F.
BAR. PRESSURE= 29.06 INCHES HG
STATIC PRESSURE= -3.00 INCHES H20
AVE. DELTA P= 0.76 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 61.0 DEGREES F.
PROBE DIA.= 0.195 INCHES

SAMPLING TIME= 20.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 348.2 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 5.924 CUBIC FEET
DELTA H= 0.25 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 5.833 CU. FT.
SAMPLE VOL.-WET STD.= 7.292 CU. FT.
STACK VELOCITY= 3827.8 FT./MIN.
NOZZLE VELOCITY= 2792.8 FT./MIN.
MASS COLLECTED= 2380.600 MG.
LOADING= 5.03842 GRAIN/SCF
LOADING(DRY)= 6.29802 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.573 CU. FT/MIN

DRY MOLECULAR WT.= 29.31
WET MOLECULAR WT.= 27.05
% ISOKINETIC= 73.0
SAMPLING RATE-ACTUAL= 0.579 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	3247.00	1437.00	1530.80	1649.00	24403.60
TARE WT (MG)	1381.20	1393.20	1388.20	1392.20	24331.60
NET WT (MG) CORRECTED	1865.80	43.80	142.60	256.80	71.60
FRACTION % OF TOTAL	78.38	1.84	5.99	10.79	3.01
CUM. % WITH FILTER	78.38	80.22	86.21	96.99	100.00
FRACTION % WITHOUT FILTER	80.81	1.90	6.18	11.12	
CUM. % WITHOUT FILTER	80.81	82.70	88.88	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	14.89	11.39	6.35	1.88	<1.88
DM/DLOGD (GRAINS/SCF)		0.79549	1.18888	1.02763	
GEO MEAN (MICRONS)		13.02	8.50	3.45	<3.45
PARTICLE COUNT		7.56D+06	1.73D+07	3.68D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I11HC
TEST DATE - 10/19/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-1-1

% WATER= 20.00
% CARBON DIOXIDE= 5.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 14.70

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE= 350.3 DEGREES F.
BAR. PRESSURE= 29.30 INCHES HG
STATIC PRESSURE= -3.00 INCHES H20
AVE. DELTA P= 0.43 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 68.0 DEGREES F.
PROBE DIA.= 0.156 INCHES

SAMPLING TIME= 16.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 350.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 5.099 CUBIC FEET
DELTA H= 0.30 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 4.995 CU. FT.
SAMPLE VOL.-WET STD.= 6.244 CU. FT.
STACK VELOCITY= 2860.7 FT./MIN.
NOZZLE VELOCITY= 4643.9 FT./MIN.
MASS COLLECTED= 7854.501 MG.
LOADING= 19.41353 GRAIN/SCF
LOADING(DRY)= 24.26691 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.575 CU. FT/MIN

DRY MOLECULAR WT.= 29.39
WET MOLECULAR WT.= 27.11
% ISOKINETIC= 162.3
SAMPLING RATE-ACTUAL= 0.616 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= 0.000 MG.
FILTER BLANK= 0.400 MG.

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	7784.20	1520.00	1841.00	2289.20	24523.90
TARE WT (MG)	1438.70	1451.50	1441.60	1382.40	24389.20
NET WT (MG) CORRECTED	6345.50	68.50	399.40	906.80	134.30
FRACTION % OF TOTAL	80.79	0.87	5.08	11.54	1.71
CUM. % WITH FILTER	80.79	81.66	86.75	98.29	100.00
FRACTION % WITHOUT FILTER	82.19	0.89	5.17	11.75	
CUM. % WITHOUT FILTER	82.19	83.08	88.25	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	14.36	11.14	6.16	1.82	<1.82
DM/DLOGD (GRAINS/SCF)		1.53493	3.83337	4.22844	
GEO MEAN (MICRONS)		12.64	8.28	3.34	<3.34
PARTICLE COUNT		1.50D+07	5.73D+07	1.57D+08	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

INPUT DATA FOR FILE I21BHC
TEST DATE - 10/30/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - I-2-1B

% WATER= 16.41
% CARBON DIOXIDE= 2.83
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL HCSS IMPACTOR W/15 MICRON CYCLONE

STACK TEMPERATURE=	335.2 DEGREES F.	SAMPLING TIME=	30.0 MIN.
BAR. PRESSURE=	29.06 INCHES HG	PRESSURE DROP=	0.00 INCHES HG
STATIC PRESSURE=	-2.20 INCHES H20	SAMPLER TEMP. =	335.2 DEGREES F.
AVE. DELTA P=	0.69 INCHES H20	PARTICLE DENS=	1
PITOT COEFF.=	.84	METER VOL.=	9.056 CUBIC FEET
METER TEMP.=	78.3 DEGREES F.	DELTA H=	0.26 INCHES H20
PROBE DIA.=	0.155 INCHES		

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.=	8.629 CU. FT.	DRY MOLECULAR WT.=	29.13
SAMPLE VOL.-WET STD.=	10.323 CU. FT.	WET MOLECULAR WT.=	27.30
STACK VELOCITY=	3602.7 FT./MIN.	% ISOKINETIC=	113.7
NOZZLE VELOCITY=	4096.6 FT./MIN.	SAMPLING RATE-ACTUAL=	0.537 CU. FT/MIN
MASS COLLECTED=	2414.499 MG.	CYCLONE BLANK=	0.000 MG.
LOADING=	3.60942 GRAIN/SCF	STAGE BLANK=	0.000 MG.
LOADING(DRY)=	4.31801 GRAIN/SCF	FILTER BLANK=	0.100 MG.

RATE FOR 15 MICRON CYCLONE CUTOFF= 0.558 CU. FT/MIN

STAGE #	15 MICRON	1	2	CYCLONE	FILTER
FINAL WT (MG)	2848.20	1421.50	1580.00	2030.70	24594.70
TARE WT (MG)	1447.00	1385.20	1377.40	1384.40	24466.50
NET WT (MG) CORRECTED	1401.20	36.30	202.60	646.30	128.10
FRACTION % OF TOTAL	58.03	1.50	8.39	26.77	5.31
CUM. % WITH FILTER	58.03	59.54	67.93	94.69	100.00
FRACTION % WITHOUT FILTER	61.28	1.59	8.86	28.27	
CUM. % WITHOUT FILTER	61.28	62.87	71.73	100.00	
JET VEL. (CM/SEC)	0	0	0	0	
D50 SIZE (MICRONS)	15.37	11.66	6.56	1.93	<1.93
DM/DLOGD (GRAINS/SCF)		0.45209	1.21395	1.81868	
GEO MEAN (MICRONS)		13.38	8.75	3.56	<3.56
PARTICLE COUNT		4.18D+06	1.72D+07	6.32D+07	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).

UNACCEPTABLE AND SUSPECT ANDERSEN HCSS RUNS

FILE NAME - 013A
RUN # - ~~BOWEN ASPHALT~~ 0-1-3@)
LOCATION - BAGHOUSE OUTLET
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	922.433
FINAL METER VOLUME (CUBIC FEET)=	982.953
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	60.883
GAS VOLUME (DRY STANDARD CUBIC FEET)=	60.229
BAROMETRIC PRESSURE (IN. HG)=	29.38
STATIC PRESSURE (INCHES H2O)=	-0.94
PERCENT OXYGEN=	4.30
PERCENT CARBON DIOXIDE=	14.80
MOISTURE COLLECTED (ML)=	306.8
PERCENT WATER=	19.35
AVERAGE METER TEMPERATURE (F.)=	67.4
AVERAGE DELTA H (IN. H2O)=	2.64
AVERAGE DELTA P (IN. H2O)=	1.29
AVERAGE STACK TEMPERATURE (F.)=	304.9
DRY MOLECULAR WEIGHT=	30.540
WET MOLECULAR WEIGHT=	28.114
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	1.1333
% ISOKINETIC=	88.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	80.0
NOZZLE DIAMETER (INCHES)=	0.2470
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	4,704
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	59,111
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	39,975
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	32,240

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2848
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0728
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0397
EMISSION RATE (LB/HR)=	20.12

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2848
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0728
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0397
EMISSION RATE (LB/HR)=	20.12
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 013A
RUN # - ~~BOWEN ASPHALT~~ 0-1-3(A)
LOCATION - BAGHOUSE OUTLET
DATE - 10/19/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	26.120
FINAL METER VOLUME (CUBIC METERS)=	27.833
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	1.724
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.705
BAROMETRIC PRESSURE (MM HG)=	746.25
STATIC PRESSURE (MM H2O)=	-23.9
PERCENT OXYGEN=	4.30
PERCENT CARBON DIOXIDE=	14.80
MOISTURE COLLECTED (ML)=	306.8
PERCENT WATER=	19.35
AVERAGE METER TEMPERATURE (C.)=	19.6
AVERAGE DELTA H (MM H2O)=	67.1
AVERAGE DELTA P (MM H2O)=	32.7
AVERAGE STACK TEMPERATURE (C.)=	151.6
DRY MOLECULAR WEIGHT=	30.540
WET MOLECULAR WEIGHT=	28.114
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	5.7117
% ISOKINETIC=	88.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	80.0
NOZZLE DIAMETER (MM)=	6.27
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,434
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,674
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,132
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	913

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2848
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1670
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0910
EMISSION RATE (KG/HR)=	9.13

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2848
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1670
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0910
EMISSION RATE (KG/HR)=	9.13
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 013A
RUN # - ~~BOWEN ASPHALT~~ 0-1-3(A)
LOCATION - BAGHOUSE OUTLET
DATE - 10/19/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	1.40	2.90	317	58	62
2	1.40	2.90,	311	67	62
3	1.20	2.50	313	75	63
4	1.30	2.60	308	75	63
5	1.20	2.20	300	75	65
6	1.30	2.70	296	75	65
7	1.20	2.70	289	73	65

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.8569	1.5774	0.0000	0.2795

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	67.7246	67.7192	20.0	0.0053
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 022A
RUN # - 0-2-2A
LOCATION - BAGHOUSE OUTLET
DATE - 10/21/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	106.248
FINAL METER VOLUME (CUBIC FEET)=	146.173
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	40.165
GAS VOLUME (DRY STANDARD CUBIC FEET)=	39.514
BAROMETRIC PRESSURE (IN. HG)=	29.28
STATIC PRESSURE (INCHES H2O)=	-0.94
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	218.6
PERCENT WATER=	20.67
AVERAGE METER TEMPERATURE (F.)=	67.9
AVERAGE DELTA H (IN. H2O)=	2.16
AVERAGE DELTA P (IN. H2O)=	1.02
AVERAGE STACK TEMPERATURE (F.)=	291.0
DRY MOLECULAR WEIGHT=	29.313
WET MOLECULAR WEIGHT=	26.975
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	1.0094
% ISOKINETIC=	100.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	50.0
NOZZLE DIAMETER (INCHES)=	0.2500
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	4,245
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	53,350
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	36,620
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	29,050

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1939
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0756
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0411
EMISSION RATE (LB/HR)=	18.82

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1939
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0756
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0411
EMISSION RATE (LB/HR)=	18.82
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 022A
RUN # - 0-2-2A
LOCATION - BAGHOUSE OUTLET
DATE - 10/21/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	3.009
FINAL METER VOLUME (CUBIC METERS)=	4.139
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	1.137
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.119
BAROMETRIC PRESSURE (MM HG)=	743.71
STATIC PRESSURE (MM H2O)=	-23.9
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	4.00
MOISTURE COLLECTED (ML)=	218.6
PERCENT WATER=	20.67
AVERAGE METER TEMPERATURE (C.)=	19.9
AVERAGE DELTA H (MM H2O)=	54.9
AVERAGE DELTA P (MM H2O)=	26.0
AVERAGE STACK TEMPERATURE (C.)=	143.9
DRY MOLECULAR WEIGHT=	29.313
WET MOLECULAR WEIGHT=	26.975
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	5.0872
% ISOKINETIC=	100.3
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	50.0
NOZZLE DIAMETER (MM)=	6.35
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,294
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,511
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	1,037
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	823

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.1939
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1733
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0943
EMISSION RATE (KG/HR)=	8.54

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.1939
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1733
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0943
EMISSION RATE (KG/HR)=	8.54
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 022A
RUN # - 0-2-2A
LOCATION - BAGHOUSE OUTLET
DATE - 10/21/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.88	1.90	295	55	55
2	0.90	2.10	292	60	58
3	0.84	1.50	297	65	60
4	1.00	2.20	295	70	60
5	1.10	2.40	295	74	63
6	1.10	2.40	292	77	64
7	1.20	2.50	286	79	68
8	1.10	2.30	285	81	68
9	1.00	2.00	284	81	69
10	1.10	2.30	289	81	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	1.7140	1.5262	0.0000	0.1878

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	68.3300	68.3238	20.0	0.0061
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 024A
RUN # - 0-2-4A
LOCATION - BAGHOUSE OUTLET
DATE - 10/21/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC FEET)=	146.450
FINAL METER VOLUME (CUBIC FEET)=	184.577
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.010
NET METER VOLUME (CUBIC FEET)=	38.356
GAS VOLUME (DRY STANDARD CUBIC FEET)=	37.616
BAROMETRIC PRESSURE (IN. HG)=	29.38
STATIC PRESSURE (INCHES H2O)=	-0.94
PERCENT OXYGEN=	15.31
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	219.9
PERCENT WATER=	21.59
AVERAGE METER TEMPERATURE (F.)=	70.3
AVERAGE DELTA H (IN. H2O)=	1.38
AVERAGE DELTA P (IN. H2O)=	0.67
AVERAGE STACK TEMPERATURE (F.)=	291.9
DRY MOLECULAR WEIGHT=	29.412
WET MOLECULAR WEIGHT=	26.948
AVERAGE SQUARE ROOT OF DELTA P (IN. H2O)=	0.8159
% ISOKINETIC=	100.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	60.0
NOZZLE DIAMETER (INCHES)=	0.2490
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,429
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	43,095
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	29,646
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	23,245

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0732
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0300
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0162
EMISSION RATE (LB/HR)=	5.97

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0732
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0300
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0162
EMISSION RATE (LB/HR)=	5.97
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 024A
RUN # - 0-2-4A
LOCATION - BAGHOUSE OUTLET
DATE - 10/21/81
PROJECT # - 4891L-83

INITIAL METER VOLUME (CUBIC METERS)=	4.147
FINAL METER VOLUME (CUBIC METERS)=	5.226
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0003
NET METER VOLUME (CUBIC METERS)=	1.086
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.065
BAROMETRIC PRESSURE (MM HG)=	746.25
STATIC PRESSURE (MM H2O)=	-23.9
PERCENT OXYGEN=	15.31
PERCENT CARBON DIOXIDE=	5.00
MOISTURE COLLECTED (ML)=	219.9
PERCENT WATER=	21.59
AVERAGE METER TEMPERATURE (C.)=	21.3
AVERAGE DELTA H (MM H2O)=	35.1
AVERAGE DELTA P (MM H2O)=	16.9
AVERAGE STACK TEMPERATURE (C.)=	144.4
DRY MOLECULAR WEIGHT=	29.412
WET MOLECULAR WEIGHT=	26.948
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.1119
% ISOKINETIC=	100.2
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	60.0
NOZZLE DIAMETER (MM)=	6.32
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,045
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,220
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	839
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	658

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.0732
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.0687
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0371
EMISSION RATE (KG/HR)=	2.71

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.0732
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.0687
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0371
EMISSION RATE (KG/HR)=	2.71
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 024A
RUN # - 0-2-4A
LOCATION - BAGHOUSE OUTLET
DATE - 10/21/81
PROJECT # - 4891L-83

POINT #	DELTA P (IN. H2O)	DELTA H (IN. H2O)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.70	1.60	291	60	60
2	0.68	1.50	287	68	60
3	0.62	1.30	293	70	64
4	0.68	1.30	288	72	68
5	0.65	1.40	291	72	68
6	0.65	1.40	294	72	68
7	0.67	1.40	295	74	69
8	0.67	1.30	296	76	70
9	0.67	1.30	293	78	70
10	0.70	1.60	292	78	70
11	0.65	1.30	290	80	70
12	0.65	1.20	293	80	70

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.5880	1.5168	0.0000	0.0712

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	67.4284	67.4263	20.0	0.0020
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043 4.3E-03
IMPINGER BLANK (MG/ML)= 0.0000

FILE NAME - 024B
RUN # - o-2-4-b
LOCATION - BAGHOUSE OUTLET
DATE - 10-30-81
PROJECT # - 4891-L83

INITIAL METER VOLUME (CUBIC FEET)=	425.470
FINAL METER VOLUME (CUBIC FEET)=	483.868
METER FACTOR= 1.006	
FINAL LEAK RATE (CU FT/MIN)=	0.000
NET METER VOLUME (CUBIC FEET)=	58.768
GAS VOLUME (DRY STANDARD CUBIC FEET)=	56.628
BAROMETRIC PRESSURE (IN. HG)=	29.02
STATIC PRESSURE (INCHES H20)=	-0.43
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	2.83
MOISTURE COLLECTED (ML)=	288.9
PERCENT WATER=	19.37
AVERAGE METER TEMPERATURE (F.)=	73.4
AVERAGE DELTA H (IN. H20)=	1.57
AVERAGE DELTA P (IN. H20)=	0.77
AVERAGE STACK TEMPERATURE (F.)=	288.3
DRY MOLECULAR WEIGHT=	29.127
WET MOLECULAR WEIGHT=	26.971
AVERAGE SQUARE ROOT OF DELTA P (IN. H20)=	0.8797
% ISOKINETIC=	96.4
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	85.0
NOZZLE DIAMETER (INCHES)=	0.2490
STACK AXIS #1 (INCHES)=	48.00
STACK AXIS #2 (INCHES)=	48.00
CIRCULAR STACK	
STACK AREA (SQUARE FEET)=	12.566
STACK VELOCITY (ACTUAL, FEET/MIN)=	3,708
FLOW RATE (ACTUAL, CUBIC FT/MIN)=	46,590
FLOW RATE (STANDARD, WET, CUBIC FT/MIN)=	31,851
FLOW RATE (STANDARD, DRY, CUBIC FT/MIN)=	25,681

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2318
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0630
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0347
EMISSION RATE (LB/HR)=	13.87

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2318
PARTICULATE LOADING, DRY STD. (GR./SCF)=	0.0630
PARTICULATE LOADING, ACTUAL (GR./CU. FT.)=	0.0347
EMISSION RATE (LB/HR)=	13.87
PERCENT IMPINGER CATCH=	0.0

* * METRIC UNITS * *

FILE NAME - 024B
RUN # - o-2-4-b
LOCATION - BAGHOUSE OUTLET
DATE - 10-30-81
PROJECT # - 4691-L83

INITIAL METER VOLUME (CUBIC METERS)=	12.048
FINAL METER VOLUME (CUBIC METERS)=	13.702
METER FACTOR= 1.006	
FINAL LEAK RATE (CU M/MIN)=	0.0000
NET METER VOLUME (CUBIC METERS)=	1.664
GAS VOLUME (DRY STANDARD CUBIC METERS)=	1.603
BAROMETRIC PRESSURE (MM HG)=	737.11
STATIC PRESSURE (MM H2O)=	-10.9
PERCENT OXYGEN=	16.83
PERCENT CARBON DIOXIDE=	2.83
MOISTURE COLLECTED (ML)=	288.9
PERCENT WATER=	19.37
AVERAGE METER TEMPERATURE (C.)=	23.0
AVERAGE DELTA H (MM H2O)=	40.0
AVERAGE DELTA P (MM H2O)=	19.7
AVERAGE STACK TEMPERATURE (C.)=	142.4
DRY MOLECULAR WEIGHT=	29.127
WET MOLECULAR WEIGHT=	26.971
AVERAGE SQUARE ROOT OF DELTA P (MM H2O)=	4.4334
% ISOKINETIC=	96.4
PITOT COEFFICIENT=	0.8400
SAMPLING TIME (MINUTES)=	85.0
NOZZLE DIAMETER (MM)=	6.32
STACK AXIS #1 (METERS)=	1.219
STACK AXIS #2 (METERS)=	1.219
CIRCULAR STACK	
STACK AREA (SQUARE METERS)=	1.167
STACK VELOCITY (ACTUAL, M/MIN)=	1,130
FLOW RATE (ACTUAL, CUBIC M/MIN)=	1,319
FLOW RATE (STANDARD, WET, CUBIC M/MIN)=	902
FLOW RATE (STANDARD, DRY, CUBIC M/MIN)=	727

PARTICULATE LOADING - PARTIAL CATCH

PARTICULATE WEIGHT (G)=	0.2318
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1446
PARTICULATE LOADING, ACTUAL (G/CU. M.)=	0.0797
EMISSION RATE (KG/HR)=	6.30

PARTICULATE LOADING - TOTAL CATCH INCLUDING IMPINGERS

PARTICULATE WEIGHT (G)=	0.2318
PARTICULATE LOADING, DRY STD. (G/CU. M)=	0.1446
PARTICULATE LOADING, ACTUAL (G/CU. M)=	0.0797
EMISSION RATE (KG/HR)=	6.30
PERCENT IMPINGER CATCH=	0.0

FILE NAME - 024B
RUN # - o-2-4-b
LOCATION - BAGHOUSE OUTLET
DATE - 10-30-81
PROJECT # - 4891-L83

POINT #	DELTA P (IN. H20)	DELTA H (IN. H20)	STACK T (F.)	METER T. IN(F.)	METER T. OUT(F.)
1	0.80	1.70	289	60	60
2	0.75	1.60	286	69	72
3	0.80	1.70	287	70	73
4	0.81	1.70	287	72	75
5	0.80	1.60	289	72	75
6	0.79	1.60	288	72	75
7	0.78	1.60	287	70	78
8	0.78	1.70	287	70	78
9	0.76	1.70	285	70	78
10	0.76	1.55	289	70	78
11	0.72	1.40	289	70	79
12	0.76	1.50	287	71	80
13	0.71	1.40	290	71	80
14	0.74	1.50	288	71	81
15	0.79	1.50	289	72	81
16	0.78	1.50	292	72	79
17	0.83	1.50	292	72	79

FRACTION	FINAL WT. (G)	TARE WT. (G)	BLANK WT. (G)	NET WT. (G)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	1.7509	1.5286	0.0002	0.2221

FRACTION	FINAL WT. (G)	TARE WT. (G)	VOL. (ML)	NET WT. (G)
PROBE RINSE	67.4776	67.4678	20.0	0.0097
IMPINGERS	0.0000	0.0000	0.0	0.0000

PROBE RINSE BLANK (MG/ML)= 0.0043
IMPINGER BLANK (MG/ML)= 0.0000

UNACCEPTABLE ANDERSEN MARK III RUN

INPUT DATA FOR FILE 011AMK3
TEST DATE - 10/20/81
PROJECT # - 4891L-83
TEST SITE - BOWEN ASPHALT
RUN ID - 0-1-1A

% WATER= 18.02
% CARBON DIOXIDE= 4.00
% CARBON MONOXIDE= 0.00
% OXYGEN= 16.83

ANDERSEN MODEL III IMPACTOR W/CYCLONE

STACK TEMPERATURE= 309.3 DEGREES F.
BAR. PRESSURE= 29.07 INCHES HG
STATIC PRESSURE= -0.94 INCHES H20
AVE. DELTA P= 0.85 INCHES H20
PITOT COEFF.= .84
METER TEMP.= 73.4 DEGREES F.
PROBE DIA.= 0.136 INCHES

SAMPLING TIME= 67.0 MIN.
PRESSURE DROP= 0.00 INCHES HG
SAMPLER TEMP. = 309.3 DEGREES F.
PARTICLE DENS= 1
METER VOL.= 19.901 CUBIC FEET
DELTA H= 0.23 INCHES H20

CALCULATED RESULTS

SAMPLE VOL.-DRY STD.= 19.145 CU. FT.
SAMPLE VOL.-WET STD.= 23.353 CU. FT.
STACK VELOCITY= 3912.5 FT./MIN.
NOZZLE VELOCITY= 5195.6 FT./MIN.
MASS COLLECTED= 45.880 MG.
LOADING= 0.03032 GRAIN/SCF
LOADING(DRY)= 0.03698 GRAIN/SCF
RATE FOR 15 MICRON CYCLONE CUTOFF= 0.528 CU. FT/MIN

DRY MOLECULAR WT.= 29.31
WET MOLECULAR WT.= 27.27
% ISOKINETIC= 132.8
SAMPLING RATE-ACTUAL= 0.524 CU. FT/MIN
CYCLONE BLANK= 0.000 MG.
STAGE BLANK= -0.950 MG.
FILTER BLANK= -1.070 MG.

STAGE #	CYCLONE	0	1	2	3	4	5	6	7	FILTER
FINAL WT (MG)	271.64	383.84	373.76	386.85	365.74	389.69	389.96	369.61	381.56	419.08
TARE WT (MG)	234.12	383.91	374.36	386.32	365.06	389.02	389.62	369.96	382.33	419.82
NET WT (MG) CORRECTED	37.52	0.88	0.35	1.48	1.63	1.62	1.29	0.60	0.18	0.33
FRACTION % OF TOTAL	81.78	1.92	0.76	3.23	3.55	3.53	2.81	1.31	0.39	0.72
CUM. % WITH FILTER	81.78	83.70	84.46	87.69	91.24	94.77	97.58	98.89	99.28	100.00
FRACTION % WITHOUT FILTER	82.37	1.93	0.77	3.25	3.58	3.56	2.83	1.32	0.40	
CUM. % WITHOUT FILTER	82.37	84.30	85.07	88.32	91.90	95.46	98.29	99.60	100.00	
JET VEL. (CM/SEC)	0	46	86	143	236	419	1015	1849	3129	
D50 SIZE (MICRONS)	15.07	14.61	9.11	6.16	4.19	2.67	1.32	0.80	0.58	<0.58
DM/DLOGD (GRAINS/SCF)		0.04359	0.00113	0.00576	0.00641	0.00550	0.00277	0.00181	0.00088	
GEO MEAN (MICRONS)		14.84	11.54	7.49	5.08	3.35	1.88	1.02	0.68	<0.68
PARTICLE COUNT		3.64D+05	1.21D+04	9.52D+04	1.56D+05	2.03D+05	1.83D+05	2.19D+05	1.60D+05	

THE CYCLONE D50 ASSUMES A (-.63) POWER OF FLOW RATE (SRI CYCLONE I).