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Office of Enforcement  
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COTTON GIN EMISSION TESTS  
MARANA GIN  
PRODUCERS COTTON OIL COMPANY  
Marana, Arizona

[November 2 - 19, 1977]

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National Enforcement Investigations Center - Denver  
and  
Region IX - San Francisco



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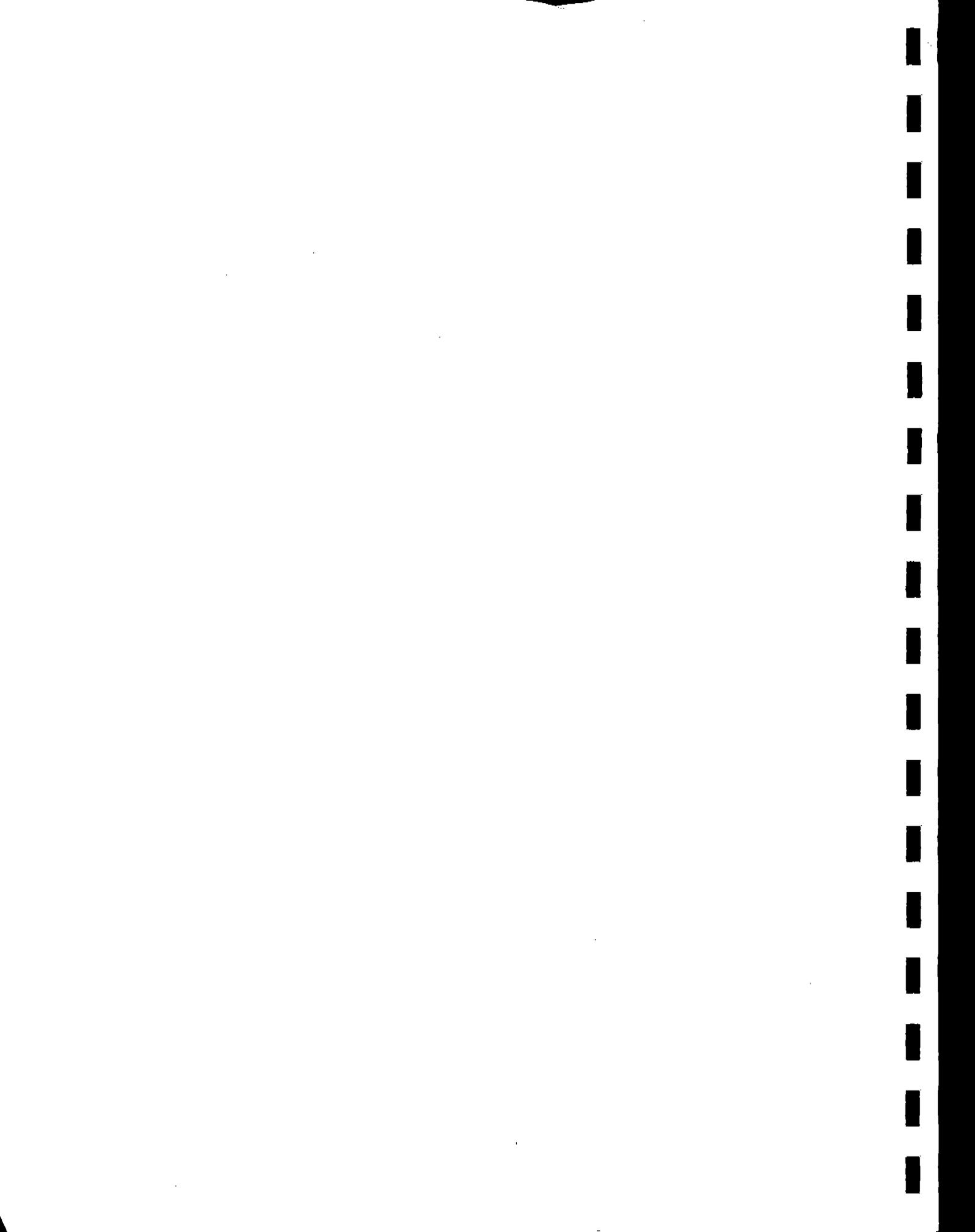
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I. INTRODUCTION

The Environmental Protection Agency (EPA), Region IX, requested the National Enforcement Investigations Center (NEIC) to source test the Marana Gin of Producers Cotton Oil Company, Marana, Arizona. NEIC was to determine if the gin was in compliance with the Pima County Regulation II, Rule 2 which limits the particulate emissions based on process weight, i.e., seed cotton feed rate.

The Marana Gin consists of two gins---one for processing short-staple cotton,\* and the other for processing long-staple (Pima) cotton---with production capacities of 10 and 4 bales/hr, respectively [Figure 1]. The two gins are similar, each being separated into a high-pressure and a low-pressure side, so named because of the process fan capacities. The high-pressure side includes the cleaning, drying and ginning of seed cotton. Particulate emissions from these sources are controlled by cyclones. The low-pressure side includes cleaning, compressing and baling of lint cotton, with the emissions being controlled by lint cages.

NEIC performed a presurvey inspection of the Marana Gin on November 17, 1976, to determine the feasibility of source sampling, and to evaluate process operations and control devices [Appendix A]. This inspection determined that: 1) the cyclones could be sampled if the outlets were modified to provide acceptable sampling locations;

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\* Short-staple cotton fibers range in length from 2.4 to 2.7 cm (0.94 to 1.06 in) as compared to long-staple cotton fibers which range from 2.8 to 3.8 cm (1.09 to 1.5 in).



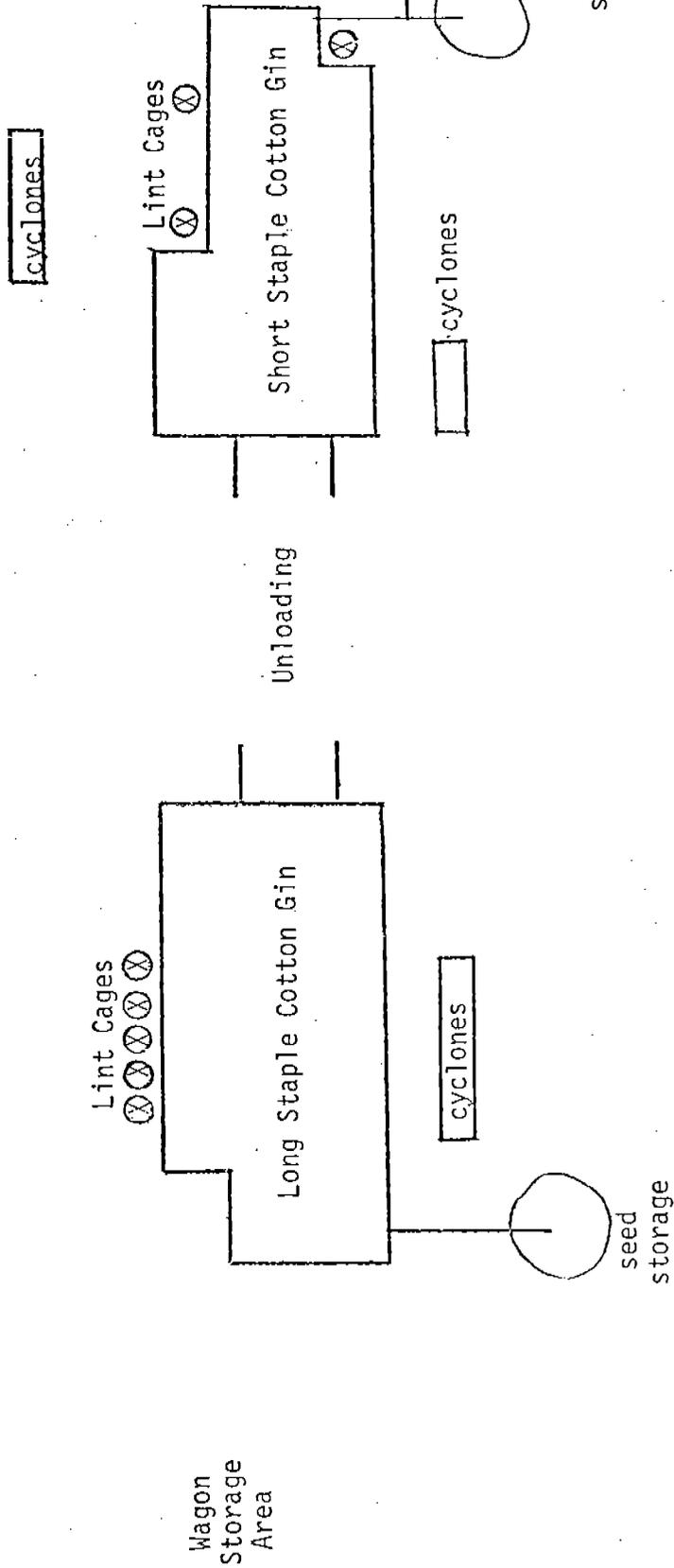
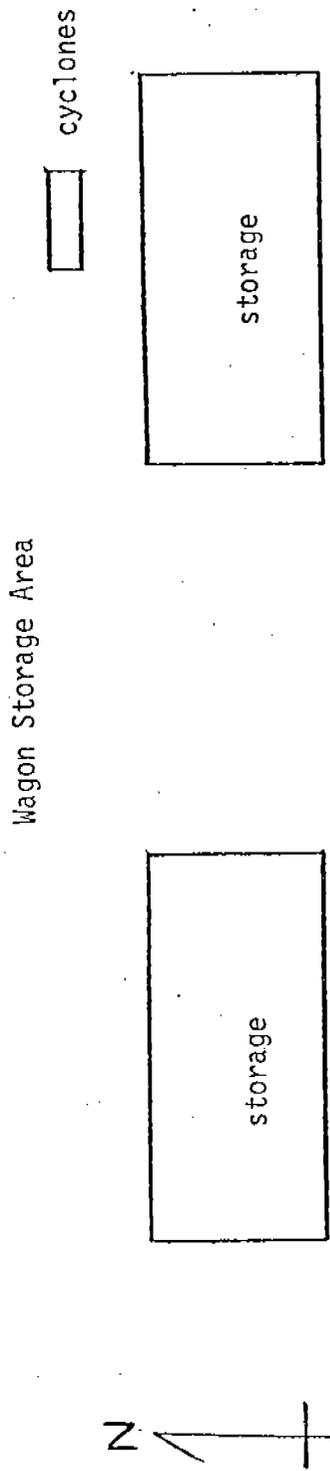


Figure 1. Producers Cotton Oil Company  
Marana Gin Plot Plan



2) the seed and mote\* cyclones could not be sampled because of their inaccessibility; and 3) the low-pressure side lint cages could not be source tested using EPA Method 5<sup>1</sup> procedures.

During the preliminary stages of developing the source test program, questions arose as to whether a suitable sampling methodology existed. A meeting was held in Dallas, Texas on January 5, 1977 between the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS); the Cotton Ginning Council of America; and the EPA (Region IX and NEIC) to discuss sampling procedures for measuring cotton gin cyclone emissions. It was decided that NEIC and ARS would undertake a comparability study between the EPA Method 5 and the ARS high-volume sampling procedures. The results of this comparability study<sup>2</sup> showed that Method 5 could be used to test cotton gin emissions, provided a large sampling nozzle ( $\geq 1.3$  cm or 0.5 in) was used. The Aerotherm Corporation's high-volume source sampler (HVSS) was selected to test the cyclone emissions because it meets all the EPA Method 5 testing requirements using a large sampling nozzle.

The HVSS was not considered suitable to sample the lint cage emissions because the air-flow rates were below that detectable by an S-type pitobe assembly, and the HVSS does not have the geometric flexibility required. The Rader\*\* high-volume (HV) sampler was selected to test the lint cage emissions because it does have the flexibility required.

On September 27, 1977, EPA personnel met with Marana Gin officials to discuss the modifications required to enable testing of the cyclone outlets and to discuss sampling procedures for the lint cages.

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\* Motes are a group of fibers attached to a portion of seed hull.  
\*\* Brand name.

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Between November 2 and 19, 1977, the short- and long-staple cotton gins were source tested. In addition to the emission testing, ambient air particulate sampling was performed with high-volume samplers (Hi-Vols) to determine if the gin emissions had an impact on the air quality in the immediate area, and visible emissions were evaluated in accordance with Pima County Regulation II, Rule 1 which limits the emissions to 40% opacity.



## II. SUMMARY AND CONCLUSIONS

The lint cages and cyclones of the short- and long-staple cotton gins of Producers Cotton Oil Company, Marana, Arizona, were source tested to determine compliance with Pima County Regulation II, Rule 2. During the November 2 to 19, 1977 survey the short- and long-staple gins operated at 86 and 85% capacity, 8.6 and 3.4 bales/hr, respectively. The seed cotton that was ginned was machine-picked cotton.

According to Rule 2 the short-staple gin is allowed to emit particulate at 5.1 kg (11.2 lb)/hr. The cyclone and lint cage emissions, listed below, totaled 13.4 kg (29.5 lb)/hr, 164% greater than the allowed emissions.

Source	Particulate Emissions			
	Actual		Allowed	
	kg/hr	lb/hr	kg/hr	lb/hr
Cyclones	7.23	16.0	-	-
Lint Cages	6.13	13.5	-	-
Total	13.4	29.5	5.1	11.2

The short-staple gin emissions determined by the source testing are conservative, because: 1) the mote cyclone emissions were not tested, therefore not included, and 2) the lint cage testing was conducted over the acceptable isokinetic sampling rate, thus emission results are less than the actual emissions.



Particulate emissions from the long-staple gin are limited to 2.7 kg (6.02 lb)/hr. Lint cage and cyclone emissions totaled 3.40 kg (7.50 lb)/hr, 25% greater than the allowable.

Source	Particulate Emissions			
	Actual		Allowed	
	kg/hr	lb/hr	kg/hr	lb/hr
Cyclones	1.84	4.06	-	-
Lint Cages	1.56	3.44	-	-
Total	3.40	7.50	2.7	6.02

The source testing results of the long-staple gin emissions are also conservative because the seed cyclone emissions were not included in the total, and the lint cage emissions results are less than the actual emissions for the reasons discussed above.

Visible emissions observed from the short-staple gin cyclones were less than the Pima County Regulation II, Rule 1, opacity limit (40%).



### III. PROCESS DESCRIPTION

Both short- and long-staple gins process seed cotton in a similar manner. Pneumatic or air conveying is the principal means of moving cotton within each gin. Approximately 725 kg (1,600 lb)\* of seed cotton is required to produce a bale of lint cotton (227 kg or 500 lb). The weight difference (498 kg or 1,100 lb) is the weight of trash and cottonseed removed during processing.

Seed cotton is usually delivered to a gin in a wagon, and unloaded. This seed cotton is alternately dried and cleaned twice before being ginned. Lint cotton, cottonseed and trash are separated during ginning, after which the lint cotton is cleaned again before being baled.

The condition of the seed cotton, a function of the picking procedures, affects process operations and emissions. Cotton is generally picked twice from the defoliated stalks which accounts for 90 to 95% of the cotton ginned. Picked cotton contains some trash (stalks, leaves and dirt). Subsequent to the second pick, a vacuum sweeper is used to pick up cotton including trash that has fallen to the ground (ground-cotton). Second-pick cotton, which has slightly more trash than first-pick but much less than ground cotton, was reportedly ginned during the November 2-19 survey.

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\* At the Marana Gin it was computed to take 662 kg (1,460 lb) of seed cotton to produce a bale of lint cotton.



The seed cotton moisture content also affects the process operations and emissions. The moisture content is a function of the mode of harvesting (i.e., picked or ground cotton) and the time of harvesting (i.e., morning or afternoon, and before or after a rain). A 6 to 8% moisture content is considered ideal for processing; less than 6% results in cotton being removed with the trash, increasing the loading to the cyclones. Conversely, only a small amount of trash will be removed when the moisture content is greater than 8%, resulting in a poor grade of bale cotton. Detailed process information for both Marana gins follows.

The seed cotton is off-loaded from a wagon with a vacuum system and collected in a separator [Figures 2 and 3]. The cotton then enters a natural-gas-fired reel drier. The reel drier is a horizontal rotary drier that also removes some trash as the cotton passes through the unit.

This cotton is air-conveyed to a 7-cylinder inclined cleaner (the long-staple gin has a 5-cylinder inclined cleaner). The cleaner consists of 7 (5) spiked drum cylinders which carry and "scrub" the seed cotton to remove fine particles such as leaves, dirt and sand.

Next, a bur extractor removes heavy trash and burs from the cotton with a revolving saw cylinder. The teeth of the saw hold the seed cotton and subject it to a carding and cleaning action as the cotton is spread across the surface of the cylinder.

The cotton is then fed into a 24-shelf natural-gas-fired tower drier. The cotton, while falling from shelf to shelf, is dried by a concurrent stream of warm gases. The cotton moisture content at the exit is normally between 6 and 8%. This dry cotton is air-conveyed to second-stage inclined cleaners (the short-staple gin has two cleaners



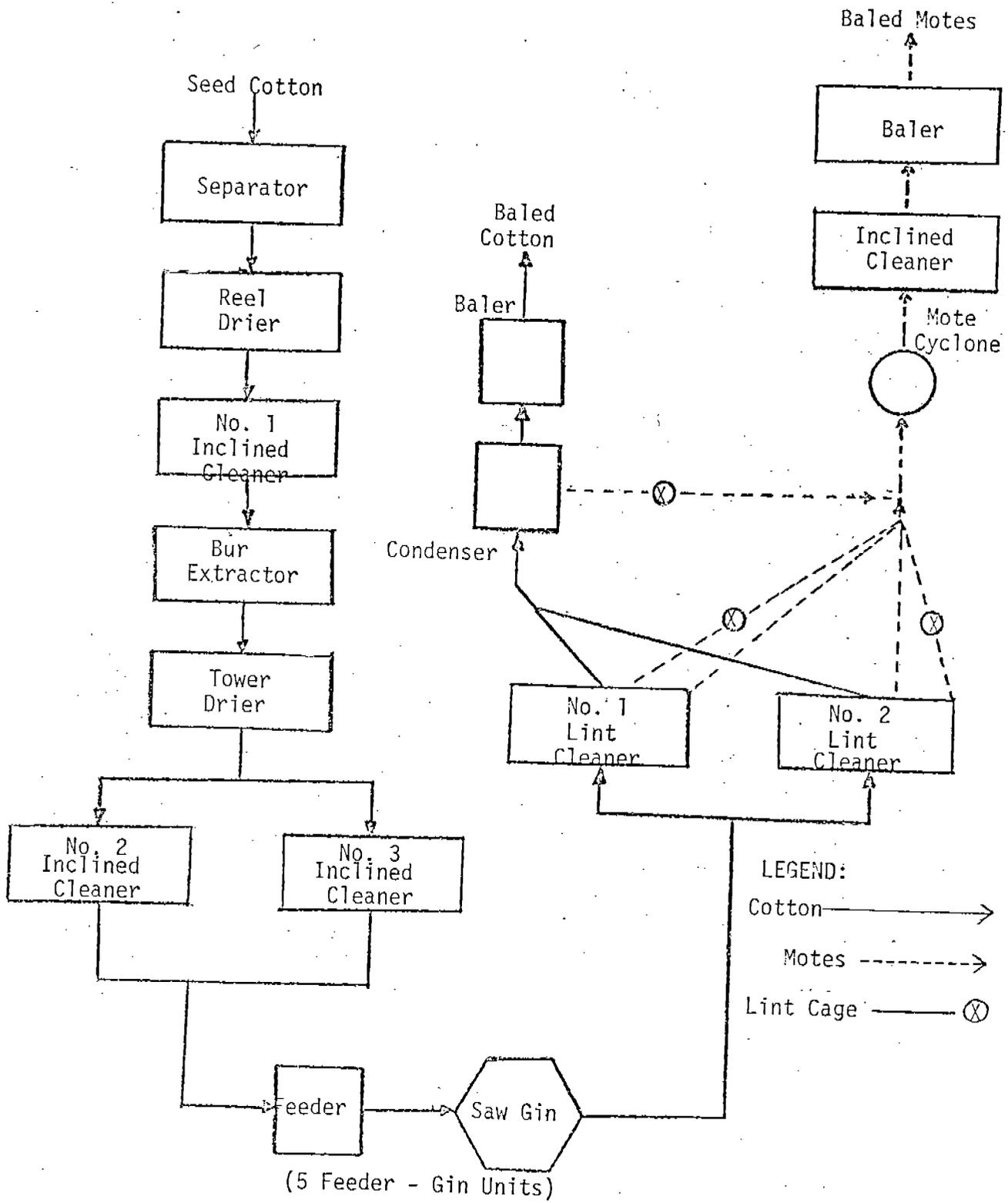


Figure 2. Short-Staple Cotton Gin Process Flow  
 Producers Cotton Oil Company  
 Marana Gin

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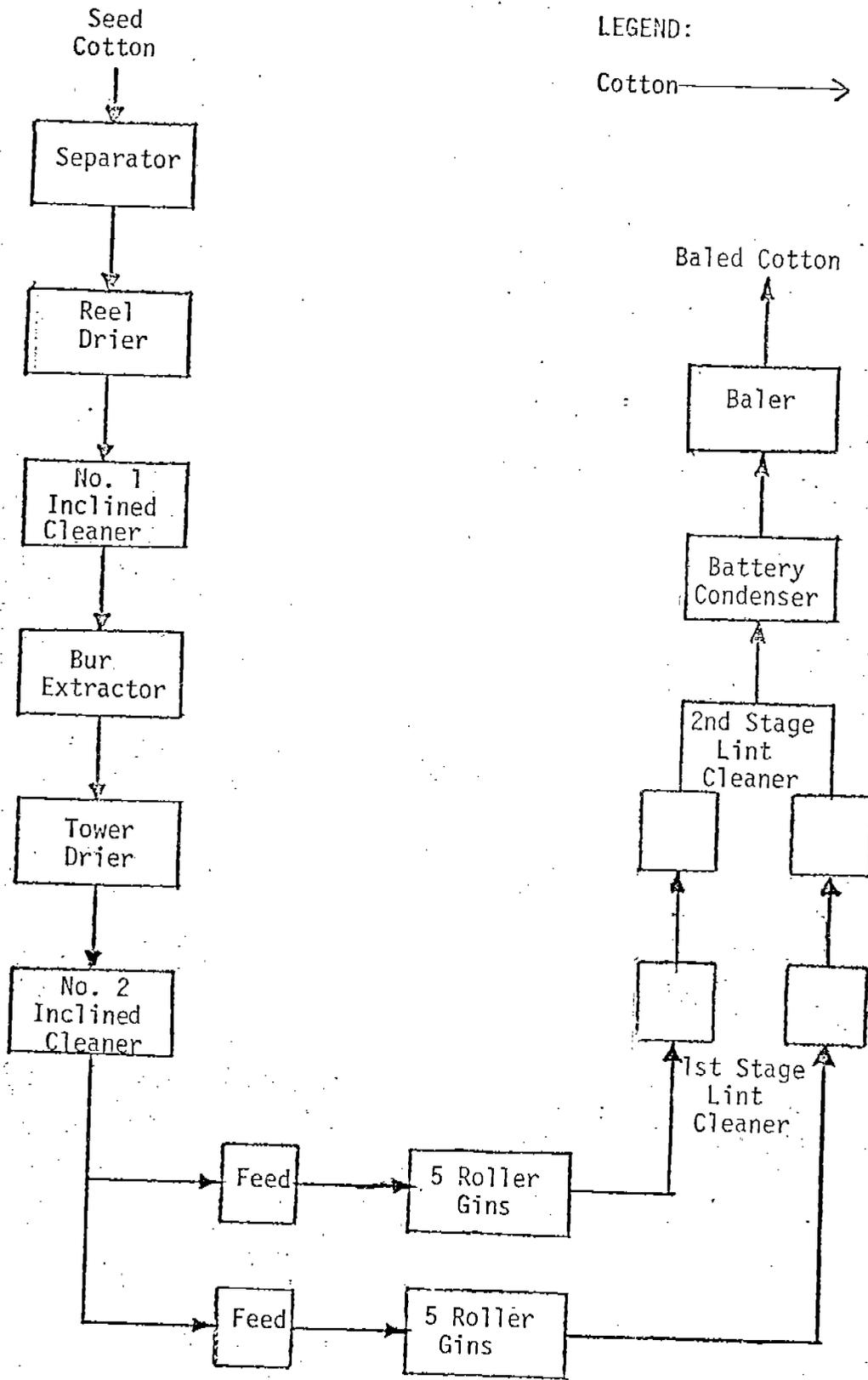


Figure 3. Long-Staple Cotton Gin Process Flow  
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Marana Gin

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in parallel, the long-staple gin has one). These inclined cleaners are identical to the one previously described:

Then, the cotton is distributed to five extractor feeders in parallel (the long-staple gin has ten) where additional burs, stems, whole leaves and other trash are removed. The cotton is fed at a constant rate to five 80-saw-gin stands (10 roller gins in the long-staple gin). Excess cotton is returned to the second stage cleaners.

The saw-gin stands use saws and air blasts to separate seeds and trash from the cotton; the roller gins use revolving cylinders to separate the seeds and trash from the lint. The resulting lint cotton is air-conveyed to two lint cleaners operated in parallel (two sets of two lint cleaners are used in the long-staple gin). The lint cleaners remove fine particles, motes, dust and sticks. The clean lint cotton is air-conveyed to the condenser where it is formed into a smooth endless mat and fed into the baler. The bales are wrapped in burlap, tied with metal bands and stored.

The motes and lint cotton removed with the trash from the lint cleaners and condenser are recovered in the mote cyclone. The motes are then cleaned in an inclined cleaner, and baled. Motes are not recovered in the long-staple gin.\*

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\* The long-staple cotton reportedly contains only 1 to 2% motes while short-staple contains 10 to 12%.



#### IV. CONTROL EQUIPMENT DESCRIPTION

All the trash removed from the cotton is pneumatically conveyed out of the gin building where cyclones and lint cages remove the trash from the air streams. Eight lint cages control the short- and long-staple gin low-pressure side emissions [Figures 4 and 5]. The trash collected by the lint cages is air conveyed to the mote cyclone or Station 2306 cyclones (short- and long-staple gins, respectively).

Twenty-eight cyclones control the short- and long-staple gin high-pressure side emissions [Figures 4 and 5]. These cyclones operate in groups of twos and threes. In the short-staple gin, all collected trash is conveyed to three cyclones (Station 2211) which have a screw conveyor at their base to dump the collected trash into a wagon.

##### LINT CAGES

The lint cage consists of a screened cylinder [Figure 6] where the gases enter from the top and vent through the entire cylindrical circumference with a swirling flow. The collected particulate (mostly lint) sloughs off the inside of the screen and falls to the bottom of the lint cage.

The lint cages are supported from the ground and, with the exception of Station 2203 [Figure 4], are located against the outside wall of the gin buildings, exposed to the weather. Station 2203 lint cage is partially enclosed by a shed on three sides and on top, so that the gases are vented through a 2 x 2.2 m (6.5 x 7.2 ft) opening.

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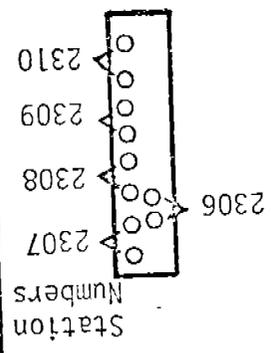
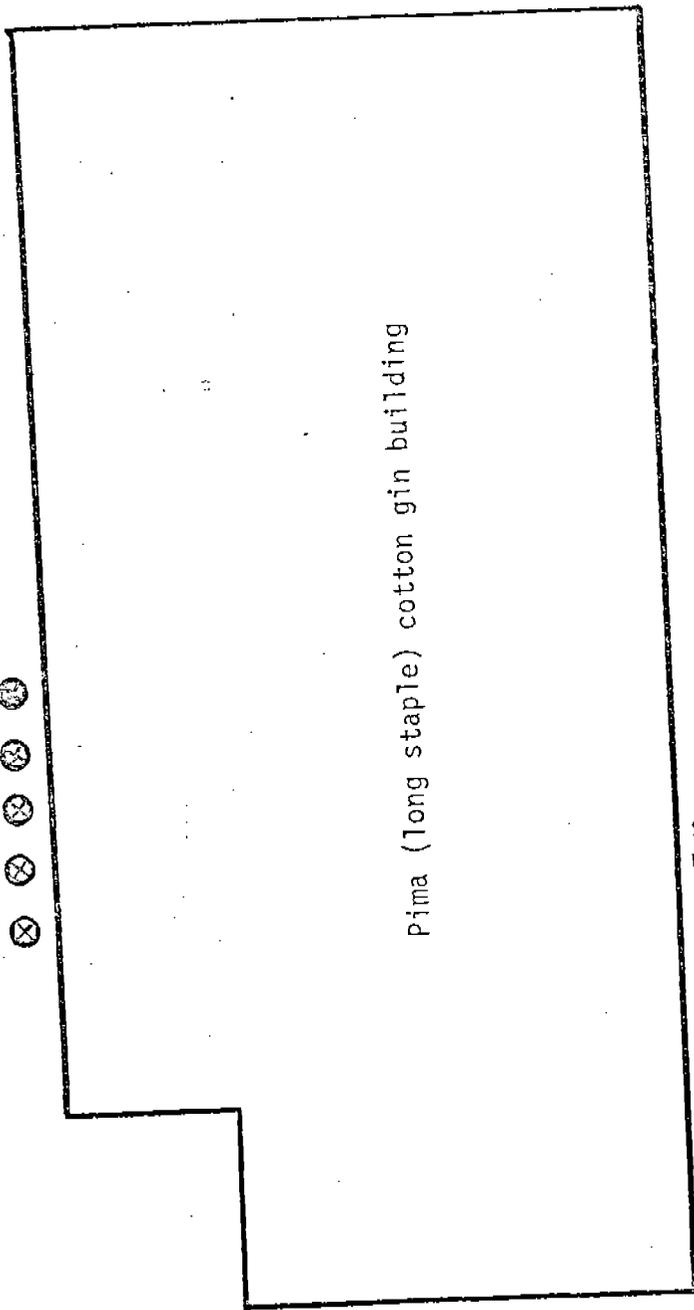


LEGEND:

- 0 - cyclone
- ∅ - lint cage
- V - cyclone pair
- SN - station number



- ⊗ SN 2301
- ⊗ SN 2302
- ⊗ SN 2303
- ⊗ SN 2304
- ⊗ SN 2305



○ Seed cyclone

Figure 5. Long-Staple Gin Emission Points  
Producers Cotton Oil Company  
Marana Gin

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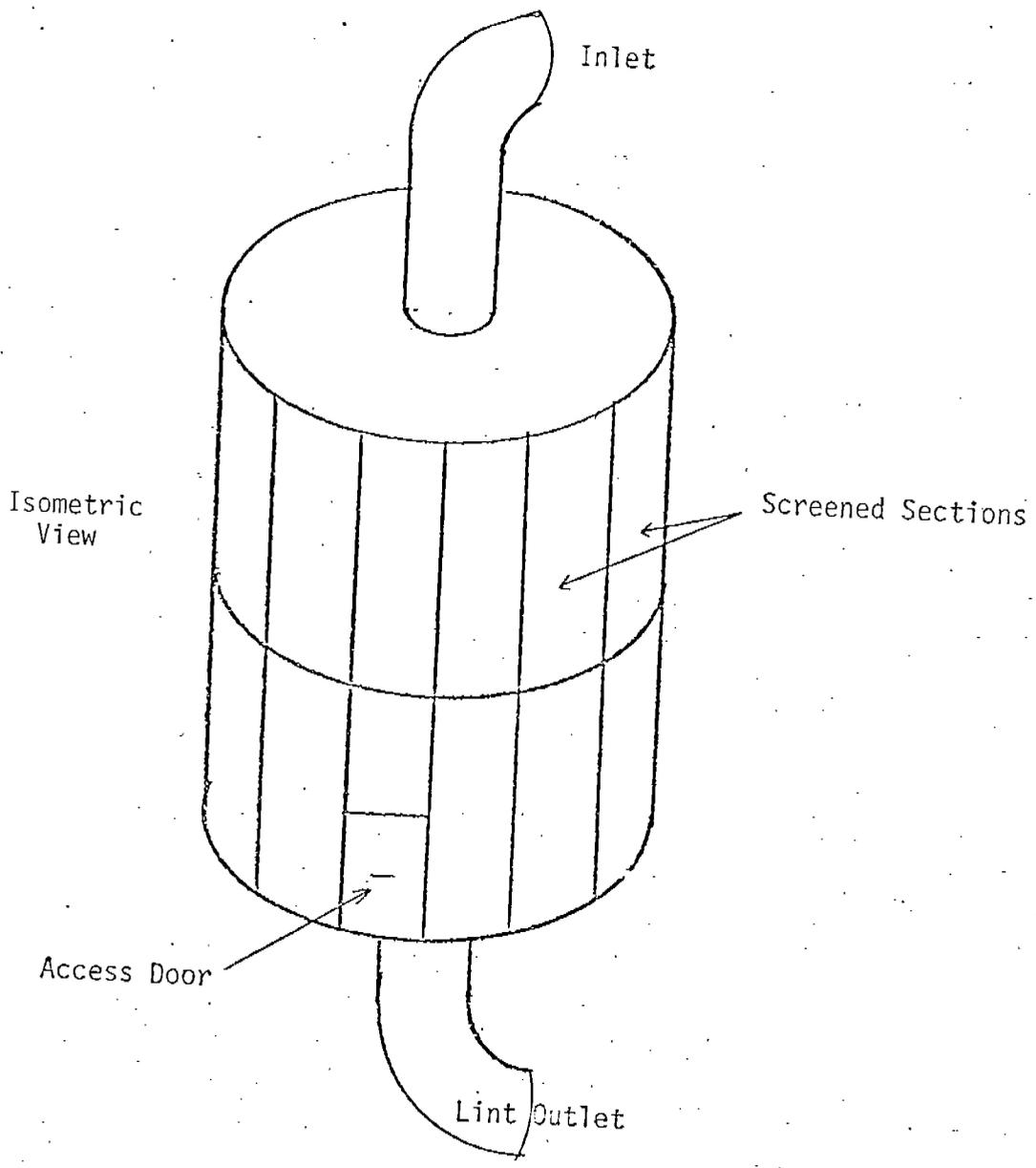


Figure 6. Lint Cage Diagram



The three short-staple gin lint cages, each have 28 sections approximately 1.2 x 0.4 m (3.9 x 1.2 ft) in two bands of 14 sections each. The 3.6 m (11.7 ft) high cage has a third band of solid metal between the two screened bands [physical dimensions of each lint cage are listed in Table 1].

The five lint cages of the long-staple gin are 1.1 m (3.6 ft) above the ground, 0.5 to 0.9 m (1.5 to 3 ft) away from any cage or building wall. Each lint cage has 8 sections, approximately 1.2 x 0.4 m (3.9 x 1.2 ft), in a single band [Table 1].

#### CYCLONES

A cyclone is an inertial separator in which particles are separated from the gas streamlines by means of centrifugal force created in a vortex flow, driving the particulates suspended in the gas to the collector wall. From there, the particulates settle to the bottom of the cyclone and are pneumatically or mechanically carried away.

The cyclones at the Marana Gin are supported so that with the cyclone outlets are 4.6 to 7.3 m (15 to 24 ft) above the ground. The cyclone outlets range from 43 to 48 cm (17 to 19 in) in diameter and are 10 cm (4 in) tall. Table 2 summarizes the cyclone design gas flow rates and geometry data provided by the Company.

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Table 1  
 LINT CAGE CONSTRUCTION DETAILS  
 PRODUCERS COTTON OIL COMPANY  
 Marana, Arizona

Lint Cage Station No.	Process Controlled	Cage Height		Cage Diameter		No. of Sections
		m	ft	m	ft	
Short-Staple Cotton Gin [Figure 4]						
SN 2201	Lint Cleaner	2.5	7.8	1.6	5.1	28
SN 2202	Condenser	3.6	11.7	1.6	5.1	28
SN 2203	Lint Cleaner	2.4	7.8	1.6	5.1	28
Long-Staple Cotton Gin [Figure 5]						
SN 2301	1st Stage Lint Cleaner	1.5	5	0.9	3	8
SN 2302	1st Stage Lint Cleaner	1.5	5	0.9	3	8
SN 2303	2nd Stage Lint Cleaner	1.5	5	0.9	3	8
SN 2304	2nd Stage Lint Cleaner	1.5	5	0.9	3	8
SN 2305	Condenser	1.5	5	0.9	3	8

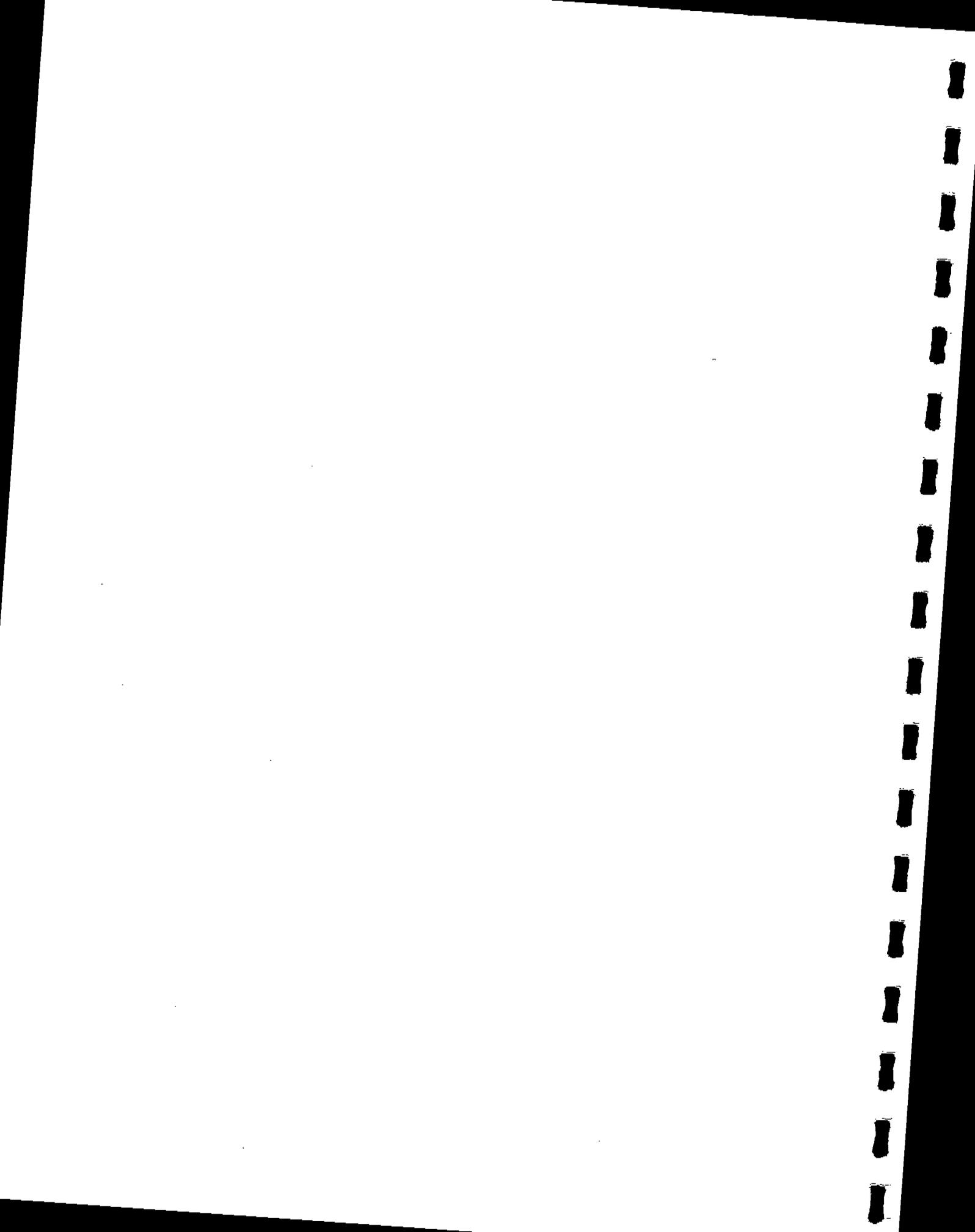


Table 2  
CYCLONE DESIGN DATA  
PRODUCERS COTTON OIL COMPANY  
Marana, Arizona

Cyclone Group Station No.	Process Controlled	Cyclone Size (Diameter)		Design Gas Flow <sup>a</sup> Rate	
		cm	in	m <sup>3</sup> /min	ft <sup>3</sup> /min
Short-Staple Cotton Gin [Figure 4]					
SN 2204	No. 1 inclined cleaner reel drier	97	38	226	8,000
SN 2205	Bur extractor	97	38	170	6,000
SN 2207	No. 2 & 3 inclined cleaners, gin stand and feeder trash conveyor	97	38	282	10,000
SN 2208	Gin stand feeder overflow, mote in- clined cleaner trash	97	38	170	6,000
SN 2206 <sup>b</sup>	Mote cyclone bypass	97	38	226	8,000
Mote	No. 1 & 2 lint cleaners and lint cages. Con- denser lint cage	270	104	226	8,000
SN 2209	Separator (unloading)	97	38	170	10,000
SN 2211	Cyclone trash pickup	97	38		Unknown
Long-Staple Cotton Gin [Figure 5]					
SN 2310	No. 1 inclined cleaner bur extractor	97	38	226	8,000
SN 2308	Separator (unloading)	97	38	226	8,000
SN 2307	Gin Trash No. 2 in- clined cleaner	97	38	170	6,000
SN 2306	Lint cleaner trash, lint cage trash	97	38	170	6,000
SN 2309	Reel drier	97	38	85	3,000
Seed	Seed conveying	61	24	42	1,500

a Data from Company process flow diagrams.

b SN 2206 cyclones are only used when the mote cleaning system is not operating and the mote cyclone is being bypassed.

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## V. TEST PROCEDURES

### CYCLONE SAMPLING PROCEDURES

The cyclone exits were 10 cm (4 in) tall and could not be sampled according to Methods 1<sup>1</sup> and 2<sup>1</sup> without outlet modifications. To accomplish sampling the outlets were modified with an involute system [Figure 7] to eliminate the cyclonic gas flow, combine the emissions of the cyclone pairs and triplets, and direct the gas flow toward the ground. Sampling was performed in the 51 cm (20 in) diameter involute system ducting at two perpendicular test ports about 1.5 m (5 ft) from the ground. Because an involute system was used for each cyclone pair or triplet, the sampling locations were similar in each case.

All particulate sampling in conjunction with the involute system was performed according to Method 5. The stack gas molecular weight was calculated using the average analyses of three gas samples. Gas samples were obtained November 17 by a grab sample technique and analyzed with Fyrite\* type combustion gas analyzers. Stations 2209 and 2211 were not sampled, but were assumed to have the same gas composition as the other Stations. Past source tests had shown that cotton gin emissions, even natural-gas-fired drier combustion gases, have had gas compositions of air---21% oxygen and 79% nitrogen; therefore these values were assumed for Stations 2209 and 2211.

The number and location of the sampling points were determined according to Method 1. Table 3 gives the lengths of straight ducting

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\* Brand name.

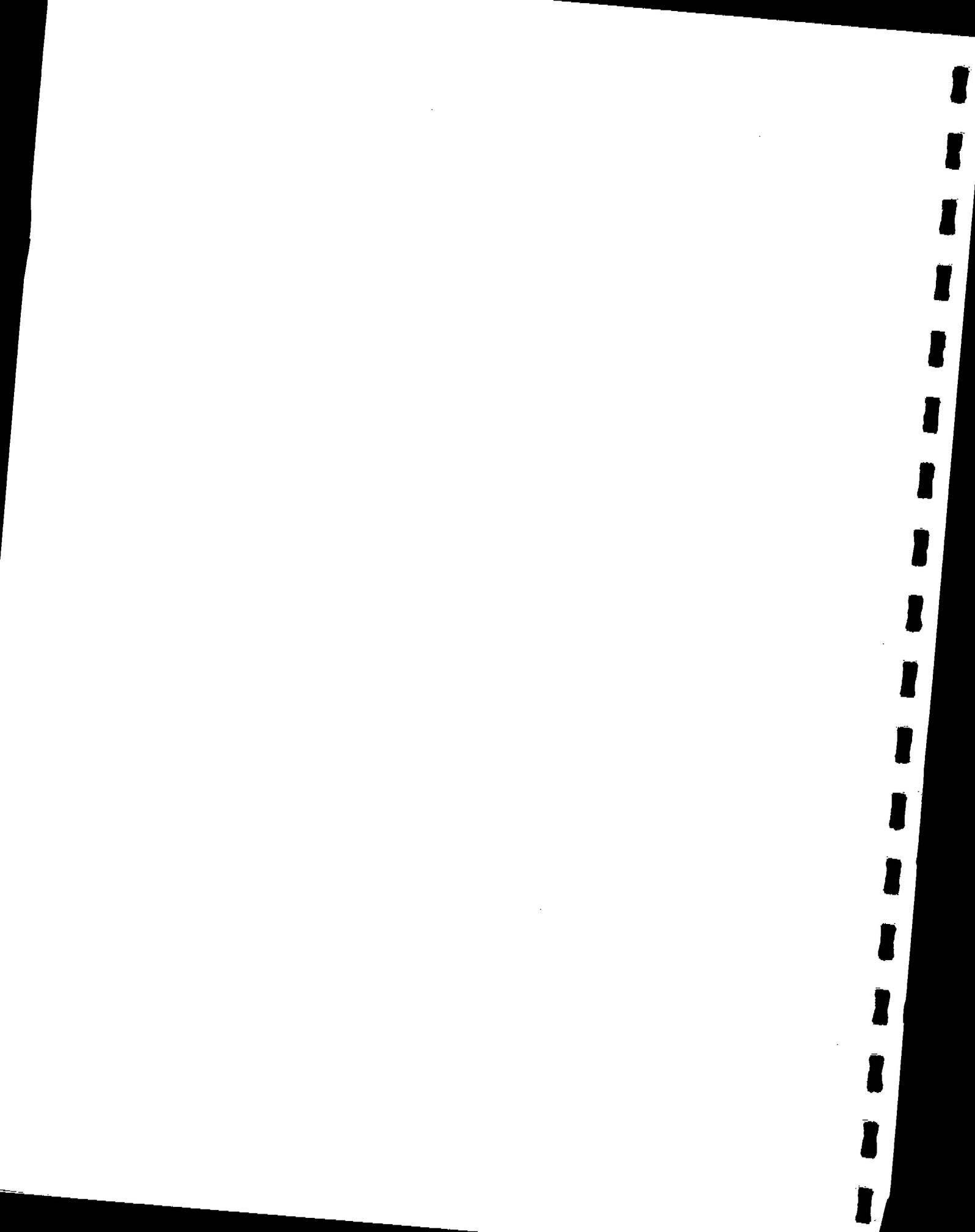


Table 3  
 SAMPLING LOCATION DATA  
 PRODUCERS COTTON OIL COMPANY  
 Marana, Arizona

Station No.	Distances <sup>a</sup>		dia.	ft	m	dia.	Sampling Points		Total Sampling Time Per Run (min)
	Upstream (A)	Downstream (B)					Required <sup>b</sup>	Used	
<b>Short-Staple gin</b>									
2204	3	10	6	0.8	2.5	1.5	16	16	64
2205	3	10	6	0.8	2.5	1.5	16	16	64
2207	3	10	6	0.8	2.5	1.5	16	16	64
2208	3	10	6	0.8	2.5	1.5	16	16	64
2209	3	10	6	0.8	2.5	1.5	16	16	60
2211	5.5	18	10.8	1.1	3.5	2.1	8	12	60
<b>Long-Staple Gin</b>									
2306	7.0	23	13.8	1.1	3.5	2.1	8	12	60
2307	5.5	18	10.8	1.1	3.5	2.1	8	12	60
2308	5.5	18	10.8	1.1	3.5	2.1	8	12	60
2309	5.5	18	10.8	1.1	3.5	2.1	8	12	60
2310	5.5	18	10.8	1.1	3.5	2.1	8	12	60

a For A and B see Figure 7.  
 b Method 1, Figure 1-1

m ft dia. m ft dia. Required Used (min)



upstream and downstream of the test ports [Figure 7], the number of diameters upstream and downstream, the required and actual number of sampling points used, and the total sampling time per run.

Moisture content of the gas stream being sampled was determined from the volume of water collected in the impingers and the weight gain of the silica gel (Method 4<sup>1</sup>).

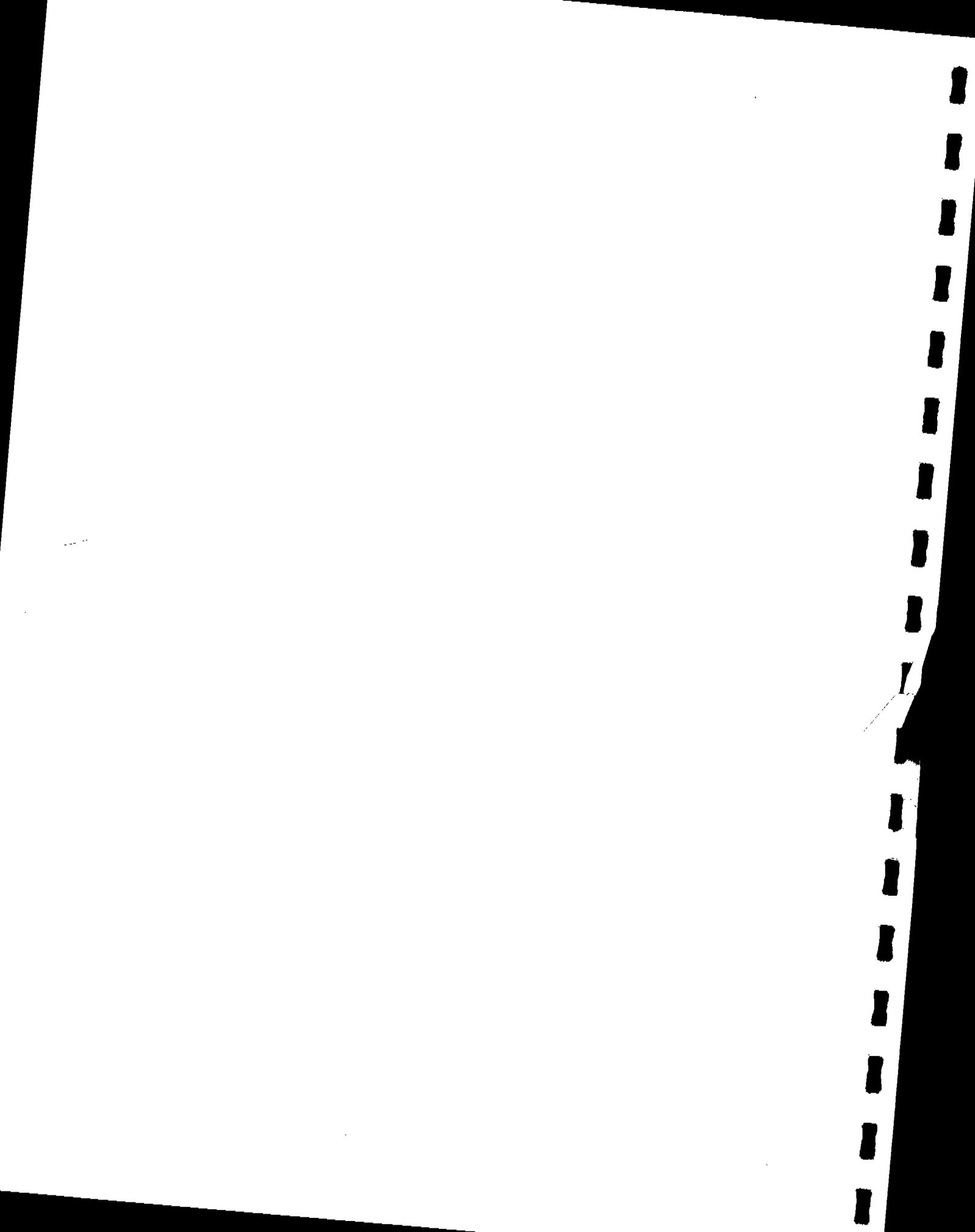
The probe and oven (filter) were not heated. Past source tests and the comparability study<sup>2</sup> show that the gas moisture content is low (<3%). Method 5 allows this deviation when condensation is not a problem.

At least three sampling runs were performed at all sampling locations. Prior to each run, the sampling train was leak checked at 380 mm (15 in) Hg vacuum or more. At the completion of the run, a second leak check was conducted at the highest vacuum recorded during the test. These checks were considered acceptable if the leak rate did not exceed 0.0057 m<sup>3</sup>/min (0.02 acfm), which is 4% of the sampling rate (5 acfm) as specified in Method 5.

All pitobe assemblies (pitot tube and probe), dry gas and orifice meters used in these tests had been calibrated before leaving Denver, Colorado and were recalibrated upon return [Appendix B]. All calibrations were within the Method 5 specifications.

The HVSS, manufactured by Acurex Aerotherm [Appendix C] and used for the cyclone testing, was arranged as follows:

- a. Stainless steel (316) nozzle
- b. Stainless steel (316) lined probe
- c. Flexible Teflon-lined probe
- d. Stainless steel (316) cyclone
- e. Glass fiber filter (15.2 cm diameter) in stainless steel filter holder



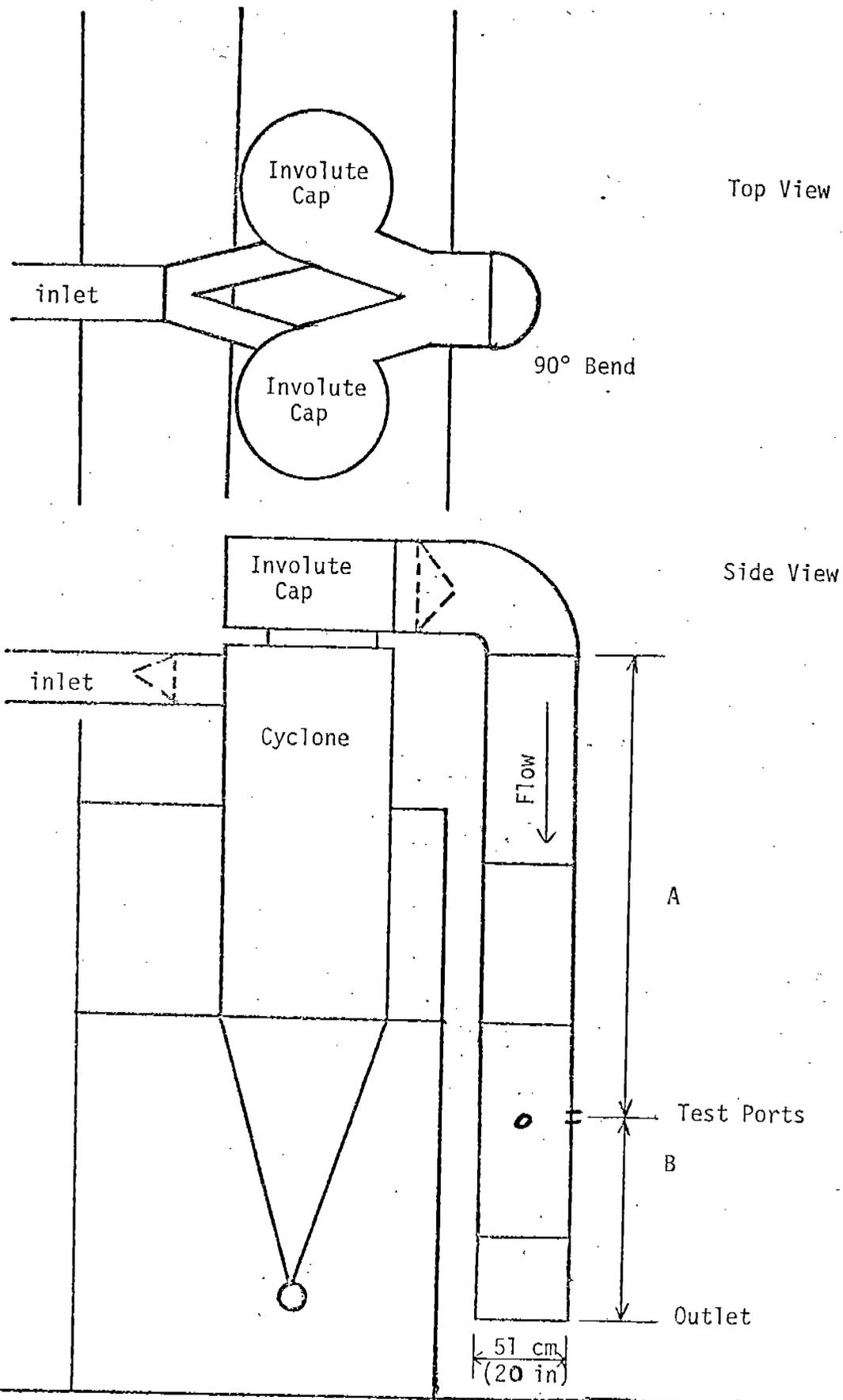


Figure 7. Cyclone Involute System

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- f. Impingers (0 to 2)\*--modified Greenburg-Smith, empty
- g. Impinger--modified Greenburg-Smith with approximately 300 grams of silica gel.

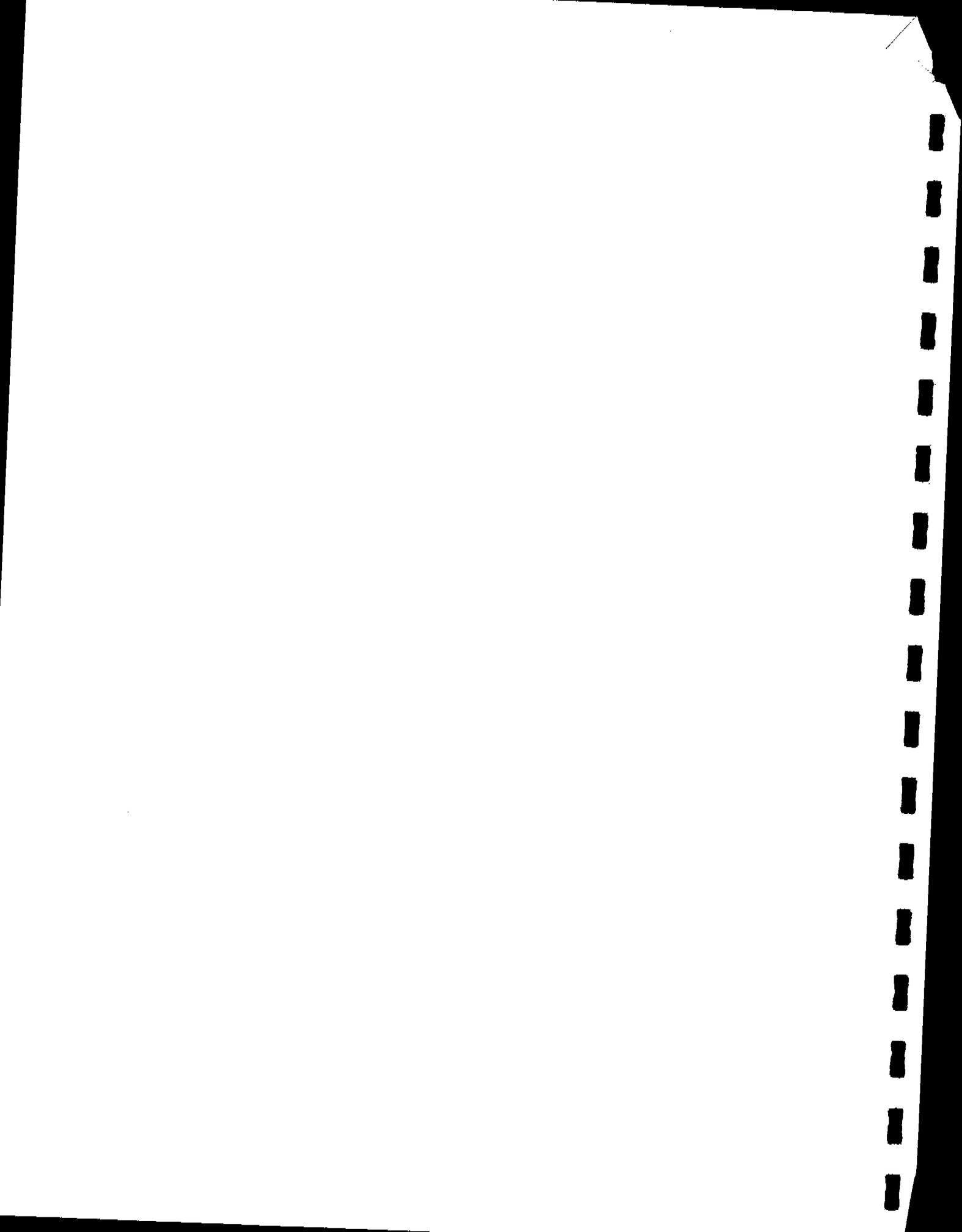
An NEIC mobile laboratory, on plant property during the tests, was used for all sample train preparation and sample recovery. Sample recovery proceeded as follows:

- a. The filter was removed, folded, and inserted in a rigid card and sealed in an envelope. The appropriate filter identification information was recorded on the outside of the envelope.
- b. The nozzle, steel probe, Teflon probe, cyclone and front portion of the stainless steel filter holder were brushed and washed with acetone. The washings from each run were collected in a glass jar with a Teflon-lined cap, and the liquid level marked.
- c. The volume of water collected in the empty impingers was volumetrically measured, as part of the moisture determination, and discarded.
- d. The silica gel impinger was weighed to determine the moisture gain, and the silica gel was discarded.
- e. All initial and final volumes and weights were recorded on a sample cleanup sheet along with other pertinent data.

All samples were returned to the NEIC laboratories for particulate analyses which were performed according to the procedures described in Method 5 [Appendix D].

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\* The number of empty impingers varied between zero and two.



## LINT CAGE SAMPLING PROCEDURES

Samples were collected around the circumferences of the seven unenclosed lint cages. At Stations 2201 and 2202, sections of the lint cage closest to the building wall could not be sampled because the clearance between the wall and cage was not adequate for the sampling nozzle.

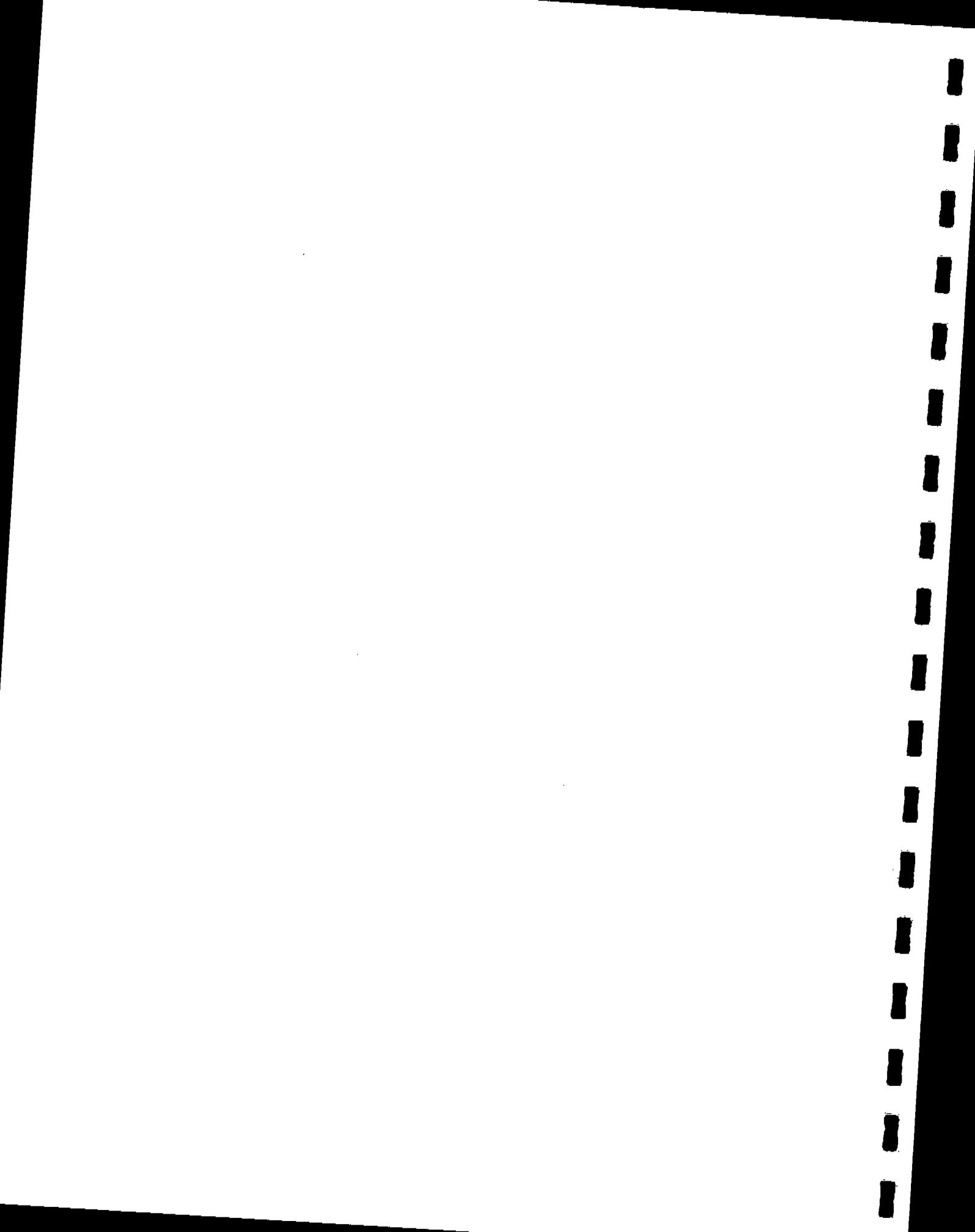
The number of sample points was determined by the number of screened sections on the lint cage. One point was sampled at the center of each screened section. Since the screened sections had similar areas [Appendix E], this procedure could be considered an equal area method.

Gas vented from Station 2203 lint cage was discharged through an opening in the shed wall. This opening was divided into 16 equal areas (4 x 4 matrix) and the center of each area was sampled.

With the exception of Station 2203, each lint cage was sampled three times. The Station 2203 lint cage was sampled six times, three times in conjunction with an ambient air high-volume sampler to determine if emission results of the two methods (Rader HV vs Hi-Vol) were comparable.

The vent gas molecular weight was calculated assuming the gas composition as air, 21% oxygen and 79% nitrogen. This assumption is considered valid because ambient air is used to convey wastes to the lint cages.

Moisture content of the gas being sampled was determined by the wet-bulb dry-bulb procedures given in Method 4. The moisture determinations were performed after the lint cage sampling was complete. As the lint cotton moisture was between 6 to 8% and the carrier gas



was ambient air, the moisture content in the exhaust gas at the time of and subsequent to sampling was assumed to remain the same.

The lint cage emissions could not be sampled isokinetically because the gas velocity was below the sensitivity\* of the pitot tube, and the gas flow was swirling and non-perpendicular to the screened circumference. Therefore, the lint cages were sampled at a constant rate of  $0.85 \text{ m}^3$  ( $30 \text{ ft}^3$ )/min with the sample nozzle facing the screened circumference. The nozzle was located 7.6 cm (3 in) from the screening [Figure 8].

Before and after each run, the Rader HV sampler was leak tested by plugging the nozzle and measuring the flow across the orifice meter. These checks were acceptable if the orifice meter reading was zero.

The orifice meter used in these tests was calibrated according to the Rader HV sampler operating manual, before leaving Denver, in the field and upon return [Appendix B]. Because the gas flow could not be measured leaving the lint cage, the volumetric flow rate was determined by measuring the incoming gas flows. Only three of the eight lint cages had good locations for a velocity traverse, and these three locations (Stations 2302, 2304 and 2305) were checked once during the survey. All eight lint cage inlets had previously been traversed by the USDA-ARS [Appendix E] when no cotton was being processed. The NEIC and ARS flow data for the three locations (Stations 2302, 2304 and 2305) were compared and it was found that the ARS data were 4 to 19% greater than the NEIC data. It was concluded that this difference in gas flows was caused by the processing of cotton. Therefore, before the ARS flow data at the five locations not traversed by NEIC were used, the ARS data were adjusted to be representative of when cotton was being processed (Test Results Section - Lint Cage Results Discussion).

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\* The S-type and standard pitot tubes have sensitivities of 0.06 cm (0.025 in) of velocity pressure or about 160 m/min (500 fpm).



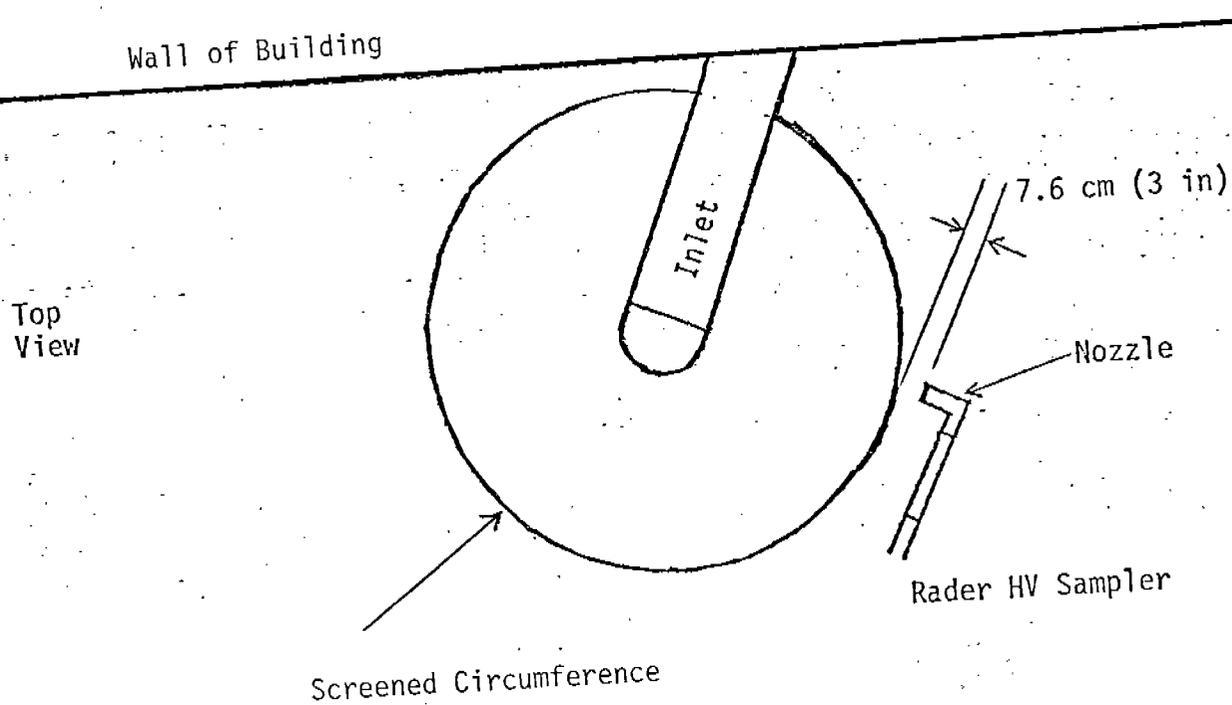
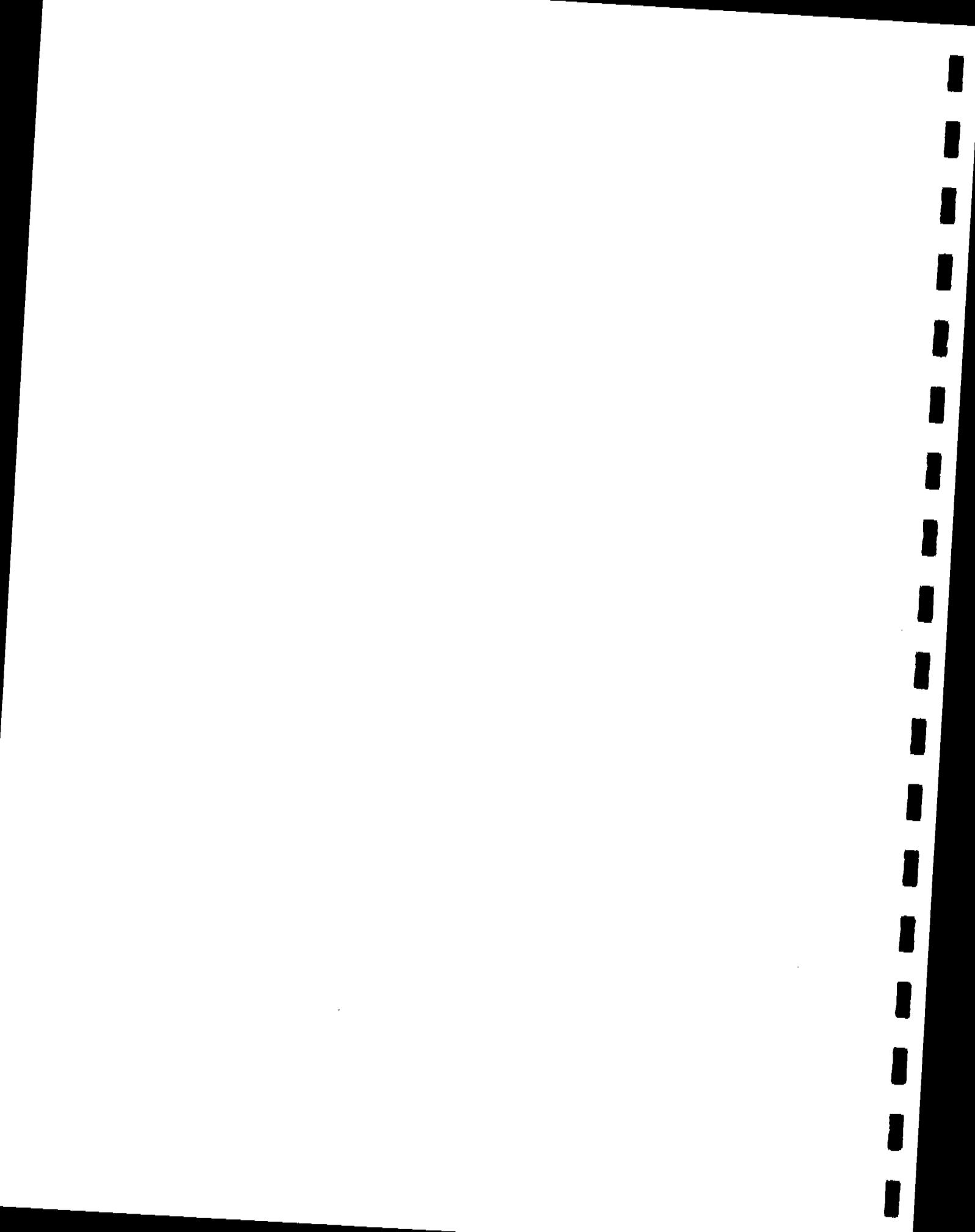


Figure 8. Lint Cage Sampling Arrangement



The Rader HV sampler, manufactured by Rader Company, Inc. [Appendix C], and used to sample the lint cages, was arranged as follows:

- a. Aluminum nozzle (4.7 and 8.9 cm-diameter)
- b. Aluminum probe - adjustable length
- c. Aluminum filter housing for 20 x 25 cm (8 x 10 in) glass fiber filter
- d. Orifice with dial thermometer
- e. Solenoid valve connected to control section and control computer
- f. Flexible hose
- g. Suction blower

The Rader sampler nozzle and probe were cleaned at the sampling location according to the Rader operating manual. This necessitated turning on the suction blower and brushing both nozzle and probe until the piece was visually free of dust and lint. The freed dust was collected on the filter. No acetone washing was performed.

The filter holder (with filter) was sealed (corked) and taken to the mobile laboratory where the filter was removed and the filter holder brushed to move any remaining particulate onto the filter. The filter was folded, inserted in a rigid card and sealed in an envelope.

The samples were handled and analyzed as described for the cyclone samples.

#### AMBIENT AIR SAMPLING PROCEDURES

Two General Metals<sup>\*</sup> High-Volume samplers were used to measure the ambient air particulate concentration at six locations [A-F, Figure 9] in and around the two gin process buildings. The Hi-Vols were located upwind and downwind of the gins as described below:

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\* Brand name.



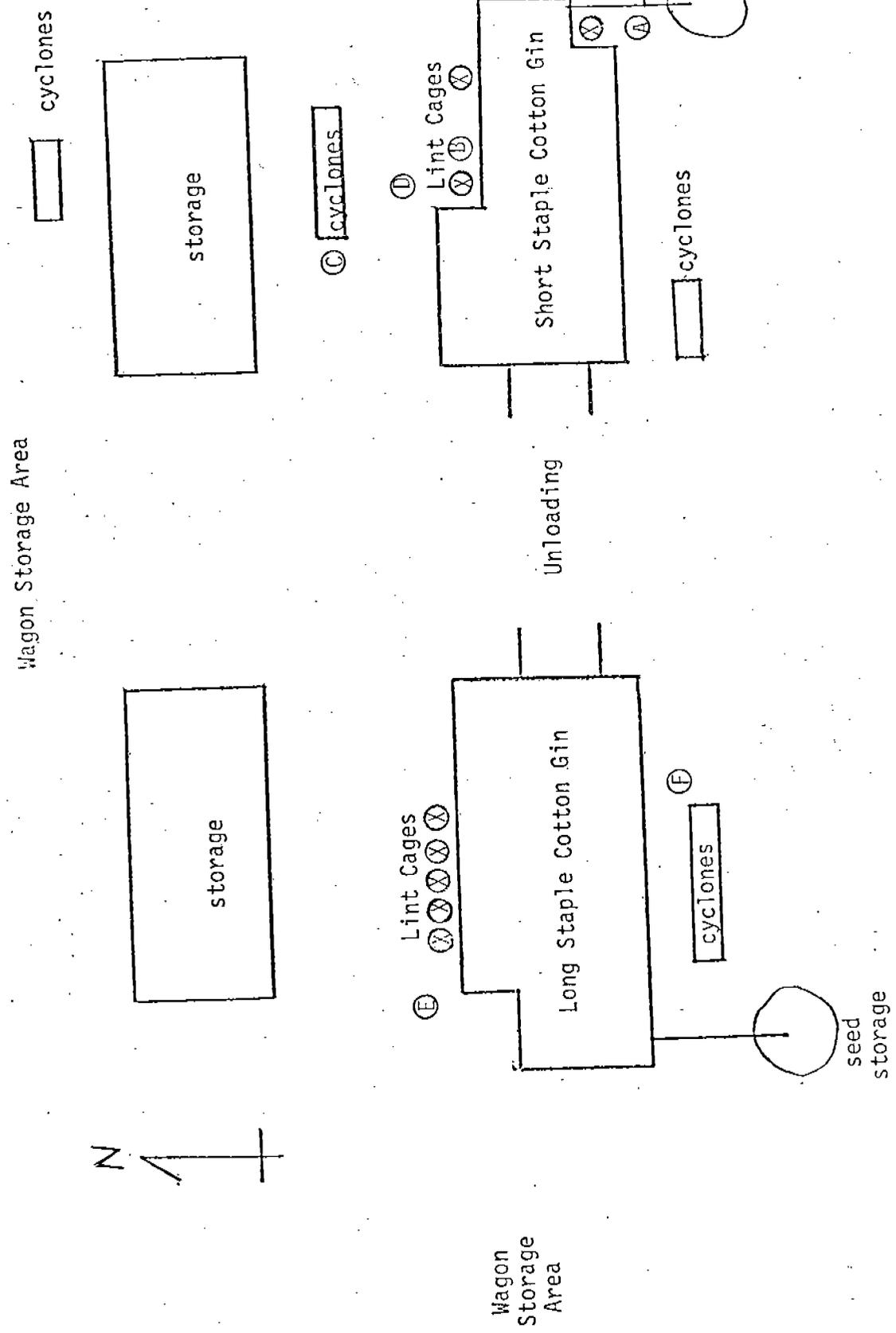
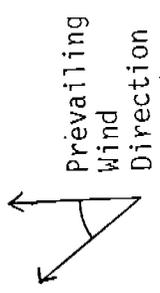
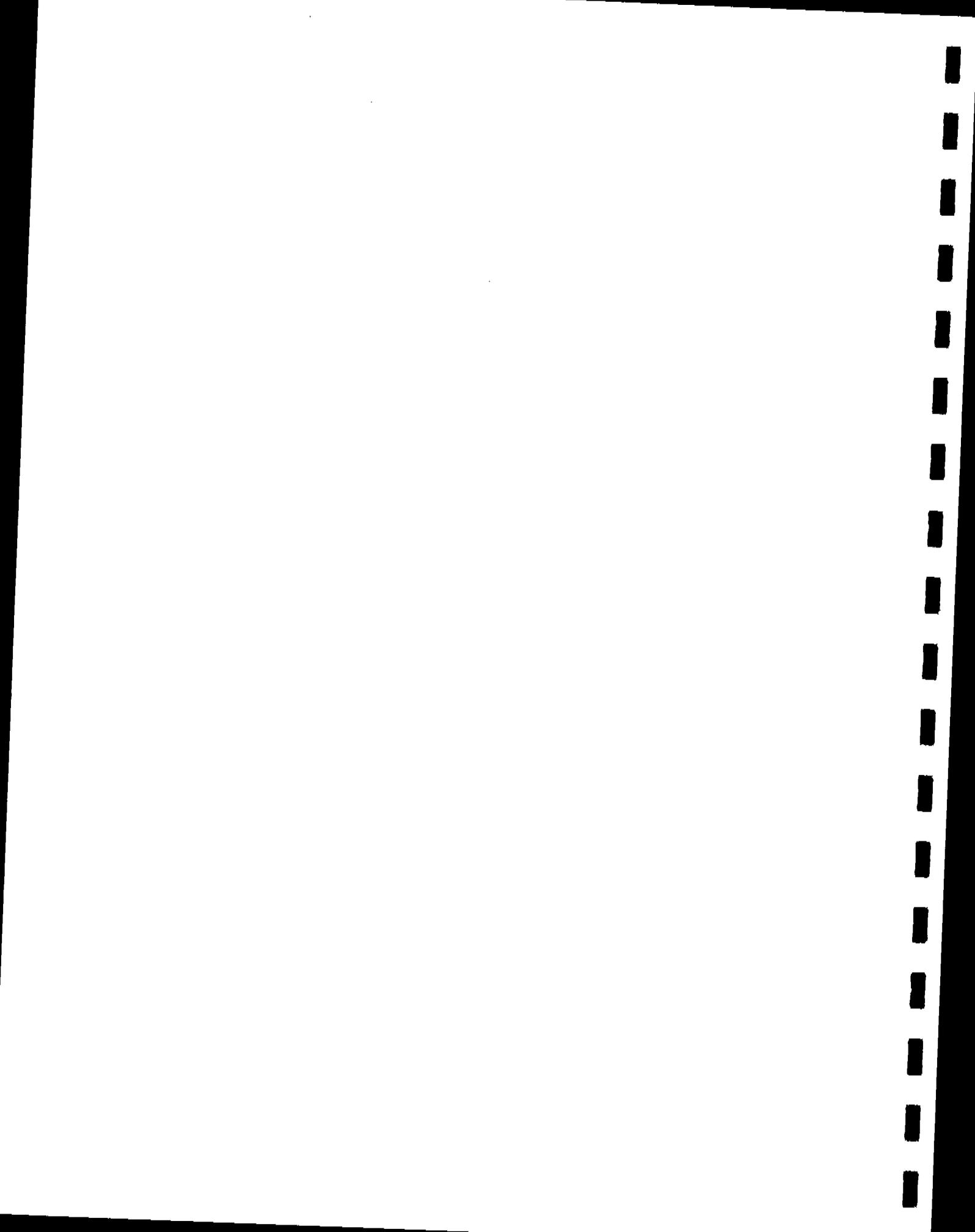


Figure 9. Producers Cotton Oil Company  
 Marana Gin Plot Plan  
 HiVol Sampling Locations

(A) — (E) - HiVols (Ambient)





<u>Location No.</u>	<u>Description</u>
A	12 to 15 m (40 to 50 ft) south of lint cage SN* 2201 on a concrete slab which supports the seed conveying system
B	Inside the shed that protects lint cage SN 2203, approximately 2 m (6.5 ft) from the lint cage
C	West end of the cyclone SN 2204 support base, 3 m (10 ft) north of the shed opening for lint cage SN 2203
D	1.6 m (5.3 ft) north of the shed opening for lint cage SN 2203
E	1.8 m ( 6 ft) north of the northwest corner of the long-staple gin building, approximately 6.1 m (20 ft) west of lint cage SN 2301
F	East end of the cyclone SN 2310 support base about 4.6 m (15 ft) from the long-staple gin building

The Hi-Vols were operated according to the procedures specified in 40 CFR 50,\*\* Appendix B---"Reference Method for the Determination of Suspended Particulates in the Atmosphere (High-Volume Method)" [Appendix F]. In most cases, sampling air flow was continuously recorded.

A single orifice plate was used to calibrate the Hi-Vols (designed to maintain a constant sampling rate) before each sampling run. (The orifice plate was calibrated with an NBS traceable Roots\*\*\* meter.)

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\* Station number.  
 \*\* Code of Federal Regulations, Title 40, Part 50.  
 \*\*\* Brand name.



Most (12 of 15) Hi-Vol samplers were scheduled to run 24 hours (midnight to midnight). However, the particulate buildup for four filters (locations B-3 Runs and D-1 run) was sufficient to reduce the air sampling rate and sampling was terminated. Two of three sampling runs, performed in conjunction with the Rader HV at Station 2203, had sampling times of 64 minutes, while a third run was approximately 10 hours.

The samples were recovered by removing the filters from the holder, folding the filters in half, placing them in a rigid card and sealing them in an envelope. Flow data, sampling time, and appropriate identification information were recorded on the envelope.

The samples were analyzed by the analytical procedures previously described.

#### VISIBLE EMISSION OBSERVATION PROCEDURES

Visible emission observations (VEO's) were performed according to Method 9<sup>1</sup> specifications. At this plant, with the predominantly southeast wind and the majority of the cyclones grouped together, the emissions intermingled and care was necessary to ensure a representative observation. VEO's on the lint cage emissions were not possible because of interference between the lint cage emissions and wind-blown dust.

#### PROCESS OBSERVATION PROCEDURES

The gin process was monitored by recording the number of wagons unloaded and the number of bales produced. Production rates were checked by comparing the wagon and/or bale numbers to the clock time,



and calculating the throughput. The production data obtained from the gin office [Appendix G] were used to determine the allowable process weight regulation emissions.

Because the gin emissions were dependent on the type and condition of the cotton---for example, pick of cotton---random grab samples of seed cotton were taken directly from the wagons and turned over to the USDA-ARS, Southwestern Cotton Ginning Research Laboratory for analysis of trash content. Four samples of short-staple (Upland) cotton and five samples of long-staple (Pima) cotton samples were analyzed.

The analysis consisted of separating the hulls, sticks, motes and fines (leaves) from the seed cotton and determining the weight of each, gravimetrically [Appendix H]. The condition of the cotton was established by its trash weight fraction of raw cotton.



## VI. TEST RESULTS

Between November 2 and 19, 1977, the short- and long-staple cotton gins were tested to determine their particulate emission rates. All cyclones were source tested three times with the Aerotherm HVSS. The seed, mote and Station 2206 cyclones were not sampled because they were either inaccessible or not operating. The lint cages were sampled three times with the Rader HV sampler. Station 2203 lint cage was sampled an additional three times in conjunction with ambient air Hi-Vol sampling to determine if the test results could be correlated. All samples were collected and analyzed according to NEIC chain-of-custody procedures, except as noted in Appendix I.

During the testing period, the average production rate of the short-staple gin was 8.6 bales/hr, 86% of the rated capacity (10 bales/hr). The long-staple gin average production rate of 3.4 bales/hr was 85% of the rated capacity (4 bales/hr). Continuous gin operations were maintained during each sampling period. From the process weight table in Pima County Regulation II, Rule 2 and the daily cotton feed rate [Table 4], the allowable emission rates were calculated as 5.1 kg (11.2 lb)/hr and 2.7 kg (6.02 lb)/hr, respectively, for the short- and long-staple gins.

The total gin particulate emissions are the sum of the individual sources, e.g., lint cages and cyclones. Tables 5 and 6 present the average emissions from each source and the cumulative results. Test

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\* Station 2308, Run No. 1 isokinetics were 89.3%.



Table 4  
 PROCESS DATA SUMMARY  
 PRODUCERS COTTON OIL COMPANY  
 Marana, Arizona

Date	Process Weight				Allowed Emissions	
	lb/day <sup>a</sup>	kg/day <sup>a</sup>	ton/hr	m. ton/hr	lb/hr	kg/hr
Short-staple cotton gin						
11/5	225,130	102,118	5.00	4.54	5.77	2.60
11/6	243,860	110,613	5.52	5.01	7.25	3.28
11/7	289,690	131,401	6.44	5.84	8.15	3.68
11/8 <sup>b</sup>	61,920	13,651	-	-	1.17	0.53
11/9	316,380	143,507	7.03	6.38	8.63	3.89
11/10	297,525	134,955	6.61	6.00	7.95	3.58
11/11	307,410	139,439	6.83	6.20	7.97	3.59
11/12	283,720	128,693	6.30	5.72	7.35	3.32
11/13	296,770	134,613	6.53	5.92	7.85	3.53
Average	-	-	6.28	5.70	11.2	5.1
Long-Staple Cotton gin						
11/12 <sup>c</sup>	31,210	14,157	1.39	1.26	1.62	0.73
11/13	48,420	21,963	2.15	1.95	2.48	1.11
11/14	117,930	53,492	2.62	2.38	3.02	1.36
11/15	109,710	49,763	2.44	2.21	2.81	1.26
11/16	100,180	45,441	2.23	2.02	2.57	1.16
11/17 <sup>d</sup>	-	-	2.70	2.45	3.08	1.39
11/18 <sup>d</sup>	-	-	2.26	2.05	2.63	1.18
11/19 <sup>d</sup>	-	-	2.76	2.51	3.18	1.43
Average	-	-	2.32	2.10	6.02	2.7

- a Process day is 22.5 hrs, gin shuts down for two 45-minute lunches per day.
- b No sampling occurred on this day. Data not included in averages.
- c Process day - 8 to 10 hours.
- d Gin process Summary not available. Process weight calculated from time period required to unload wagons.



Table 5  
EMISSION DATA SUMMARY  
SHORT-STAPLE GIN  
PRODUCERS COTTON OIL COMPANY  
Marana, Arizona

Station No.	Average Concentration <sup>a</sup>		Average Mass Emissions <sup>b</sup>	
	gr/cf	mg/m <sup>3</sup>	Tb/hr	kg/hr
<u>Cyclones</u>				
2204 <i>inclined cleaner + driver</i>	0.044	100	3.33	1.51
2205 <i>bar extractor</i>	0.011	25.7	0.38	0.17
2207 <i>2 clean up</i>	0.024	54.6	1.35	0.61
2208 <i>gin stack</i>	0.015	33.8	0.50	0.23
2209 <i>unbound sep</i>	0.048	110	2.14	0.97
2211 <i>trash conveyor</i>	0.19	437	8.25	3.74
Subtotal	-	-	16.0	7.23
<u>Lint Cages</u>				
2201	0.039	89.1	4.32	1.96
2202	0.010	23.0	0.88	0.40
2203	0.051	118	8.31	3.77
Subtotal	-	-	13.5	6.13
Total	-	-	29.5	13.4
Emission Limitation	-	-	11.2	5.1

a At standard conditions.

b Adjusted for blockage effects.



Table 6  
 EMISSION DATA SUMMARY  
 LONG-STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 Marana, Arizona

*3.4 bales/hr*

Station No.	Average Concentration <sup>a</sup>		Average Mass Emissions <sup>b</sup>	
	gr/scf	mg/m <sup>3</sup>	lb/hr	kg/hr
<u>Cyclones</u>				
2306	0.0083	18.8	0.51	0.23
2307	0.0094	21.0	0.40	0.18
2308	0.064	146	1.17	0.53
2309	0.043	98.8	1.16	0.53
2310	0.017	38.9	0.82	0.37
Subtotal	-	-	4.06 <i>1.19</i>	1.84
<u>Lint Cages</u>				
2301	0.033	76.4	1.15	0.52
2302	0.015	35.4	0.55	0.25
2303	0.016	35.7	0.34	0.15
2304	0.027	61.7	0.66	0.30
2305	0.017	38.8	0.74	0.34
Subtotal	-	-	3.44 <i>1.01</i>	1.56
Total	-	-	7.50 <i>2.21</i>	3.40
Emission Limitation	-	-	6.02	2.7

a At standard conditions.

b Adjusted for blockage effects.



data from each source run are summarized in Appendix J. Field data sheets and example calculations are presented in Appendix K.

The short-staple gin emissions were 13.4 kg (29.5 lb)/hr, 164% greater than the allowed emissions. The cumulative emission results of the short-staple gin are conservative because they do not include the mote cyclone emissions\* and include lint cage emissions which were conservatively calculated (see Lint Cage Results Discussion). A substantial (28%) part of the total emissions was from the trash cyclones (Station 2211).

Emissions from the long-staple gin were 3.40 kg (7.50 lb)/hr, which is 25% greater than the allowed 2.7 kg (6 lb)/hr. The seed cyclone emissions are not included in the long-staple cumulative results. By not including these emissions, and including conservative lint cage results (see Lint Cage Results Discussion), the overall emission rate reported is lower than actual.

The short-staple gin visible emissions were observed and recorded. Of these, no individual VEO readings exceeded 20% opacity and no average reading of 24 observations exceeded 10% opacity [Table 7]. The VEO's did not exceed the Pima County Regulation II Rule 1 which limits emissions to less than 40% opacity.

The emissions from the long-staple gin cyclones were generally not visible, therefore no VEO's were performed. No VEO's were made of the mote and seed cyclone emissions, despite the fact some visible emissions were observed from the mote cyclone. Observation of the mote cyclone visible emissions was largely impeded because of the dispersion caused by the rain cap.

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\* The mote cyclone outlet was not accessible.



Table 7<sup>a</sup>  
 VISIBLE EMISSION OBSERVATION SUMMARY  
 PRODUCERS COTTON OIL COMPANY  
 Marana, Arizona

Station No.	Date	Range of Readings (Low - High %)	Average of 24 Observations (%)
2209	11/9	0 <sup>b</sup>	0
2207	11/10	0-5	0.5
2205	11/10	0 <sup>b</sup>	0
2204	11/10	0 <sup>b</sup>	0
2208	11/10	0-5	0.5
2211	11/10	10 <sup>b</sup>	10
2211	11/10	5-20	10
2209	11/10	0-5	2

a Involute system not in place during observations.  
 b All values were the same.



No visible emission observations could be performed at the lint cages because of the interferences from the wind and nearby lint cages. However, a white haze in the vicinity (1 to 3 m) of these devices necessitated the wearing of dust masks.

Ambient air particulate data are presented in Table 8. Due to weather conditions, vehicle movement in the plant and process operating changes, the results vary widely. All the data exceeded the National Primary Ambient Air Quality Standard of  $0.26 \text{ mg/m}^3$  maximum 24-hr concentration, and all but one value (Location A, November 11 sample) exceeded the "never to be reached" value of  $1 \text{ mg/m}^3$  specified in the Federal Air Episode Criteria.<sup>3</sup> Particulate concentrations of  $1 \text{ mg/m}^3$  are designated as substantial endangerment levels. Therefore, the gin emissions have an adverse impact on the air quality of the plant employees' work environment.

The data from Locations B, C and D (downwind of short-staple gin) were generally greater than at Location A (upwind). This was true for the long-staple gin (Locations E and F) also. No correlation could be made between the ambient air data at Location D and the Rader sampling data at Station 2203, because of the limited number of data points.

Table 9 summarizes the seed cotton analytical results. As mentioned in the Process Description, it takes about 725 kg (1,600 lb) of seed cotton to produce a bale of lint cotton. According to the Cotton Ginners Handbook<sup>4</sup> [Tables 4-15], the average weight of trash removed during ginning of machine-picked cotton is 92 kg (203 lb)/bale. Therefore, trash normally accounts for about 13% ( $92 \text{ kg}/725 \text{ kg}$ ) of the seed cotton weight to the gin. The trash weight percentage of the short-staple and long-staple seed cotton samples obtained at the Marana Gin were 9.8 and 9.6%, respectively. Because these sample results were close to the Handbook value (13%), the cotton processed was considered typical of machine-picked seed cotton.



Table 8  
 AMBIENT AIR DATA SUMMARY  
 PRODUCERS COTTON OIL COMPANY  
 Marana, Arizona

Location	(Date) November	Sample Volume m <sup>3</sup>	Particulate Catch gm	Particulate Concentration mg/m <sup>3</sup>
A	9	77.3	1.12	14.5
A	11	1,770	0.88	0.50
B	4	895	80.0	89.4
B	5	899	76.4	85.0
B	6	458	48.0	105
C	7 <sup>a</sup>	1,146	11.16	9.74
C	10	1,043	116.4	112
D	9	761	1.14	1.50
D	9	77.3	8.14	105
D	9	78.1	5.72	73.2
E	12	1,757	6.84	3.89
E	14	1,771	10.38	5.86
E	16	1,772	13.98	7.89
F	13	1,561	2.46	1.58
F	15	1,553	4.24	2.73

a 11/7-raining, 11/8-gin not operating.



Table 9  
COTTON ANALYTICAL RESULTS  
PRODUCERS COTTON OIL COMPANY  
Marana, Arizona

Trash Identification	Percent of <sup>a</sup> Raw Short- Staple Cotton	Percent of <sup>b</sup> Raw Long- Staple Cotton
Hulls	1.5	2.0
Sticks & Stems	0.7	0.8
Motes	0.7	0.2
Leaves and Fines	6.9	6.6
Total Trash	9.8	9.6

a Average of four samples.

b Average of five samples.



The filters and acetone wash samples collected during the four sampling runs on the short-staple gin trash cyclones (Station 2211) were analyzed for four phosphorus pesticides---methyl and ethyl parathion, malathion and dimethoate. The analytical results summary [Appendix D] is quoted below:

"The four filters contained no detectable amounts of the pesticides of interest. All four of the acetone washes contained methyl parathion, ranging from 0.1 to 1.8  $\mu\text{g}$ . Three of the acetone washes contained ethyl parathion in amounts ranging from 0.1 to 0.5  $\mu\text{g}$ . Malathion was not found in any of the acetone washes. The analytical methods used to analyze ethyl and methyl parathion and malathion prohibited analyzing the acetone wash samples for dimethoate."

Based on the acetone wash results, the average emission concentrations of methyl and ethyl parathion were 0.18 and 0.052  $\mu\text{g}/\text{m}^3$ , respectively. The methyl and ethyl parathion emission rates were 1.64 and 0.47 mg/hr, respectively.

#### CYCLONE RESULTS DISCUSSION

The involute system was used for all cyclone testing. Because the diameter of the involute system ducting (0.5 m or 1.7 ft) was less than 0.9 m (3 ft), the Scientific Glass\* sampling probe (no external sheath) caused some flow blockage. From NEIC experimental data on the relationship between blockage and the pitot tube calibration coefficient ( $C_p$ ), the data show that as blockage increases,  $C_p$  decreases [Appendix B, Figure B-2]. The average probe blockage when sampling at the centerpoint in the 51 cm (20 in) duct was 4.7%, resulting in a  $C_p$  decrease of 3.3%.

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\* Manufacturer's name.



This decrease changed two parameters: 1) the cyclone volumetric flow rates, and 2) the isokinetic sampling rates. A 3.3% Cp decrease reduced the cyclone volumetric flow rates and thus the emission rates by 3.3%. A 3.3% decrease in the cyclone emission rates changed the total gin emission rate about 1.8%.\* The data presented in Tables 5 and 6 reflect the 3.3% decrease in the cyclone data contained in Appendix J [Table J-20].

The isokinetic sampling rate increased by 3.3% as Cp decreased by 3.3%. Of the 33 runs,\*\* 28 were within the range of 90 to 110%. The five remaining runs had isokinetic sampling rates between 110 and 112.3%. Since the isokinetic sampling rates were greater than the allowable extreme (110%), the emission rates for these 5 runs are conservative.

An attempt was made to calculate the effect of the involute system on measured emissions. It can be concluded from engineering principles that the involute system effectively reduced the cyclone exit flow because of friction losses caused by the expansion joint 90° bend, and additional straight section of pipe. However, the effect of the involute system on cyclone collection efficiencies could not be computed. Thus, the involute system effect on cyclone emissions could not be estimated.

#### LINT CAGE RESULTS DISCUSSION

The eight lint cage volumetric gas flow rates were measured in the inlet ducting because the outlet velocities were below the

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\* Both the short- and long-staple gin cyclone results account for 55% of the total emissions. 55% of the 3.3% change in the cyclone emissions reduces the total emissions by 1.8%.

\*\* 33 runs - 11 cyclone groups each sampled 3 times.



sensitivity of the pitot tube. NEIC measured three locations (Stations 2302, 2304 and 2305) during the survey; ARS had previously measured the velocities at eight locations (Stations 2201, 2202, 2203, 2301, 2302, 2303, 2304 and 2305) under two different operating conditions, i.e., cotton was or was not being processed. Before using the ARS flow data at the five locations not traversed by NEIC, the ARS data was adjusted to reflect the operating condition during which the NEIC data was obtained, i.e., processing of cotton.

In order to do this, the NEIC and ARS flow data available for both operating conditions for Stations 2302, 2304 and 2305 was graphed [Appendix E, Figure E-1]. Assuming the flow reduction observed at the three locations occurred at the other five locations (Stations 2201, 2202, 2203, 2301 and 2303), the graph was used with the ARS data to obtain the adjusted ARS flow data for these five locations.

The NEIC measured and the ARS adjusted flow data are less than the ARS actual flow data. Using these lower values results in the calculation of conservative emission data.

Because the gas velocities from the lint cages were below the sensitivity of the pitot tube, the sampling was performed at a constant rate of  $0.85 \text{ m}^3$  ( $30 \text{ ft}^3$ )/min. This resulted in the short-staple gin lint cage average isokinetic sampling rates of 400, 1,530\* and 100% at Stations 2201, 2202 and 2203, respectively [Appendix E, Table E-1]. The long-staple gin lint cage average isokinetic sampling rates ranged from 312 to 466%. According to Method 5 sampling at a rate exceeding the acceptable isokinetic sampling range results in particulate concentrations, and thus emissions, which are conservative, that is, less than the actual values.

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\* 4.7 in (1.86 in) nozzle used in place of 8.9 cm (3.505 in) nozzle.



## REFERENCES

1. Code of Federal Regulations, Title 40, Part 60, Standards of Performance for New Stationary Sources, Appendix A - Reference Methods, August 18, 1977.
2. Comparability Study of EPA Method 5 and a High-Volume Sampler for Particulate Testing of Cotton Gin Emissions, EPA-330/1-77-006, June 1977 (Draft).
3. Code of Federal Regulations, Title 40, Part 51.16, Prevention of Air Pollution Emergency Episodes.
4. Cotton Ginners Handbook, Agriculture Handbook No. 503, Agricultural Research Service, U. S. Department of Agriculture, July 1977, Figure 4-30.
5. A Method of Interpreting Stack Sampling Data, Smith, W.S., Shigehara, R.T., and Todd, W.F., Paper Presented at the 63rd Annual Meeting of the Air Pollution Control Association, St. Louis, Missouri, June 14-19, 1970.



## APPENDICES

- A Presurvey Inspection Report
- B Calibration Procedures and Data
- C Sampling Train Construction Details
- D NEIC Analytical Procedures and Data
- E Lint Cage Dimensions, Flow Data and Calculations
- F High-Volume Sampler Reference Procedures  
and Calibration Data
- G Cotton Gin Production Data
- H Agricultural Research Service Trash Analysis  
Analytical Procedure and Data
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- J Emission Data Summary Sheets
- K Field Data Sheets and Example Calculations



Appendix A

Presurvey Inspection Report



ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF ENFORCEMENT  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

TO : Chief, Field Operations Branch

DATE: December 17, 1976

FROM : Paul R. dePercin

SUBJECT: Presurvey Inspection of the Marana Gin, Producers Cotton Oil Company,  
Marana, Arizona

On November 17, 1976, Mr. Daniel Yee, EPA, Region IX; Mr. H. Poole, Pima County Health Department; and the writer inspected the Marana Gin of Producers Cotton Oil Company, Marana, Arizona, to determine the feasibility of performing source testing and to evaluate process operations, control devices and the emissions.

The Marana Gin consists of two ginning operations: 1) the processing of short staple cotton, and 2) the processing of Pima or long staple cotton [Figure 1]. The short staple cotton gin processes 10-11 bales\* of cotton/hour; the Pima cotton gin processes 3-4 bales/hour. The seed cotton (i.e., unprocessed cotton) is harvested and brought to the gin by the farmers. The gin separates the trash, cottonseed and cotton lint. The cottonseed and bale cotton is returned to the farmer, who sells them. The gin is not involved with the growing, harvesting or sale of the cotton.

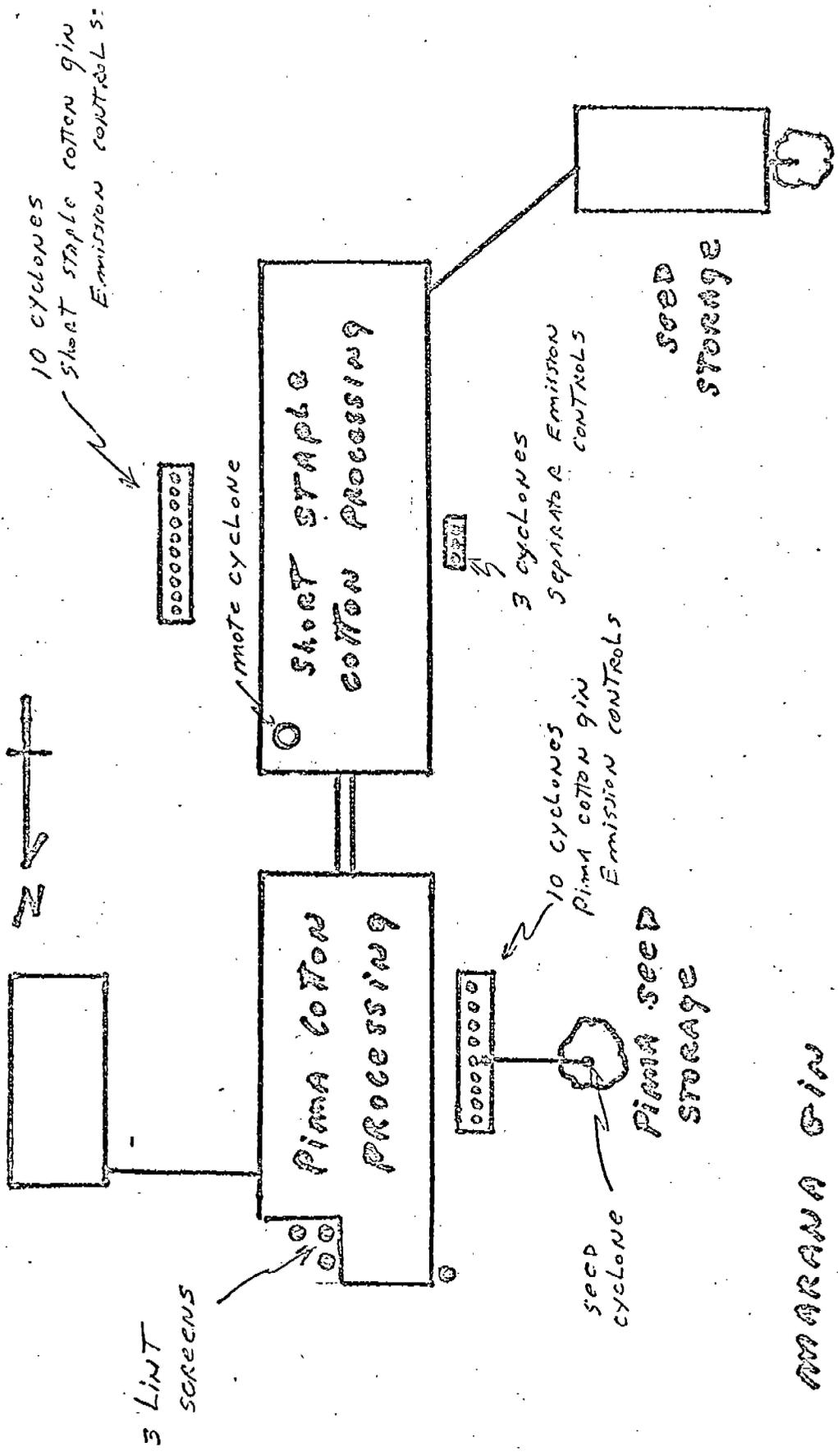
The plant representatives contacted were Messrs. R. Prikosovits, Gin Maintenance Superintendent, and Jack Collins, Gin Manager.

#### Process Description

The seed cotton is delivered to the gin in a wagon which holds about 2.2 m. tons (2.5 tons). It normally takes about 725 kg (1,600 lbs) of seed cotton to produce a bale of cotton (227 kg or 500 lbs). The weight difference (500 kg or 1,100 lbs) is the weight of trash and seed removed during processing.

The condition of the seed cotton, a function of the picking procedures, affects process operations and emissions. Cotton is generally picked twice from the defoliated stalks which accounts for 90-95% of the cotton ginned. Picked cotton contains some trash (stalks, leaves and dirt). Subsequent to the second pick a vacuum sweeper is used to pick up cotton including

\* A bale weighs 227 kg (500 lbs).



AMARANA GIN  
PRODUCERS COTTON OIL CO.

Figure 1: Gin Plot Plan

trash that has fallen to the ground (i.e., ground cotton). The pollution control devices are not designed to remove this increased trash load, therefore, visible emissions occur in the exhaust gases. Visible emissions are seldom observed when the picked cotton is processed.

The seed cotton moisture content is a function of the mode of harvesting (i.e., picked or ground cotton) and when the cotton was harvested (i.e., morning or afternoon, before or after a rain), and affects the process operations and emissions. A 6-8% moisture content is ideal for processing. A cotton moisture content less than 6% results in cotton being removed with the trash. Only a small amount of trash will be removed when the moisture content is greater than 8%, resulting in a poor grade of bale cotton. The driers adjust the cotton moisture to the desired range during processing. The cleaner (i.e., inclined cleaners) efficiencies vary with the moisture content, thus the trash loading to the cyclones is a function of the cotton moisture content.

The specific processing steps of each gin are described below:

#### 1. Short Staple Cotton Gin [Figure 2]

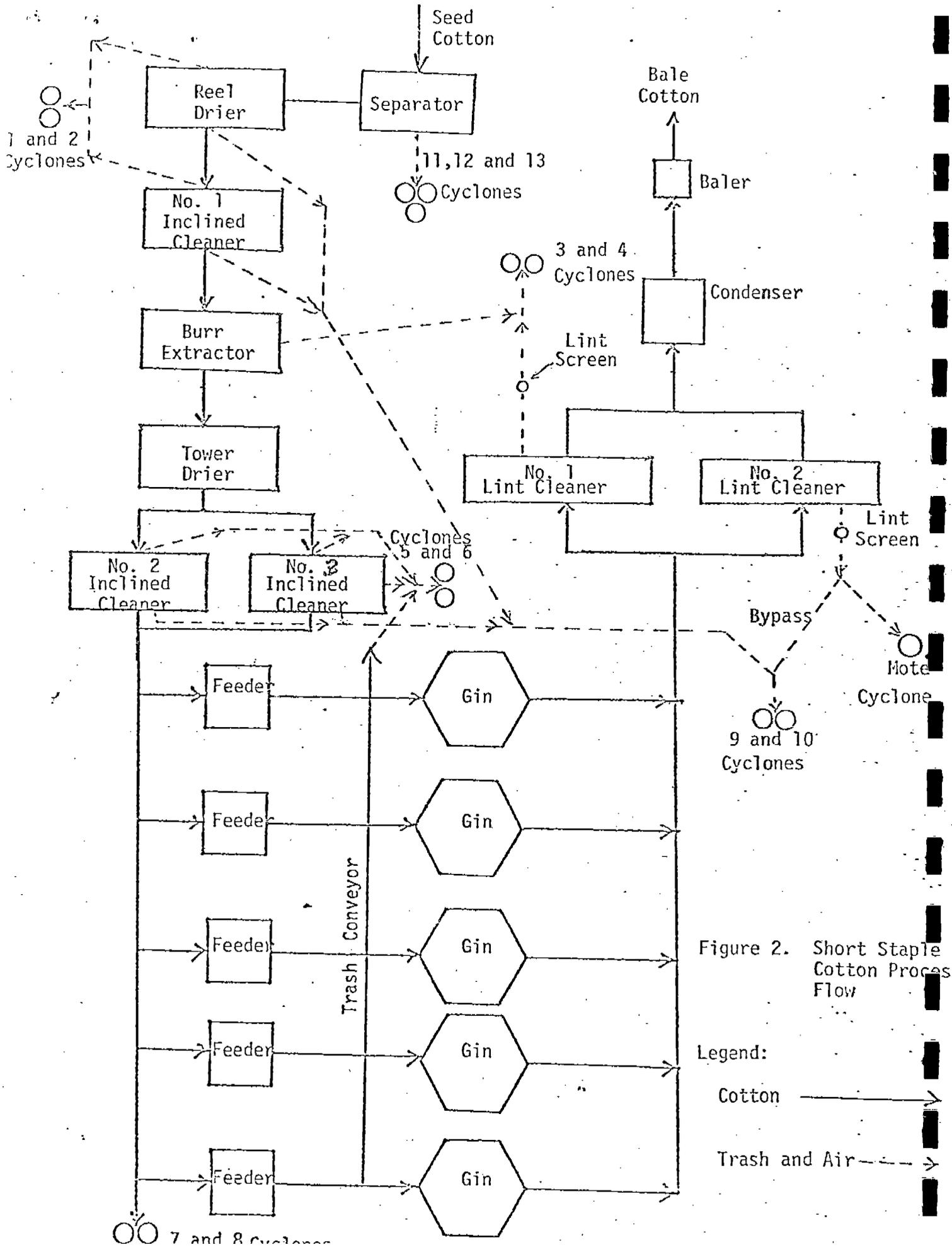
The seed cotton is off-loaded from the wagon with a vacuum system and collected in the separator where the cotton is removed from the carrier air stream. The air stream is vented to three cyclones (11, 12 and 13)\* and the cotton enters a natural gas fired reel drier.

The reel drier is the initial process used to reduce the moisture content to between 6 and 8%. The horizontal rotary drier performs a small amount of cleaning.

After the reel drier the cotton is air-conveyed to and processed by a 7 cylinder inclined cleaner. The cleaner consists of 7 spiked drum cylinders which carry and "scrub" the seed cotton to remove the fine particulates (e.g., leaf, dirt and sand). The reel drier combustion gases and the carrier air is vented to two cyclones (1 and 2). The trash collected in both the reel drier and inclined cleaner is collected in two additional cyclones (9 and 10).

The cotton passes to a bur extractor, which removes heavy trash and burs with a revolving saw cylinder. The teeth of the saw hold the seed cotton and subjects them to a carding and cleaning action as the cotton is spread across the surface

\* Numbers in parentheses refer to Figure 2 and the table of control equipment (Control Equipment Description).



of the cylinder. The trash and burs removed from the cotton are pneumatically conveyed to two cyclones (3 and 4) which remove the trash and burs from the air stream.

The cotton is then fed into the tower drier. This natural gas fired drier is made up of 24 shelves. The cotton is subjected to the warm gases while falling from shelf to shelf. The cotton moisture content is adjusted to the desired 6 to 8%. The dry cotton is air-conveyed to the second set of two inclined cleaners (operated in parallel).

These inclined cleaners are identical to the one previously described. The carrier air is ducted into two cyclones (5 and 6). The trash is collected by the same cyclones (i.e., 9 and 10) which receive the reel drier and No. 1 inclined cleaner trash.

The cotton is then distributed to five extractor-feeders where the burs, stems, whole leaf and other trash are removed. The trash drops to a conveyor belt and the cotton is fed at a constant rate to the 80-saw gin stands.

The gin stand uses these saws along with air blasts to separate the seeds and trash from the cotton. The resulting lint cotton is air-conveyed to two lint cleaners. The trash is dropped to the feeder trash conveyor belt. The conveyor belt carries the combined feeder and gin stand trash to a point where the trash is picked up by an air stream and carried to the two cyclones (5 and 6) that also control the No. 2 inclined cleaner carrier air emissions.

The lint cleaners (operated in parallel) remove the fine leaf particles, motes, dust and sticks. The carrier air and trash of the two lint cleaners are controlled by different systems. The No. 1 lint cleaner emissions are vented to a lint screen, where the collected lint is drawn to the cyclones (3 and 4) that also collect the trash from the bur extractor. The No. 2 lint cleaner emissions are ducted to another lint screen. The lint drawn off the bottom of this lint screen is conveyed to the mote cyclone. During upset conditions the mote cyclone is bypassed and the lint is removed from the air stream by the two cyclones (9 and 10) that collect the trash from the inclined cleaners and reel drier.

The lint cotton is air-conveyed to the condenser where the ginned lint is formed into a smooth endless mat. The cotton mat is fed into the baler. The bales are wrapped in burlap,

tied with metal bands and stored outside for shipment. The air stream from the condenser is vented to a lint screen. The collected lint is drawn to the two cyclones (3 and 4) that control the bur extractor and No. 1 lint cleaner emissions.

## 2. Pima Cotton Gin [Figure 3]

The seed cotton is off-loaded from the wagon with a vacuum system and collected in the separator where the cotton is removed from the carrier air stream. The air stream is vented to two cyclones [3 and 4]\* and the cotton enters a natural gas-fired reel drier.

The horizontal rotary drier reduces the cotton moisture content to 6 to 8%.

After the reel drier the cotton is air-conveyed to and processed by a five cylinder inclined cleaner. The cleaner consists of five spiked drum cylinders which carry and "scrub" the seed cotton to remove the five particulates (e.g., leaf, dirt and sand). The trash removed is collected in two cyclones [1 and 2].

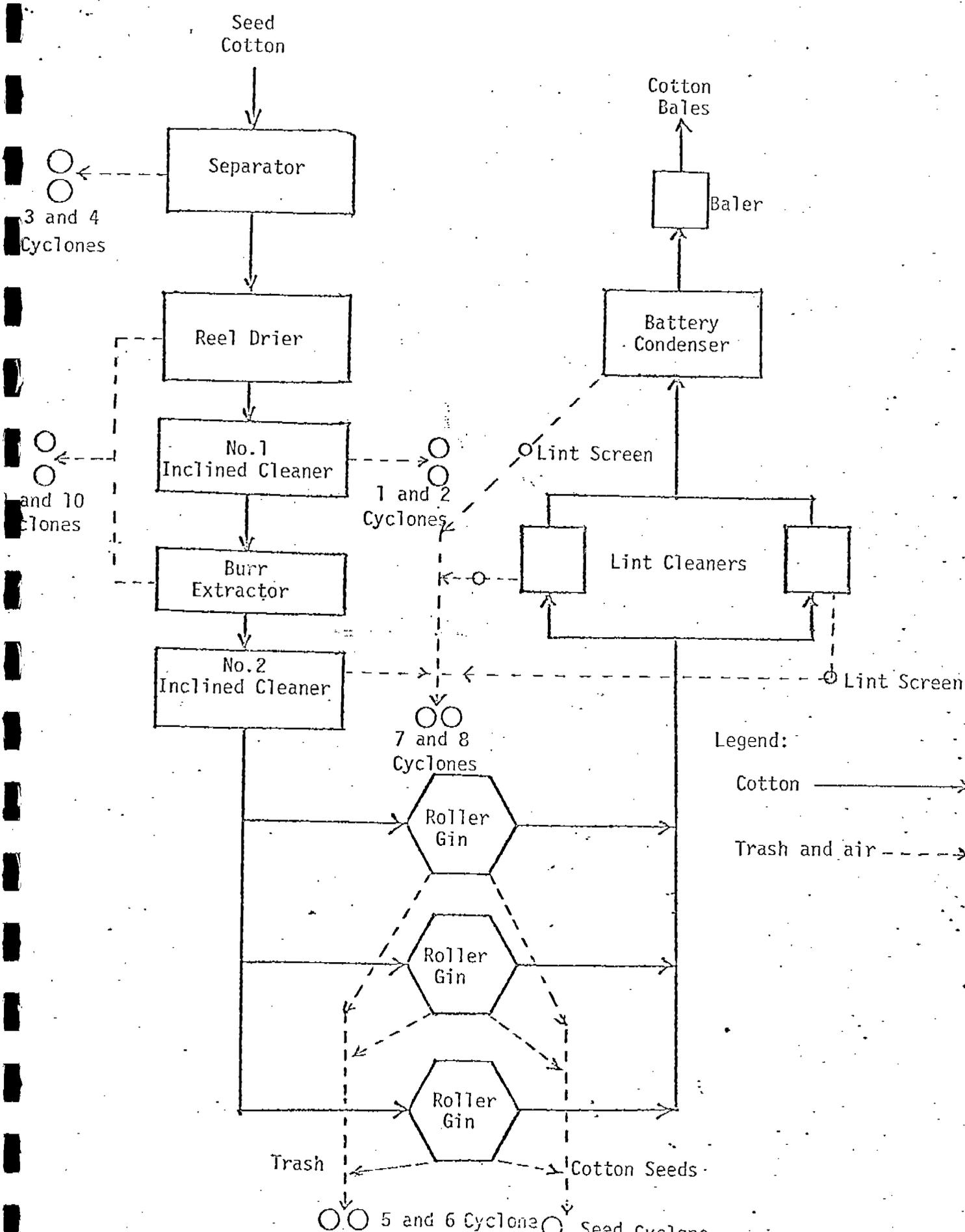
The cotton passes to a bur extractor which removes heavy trash and burs with a revolving saw cylinder. The teeth of the saw hold the seed cotton and subjects them to a carding and cleaning action as the cotton is spread across the surface of the cylinder. The trash and burs removed from the cotton are pneumatically conveyed to the two cyclones [9 and 10] that also control the emissions from the reel drier.

The cotton is further processed in a 7 cylinder inclined cleaner. The 7 cylinder inclined cleaner operates as the 5 cylinder inclined cleaner described previously. The trash is removed by two cyclones [7 and 8].

The cotton is then distributed to the three roller gin stands which use a revolving cylinder to separate the seeds and trash from the lint without breaking or damaging the long lint fibers. The seeds are pneumatically conveyed to a cyclone and storage pile. The trash is removed in two cyclones [5 and 6].

The resulting lint cotton is air-conveyed to two lint cleaners (operated in parallel) which remove the fine leaf

\* Numbers in brackets refer to Figure 3 and the table of control equipment (Control Equipment Description).



Legend:  
 Cotton —————>  
 Trash and air - - - ->

○ ○ 5 and 6 Cyclone ○ Seed Cyclone  
 Figure 3. Pima Cotton Process Flow

particles, motes\*, dust and sticks. The lint cleaners vent the carrier air to individual lint screens. The collected lint\*\* is drawn off the two lint screen bottoms and collected in the same cyclones [7 and 8] that collect the trash from the 7 cylinder inclined cleaner.

The lint cotton is air-conveyed to the battery condenser where it is formed into a smooth endless mat. The cotton mat is fed into the baler. The bales are wrapped in burlap, tied with metal bands and stored outside for shipment. The exhaust gases are vented to a lint screen. The collected lint\* is removed in the same cyclones [7 and 8] that collect the trash and lint from the No. 2 inclined cleaner and lint cleaners.

The trash is collected by the cyclones and hauled away. The seed is hauled to a cottonseed oil mill.

### Control Equipment Description

Cyclones are used to control the process emissions and collect the trash removed from the cotton. Two or three cyclones are used to collect the particulate from a single source. Below is a summary of these process control devices and their associated gas flow rates.

#### 1. Short Staple Cotton Gin

<u>Cyclone***</u>	<u>Process Controlled</u>	<u>Cyclone Size (Diameter) cm (in)</u>	<u>Gas Flow Rate m<sup>3</sup>/min (ACFM)</u>
1 & 2	No. 1 inclined cleaner reel drier	97 (38)	226 (8,000)
3 & 4	Bur extractor, No. 1 lint cleaner Battery condenser	97 (38)	170 (6,000)
5 & 6	No. 2 & 3 inclined cleaners, gin stand and feeder trash conveyor	97 (38)	282 (10,000)
7 & 8	Gin stand feeder overflow	97 (38)	170 (6,000)

\* Motes are a group of fibers attached to a portion of seed hull.

\*\* Only a small amount of poor grade lint is collected and recovery is not considered economical.

\*\*\* See Figure 2.

<u>Cyclone</u>	<u>Process Controlled</u>	<u>Cyclone Size (Diameter) cm (in)</u>	<u>Gas Flow Rate m<sup>3</sup>/min (ACFM)</u>
9 & 10	No. 1, 2 & 3 inclined cleaners-trash, No. 2 lint cleaner when mote cyclone bypassed, reel drier	97 (38)	226 (8,000)
Mote	No. 2 lint cleaner	270 (104)	226 (8,000)
11, 12 & 13	Separator	97 (38)	170 (10,000)

2. Pima Cotton Gin

<u>Cyclone*</u>	<u>Process Controlled</u>	<u>Cyclone Size (Diameter) cm (in)</u>	<u>Gas Flow Rate m<sup>3</sup>/min (ACFM)</u>
1 & 2	No. 1 inclined cleaner	97 (38)	226 (8,000)
3 & 4	Separator	97 (38)	226 (8,000)
5 & 6	Trash feeder conveyor of roller gin overflow	97 (38)	170 (6,000)
7 & 8	No. 1 & 2 lint cleaners 50-in. battery condenser No. 2 inclined cleaner	97 (38)	170 (6,000)
9 & 10	Bur extractor Reel drier	97 (38)	85 (3,000)
Seed	Seed conveying	61 (24)	42 (1,500)

\*See Figure 3.

With the exception of the mote and seed cyclones, all the cyclone outlets are 43 cm (17 inches) in diameter and 10 cm (4 inches) in height. The mote cyclone outlet has a diameter of .9 m (3 ft) and height of 15 cm (6 inches). The seed cyclone has an outlet diameter of 30 cm (12 inches) and outlet height of 5 cm (2 inches). Only the mote cyclone has a rain cap.

All the lint screens used in the plant (six total) are identical, .9 m (3 ft) in diameter and 1.2 m (4 ft) in height. The lint screen is a cylindrical cage made of 14 to 18 mesh wire screening. The contaminated gases enter the lint screen from the top and vent through the screening. The lint collected on the screening sluffs off when the weight of the lint is greater than the air exhaust pressure.

The exhaust gases from the cyclones and lint screens are composed primarily of air with temperatures ranging from ambient to 200°F and moisture from 0-3%. The gas velocities at the cyclone outlets range from 12-18 m/sec (40-60 ft/sec) and cyclonic flow is present at the outlets. The exhaust gases can contain dust, dirt and lint.

### Source Sampling Feasibility

There are 31 emission points in the Marana Gin; 25 cyclones and 6 lint screens. Twenty-three cyclones emit the majority of these emissions. The mote and seed cyclones are not considered major emission sources.

Neither the cyclones nor the lint screens have stacks or ducts that can be sampled according to EPA, Method 1<sup>1</sup> criteria (minimum requirements-- 2.5 diameters of straight ducting). The gas flow patterns from the cyclones and lint screens do not meet the EPA, Method 2<sup>1</sup> requirements, which state that sampling must be performed at a location where the gas flow is straight and uniform, not swirling or cyclonic.

There are no usable sampling platforms and little structural support for platforms. The cyclones can be source sampled if modifications are made. The lint screens, however, cannot be sampled.

The gin has 25 cyclones; 14 control emissions from the short staple cotton gin and the remainder control the Pima cotton gin emissions. Cyclones in sets of two or three control the process emissions. Assuming that each cyclone in the set (i.e., two or three) has identical emission rates, only one cyclone for each processing operation would have to be sampled. This assumption must be checked by determining the gas flow rate of each cyclone. A minimum of 11 cyclones would be sampled to obtain the total short staple gin and Pima cotton gin emissions (i.e., 6 and 5 cyclones respectively). The seed and mote cyclones would not be sampled because both are minor pollution sources. The seed cyclone separates the cottonseed from the carrier air stream with 100% efficiency. The mote cyclone also recovers 100% of the lint and motes from the waste air stream.

In order to sample the cyclone emissions, each cyclone outlet will have to be modified by attaching a stack extension which meets the EPA Method 1 and 2 requirements. An involute stack extension has been used by the Agriculture Research Service, USDA, to obtain such a sampling location. The involute-shaped cap is connected to the cyclone outlet thereby changing the vertical gas flow to horizontal with little interference to the volumetric gas flow rate and reducing the swirling of the exhaust gases. Where involute caps are connected to two or more cyclones the emissions can be combined in a single duct. The combined emissions will require fewer source tests and the test results will be more indicative of the process emissions.

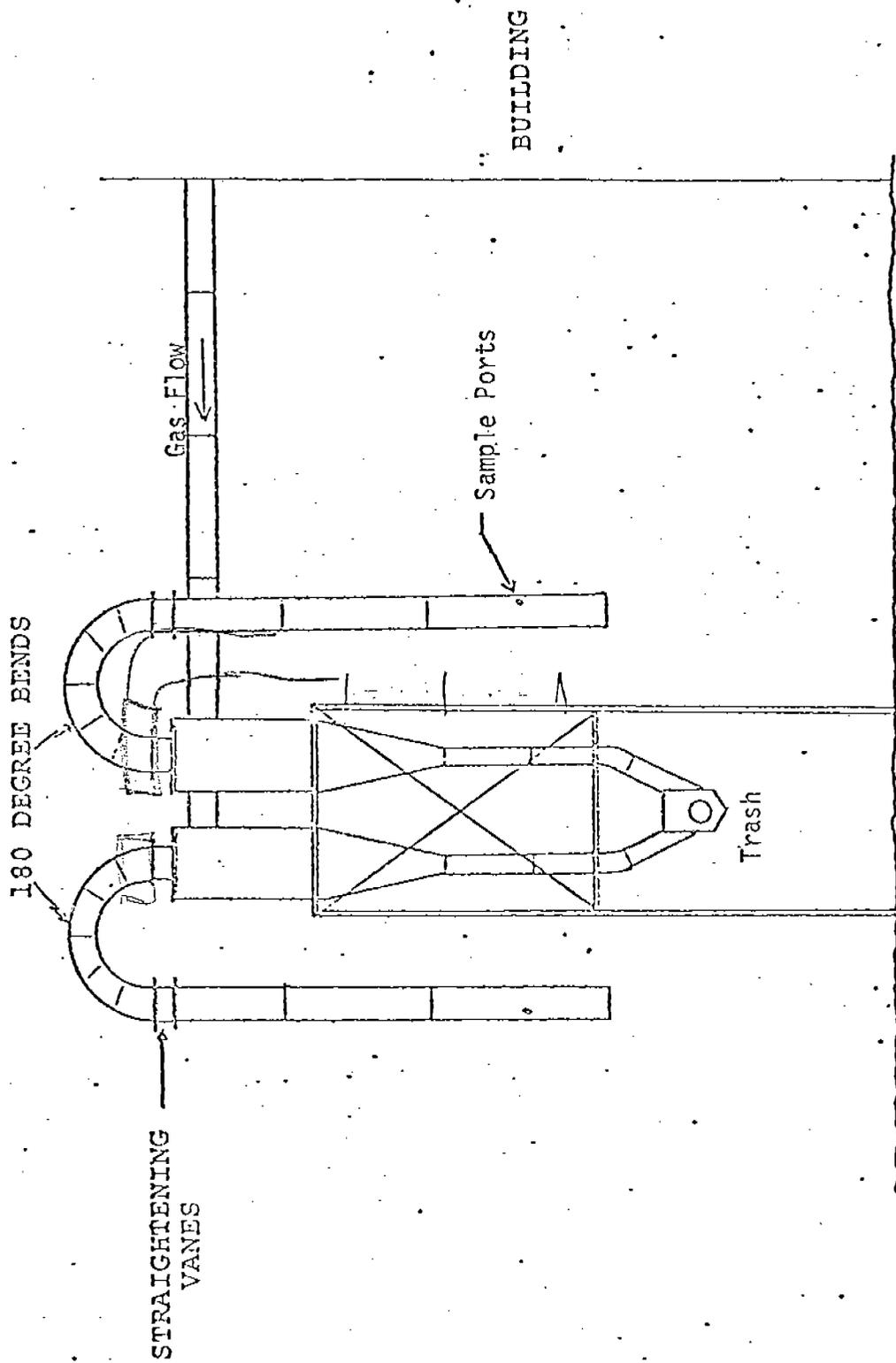


Figure 4 SCHEMATIC DIAGRAM OF THE CYCLONE UNITS AND SAMPLING DUCTS

The cyclone exhaust gases contain dirt, dust and lint. The number of large lint fibers (1.3 cm or .5 inches) are minimal. The nozzle sizes normally used by the EPA Method 5<sup>1</sup> range from 0.5 to 1.3 cm (0.19 to .50 inches) and will collect the dirt and dust particles, but large lint fibers will not be collected thereby biasing the results low. The high-volume source sampler<sup>3</sup> is an alternative to the EPA Method 5 sampling train. The high-volume source sampler is designed to collect large particulate in a gas stream using large nozzles (5 cm or 2 inches). The procedure, however, is still being tested and has not been approved.

The process operating conditions depend on the condition of the seed cotton. Ground cotton, with its large percentage of trash, has greater particulate emissions during processing than first or second pick. But the ground cotton accounts for only 10% of the total cotton processed. Further the moisture content of the cotton in each wagon load varies. From 3 to 5 and 1 to 2 wagon loads of cotton will be processed, respectively, during a sample run by the short staple and Pima cotton gins. To eliminate the variations in cotton conditions, a single pick of cotton must be processed during sampling.

The lint screens cannot be sampled as the waste air stream is discharged in all directions through the screen. Any enclosure used to confine these emissions would affect the lint screen performance.

#### Summary and Conclusions

Representative results of the emissions can be determined with the use of stack extensions and by processing a single pick of cotton. Six tests or 18 sampling runs will determine the short staple cotton gin emissions, and 5 tests or 15 sampling runs will determine the Pima cotton gin emissions. There would possibly be some bias in the Method 5 results, but the bias should be insignificant (i.e., less than 10%).

The lint screens cannot be source sampled. The geometry of the control device precludes testing according to EPA Methods 1 and 2. Lint screens are major emission sources which contribute significantly to the gin emissions.

The seed and mote cyclones cannot be sampled because of their inaccessibility and should not be sampled because they are minor sources.

## BIBLIOGRAPHY

- <sup>1</sup> 40 CFR 60 - Standard of Performance of New Stationary Sources, Appendix A, Reference Method 1 through 5.
- <sup>2</sup> Air Pollution Emission Test, Delta and Pine Land Company Cotton Gin, Scott, Mississippi. Report No. 72-MM-16, EPA, Office of Air Quality Planning and Standards, Emissions Standards and Engineering Division, November 1974.
- <sup>3</sup> Emissions from Cotton Gin at Valley Gin Company, Peoria, Arizona. Project Report No. 72-MM-20, EPA, Office of Air Quality Planning and Standards, Research Triangle Park, N.C.



Appendix B

Calibration Procedures and Data



## Calibrations

The Aerotherm HVSS dry gas meter was calibrated by the NEIC procedures except that in place of a wet test meter a Roots\* meter was used. The Roots meter is traceable to an NBS\*\* standard.

When determining the orifice coefficient ( $\Delta H_a$ ) a 50 cycle timer was used on 60 cycle electrical current to time the sample volume. This gave an erroneous  $\Delta H_a$  which had to be redetermined in the field.

The 3-2 pitot tube B leg (the leg used) had a calibration coefficient (cp) of 0.79 at the beginning of the Marana Survey and 0.78 at the end. This 1.3% change is insignificant and since Method 2 (40 CFR PART 60) (Appendix A) makes no mention of using the post-survey pitotube calibration coefficient, it is inferred the initial coefficients should be used in all calculations, i.e., for isokinetic and emission rate determinations.

The initial coefficient, however, was affected by probe blockage in the 41 cm (20 in) duct. In this Appendix is the Blockage Data and Graph, which were used to adjust the Sampling Data. This data was developed experimentally by NEIC.

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\* *Brand Name.*

\*\**National Bureau of Standards.*

NEIC PROCEDURE FOR  
CALIBRATION OF DRY GAS METER  
AND ORFICE METER

Dry gas meters are used in source testing units to accurately measure sample volumes drawn during testing. A critical orifice is also installed to provide a known sampling rate so that isokinetic sampling can be maintained. These units will be calibrated before and after each sampling trip.

Calibration is accomplished by making simultaneous total volume measurements with a calibrated wet test meter and the dry gas meter. The wet test meter must be previously calibrated from a primary standard. Calibration is performed follows:

1. Level wet test meter and adjust the water level to the proper point.
2. Level and zero the manometer on sampling control unit.
3. Leak check unit and air hoses at 15 inch Hg (leakage rate must be zero). Assemble vacuum line to the wet test meter.  
(Caution: NO NOT Leak Check System by Plugging the Inlet to the Wet Test Meter, this will cause internal damage to the meter.)
4. Warm up control unit by operating vacuum pump for 30 minutes with wet test meter connected in series.
5. Close the course valve and open the fine adjust (by-pass) valve.
6. Turn on vacuum pump, open course adjust valve and turn the fine adjust valve until manometer reads 0.5" H<sub>2</sub>O ( $\Delta H$ ).

7. Simultaneously record the dry gas meter reading, wet test meter reading and time. Record temperature of wet test meter, inlet and outlet temperature of dry gas meter and atmospheric pressure during the test run.
8. Allow pump to run until the wet test meter indicates exactly 5 cubic feet of air have passed through the system (10 cubic feet when a  $\Delta H$  of 2, 3 and 4 inches  $H_2O$  are used) and record time.
9. Repeat steps 5-9 for  $\Delta H$  of 1", 2" 3" and 4"  $H_2O$ .
10. Calibration record will be kept in a permanent file at NEIC.  
Copies will be made for field use.

Calculations

Calculate the accuracy of the dry gas meter ( $\gamma$ ) as follows:

$$\gamma = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6} (t_w + 460))}$$

Where:

$V_w$  = Volume of gas metered, wet test meter, ft.<sup>3</sup>

$V_d$  = Volume of gas metered, dry gas meter, ft.<sup>3</sup>

$P_b$  = Atmospheric pressure, inches Hg

$t_d$  = Dry gas meter temperature, °F ( $\frac{t_{d \text{ in}} - t_{d \text{ out}}}{2}$ )

$t_w$  = Wet test meter temperature, °F

If  $\gamma \neq 1.00$  ( $\pm 0.02$ ) then gas meter will be taken to Public Service Company of Colorado gas meter shop for adjustment and/or repair.

Orifice meter coefficient ( $\Delta H @ = \frac{0.317 \Delta H}{P_b (t_d + 460)} \left[ \frac{(t_w + 460) \theta}{V_w} \right]$ )

Where:

$V_w$  = Volume of gas metered, wet test meter,  $\text{ft}^3$

$P_b$  = Atmospheric pressure

$t_d$  = Dry gas meter temperature,  $^{\circ}\text{F}$

$t_w$  = Wet test meter temperature,  $^{\circ}\text{F}$

$\theta$  = Time elapsed, minutes

# Orifice Meter Calibration

Date October 26, 1977

Box No. Another HVSS

Barometric pressure,  $P_b =$  24.91 in. Hg Dry gas meter No. \_\_\_\_\_

Orifice Manometer setting, $\Delta H$ in. H <sub>2</sub> O	Gas volume wet test meter $V_w$ , ft <sup>3</sup>	Gas volume dry gas meter $V_d$ , ft <sup>3</sup>	Temperature				Time $\theta$ , min	1.01	.102
			Wet Test Meter	Dry gas meter					
			$t_w$ , °F	Inlet $t_{di}$ , °F	Outlet $t_{do}$ , °F	Average $t_d$ , °F			
0.5	4.9	5.0	70	—	82	—	2.60	1.00	.0928
1.0	4.9	5.0	70	—	84	—	1.90	1.00	.0988
2.0	5.0	5.0	70	—	84	—	1.40	1.02	.103
3.0	9.9	10.0	70	—	84	—	2.29	1.01	.103
4.0	10.0	10.0	70	—	84	—	2.02	1.01	.107
5.0	10.2	10.0	70	—	82	Average	1.83	1.02	.106

Calculations		$\gamma$	$\Delta H \theta$
$\Delta H$	$\frac{\Delta H}{13.6}$	$\frac{V_w P_b (t_d + 460)}{V_d (P_b + \Delta H) (t_w + 460)}$	$\frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[ \frac{(t_w + 460) \theta}{V_w} \right]^2$
0.5	0.0368	$\frac{(4.9)(24.91)(82+460)}{(5.0)(24.91+0.0368)(70+460)}$	$\frac{(0.0317)(.5)}{24.91(82+460)} \left[ \frac{(70+460)2.6}{4.9} \right]^2$
1.0	0.0737	$\frac{(4.9)(24.91)(84+460)}{(5.0)(24.91+0.0737)(70+460)}$	$\frac{(0.0317)(1)}{24.91(84+460)} \left[ \frac{(70+460)1.9}{4.9} \right]^2$
2.0	0.147	$\frac{(5.0)(24.91)(84+460)}{(5.0)(24.91+0.147)(70+460)}$	$\frac{(0.0317)(2)}{24.91(84+460)} \left[ \frac{(70+460)1.4}{5.0} \right]^2$
3.0	0.219	$\frac{(9.9)(24.91)(84+460)}{(10.0)(24.91+0.219)(70+460)}$	$\frac{(0.0317)(3)}{24.91(84+460)} \left[ \frac{(70+460)2.29}{10.0} \right]^2$
4.0	0.294	$\frac{(10)(24.91)(84+460)}{(10)(24.91+0.294)(70+460)}$	$\frac{(0.0317)(4)}{24.91(84+460)} \left[ \frac{(70+460)2.02}{10} \right]^2$
5.0	0.368		

Where:  $V_w$  = Volume, wet test meter  
 $V_d$  = Volume Dry gas meter  
 $T_w$  = Temperature, Wet Test Meter  
 $T_d$  = Temperature, Dry Gas Meter  
 $P_b$  = Atmospheric Pressure, Inches Hg  
 $\theta$  = Time, minutes

Calibration by: Ronald L. Perin  
 Checked by: Ronald L. Perin

Remarks:

4/24/77  $\Delta H$  was wrong, timer was 50 cycles and was operated at 60 cycles. Orifice coefficient determined in field.

# Orifice Meter Calibration

Date 12/5/77

Box No. Aerotherm

Barometric pressure,  $P_b =$ <sup>24.48</sup>     in. Hg Dry gas meter No.     

Orifice Manometer setting, $\Delta H$ in. H <sub>2</sub> O	Gas volume wet test meter $V_w$ , ft <sup>3</sup>	Gas volume dry gas meter $V_d$ , ft <sup>3</sup>	Temperature				Time $\theta$ , min	$\gamma$	$\Delta H_Q$
			Wet Test Meter	Dry gas meter					
			$t_w$ , °F	Inlet $t_{di}$ , °F	Outlet $t_{do}$ , °F	Average $t_d$ , °F			
0.5	5	5.10	63	-	69	-	2.09	.99	.058
1.0	5	5.11	64	-	69	-	1.54	.98	.064
2.0	10	10.10	62	-	71	-	2.23	1.00	.066
3.0	10	10.0	64	-	72	-	1.83	1.01	.067
4.0	10	9.98	62	-	78	-	1.60	1.02	.067
Average								1.00	.064

Calculations		$\gamma$	$\Delta H_Q$
$\Delta H$	$\frac{\Delta H}{13.6}$	$\frac{V_w P_b (t_d + 460)}{V_d (P_b + \Delta H) (t_w + 460)}$	$\frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[ \frac{(t_w + 460) \theta}{V_w} \right]^2$
0.5	0.0368	$\frac{5 \times 24.48 (69 + 460)}{5.10 (24.48 + 0.0368) (63 + 460)}$	$\frac{0.0317 \times 0.5 \left[ \frac{(69 + 460) 2.09}{5} \right]^2}{24.48 (69 + 460)}$
1.0	0.0737	$\frac{5 \times 24.48 (69 + 460)}{5.11 (24.48 + 0.0737) (64 + 460)}$	$\frac{0.0317 \times 1.0 \left[ \frac{(69 + 460) 1.54}{5} \right]^2}{24.48 (69 + 460)}$
2.0	0.147	$\frac{10 \times 24.48 (71 + 460)}{10.1 (24.48 + 0.147) (62 + 460)}$	$\frac{0.0317 \times 2.0 \left[ \frac{(71 + 460) 2.23}{10} \right]^2}{24.48 (71 + 460)}$
3.0	0.219	$\frac{10 \times 24.48 (72 + 460)}{10.0 (24.48 + 0.219) (64 + 460)}$	$\frac{0.0317 \times 3.0 \left[ \frac{(72 + 460) 1.83}{10} \right]^2}{24.48 (72 + 460)}$
4.0	0.294	$\frac{10 \times 24.48 (78 + 460)}{9.98 (24.48 + 0.294) (62 + 460)}$	$\frac{0.0317 \times 4.0 \left[ \frac{(78 + 460) 1.60}{10} \right]^2}{24.48 (78 + 460)}$

Where:  $V_w$  = Volume, wet test meter  
 $V_d$  = Volume Dry gas meter  
 $T_w$  = Temperature, Wet Test Meter  
 $T_d$  = Temperature, Dry Gas Meter  
 $P_b$  = Atmospheric Pressure, Inches Hg  
 $\theta$  = Time, minutes

Calibration by: J. Smith  
 Checked by: R. Adams

Remarks:

4/24/77

101

100

99

98

97

96

2.0

1.0

0

400

800

1200

1600

2000

2400

2800

ACCURACY CURVE

PROVER TEST  
DRESSER MEASUREMENT  
HOUSTON, TEXAS

METER INFORMATION

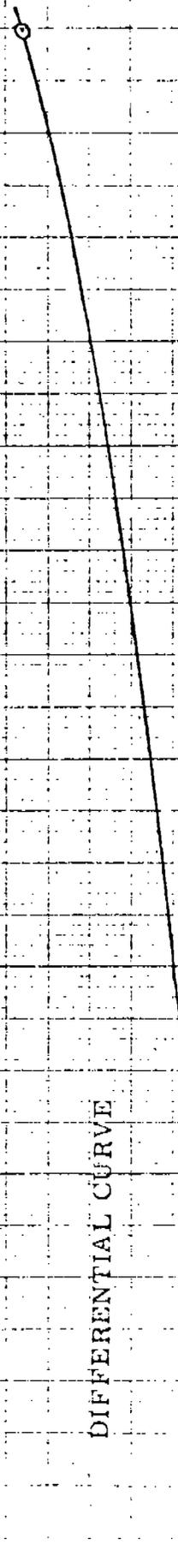
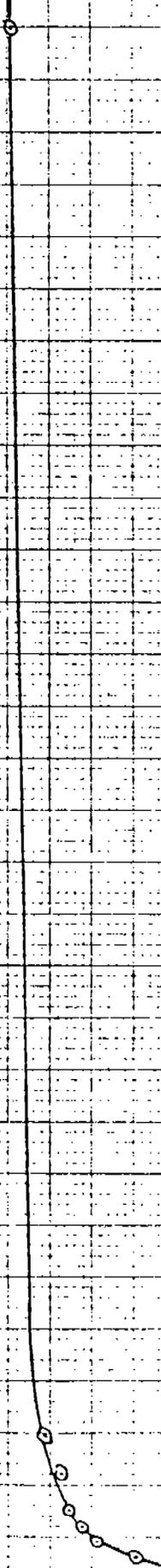
Model: 3M/25  
Serial No. 7658529  
Bill of Mat'l. 049/68-000  
Order No. V318391  
Prover Used: 50F73  
Test Date: 8-17-77

Tested by: D.W. BARNETT

Certified by: *[Signature]*

Data obtained using positive displacement proving equipment dimensionally traceable to the National Bureau of Standards. Test conducted with air at atmospheric pressure and ambient temperature.

DIFFERENTIAL CURVE



## NEIC Procedure for Pitot Tube Calibration

### Introduction

The Type-S pitot tube is used by NEIC to measure stack gas velocity during source sampling. The pitot tube coefficient ( $C_p$ ) of this instrument is determined by calibration against a traceable National Bureau of Standards (NBS) standard pitot tube. The Type-S pitot tube is calibrated on a probe sheath with a  $\frac{1}{2}$  inch diameter nozzle attached. All pitot tubes are calibrated from 305 m/min (1000 ft/min) to 1524 m/min (5000 ft/min). Pitot tubes used during tests will subsequently be recalibrated at a minimum of 3 points within the velocity range observed during testing. Tubes which have been damaged or suspected of being damaged during field use will be recalibrated over the entire range (i.e. 305 to 1524 m/min).

### I. Equipment Required

A. Flow System - Calibration is performed in a flow system meeting the following minimum requirements:

- (1) The air stream is confined in a well-defined cross sectional area, either circular or rectangular. The minimum size is 30.5 cm (12 inches) diameter for circular ducts and at least 25 cm (10 inches), as the shortest dimension for rectangular ducts.
- (2) Entry ports provided in the test section, shall be a minimum of 8 duct diameters downstream and 2 diameters upstream of any flow disturbance, e.g. bend, expansion, contraction, opening, etc.

(3) The flow system must have the capacity to generate over the range of 305 m to 1524 m (1000 ft. - 5000 ft.)/min. Velocities in this range must be constant with time to guarantee steady flow during calibration.

B. Calibration Standard

A standard type pitot tube either calibrated directly by N.B.S. or traceable to an N.B.S. standard shall be the calibration standard.

C. Differential Pressure Gauge

An inclined or expanded scale manometer shall be used to measure velocity head ( $\Delta P$ ). Such gauges shall be capable of measuring  $\Delta P$  to within  $\pm 0.13$  mm (0.005 inches)  $H_2O$ . A micro-manometer capable of measuring with 0.013 mm (0.0005 in)  $H_2O$  will be used to measure  $\Delta P$  of less than 13 (0.5")  $H_2O$ .

D. Pitot Tube Lines

Flexible lines made of tygon or similar tubing shall be used.

E. Thermometer

A mercury in glass or other type thermometer checked against a mercury in glass thermometer is considered suitable.

F. Barometer

A mercury column barometer shall be available to determine atmospheric pressure.

II. Physical Check

1. The openings are sharp and do not have a rolled edge.
2. The impact planes of sides A & B are perpendicular to the Traverse Tube axis [Figure 2].

3. The impact planes are parallel to the longitudinal tube axis [Figure 3].

### III. Calibration Procedure

The Type-S pitot tube shall be assigned an identification number. The first digit of the number is the effective length of the tube, followed by a dash and consecutive numbers for the number of tubes of the same effective length. i.e. 5-1 signifies a five foot pitot tube and is the number one tube. Calibration proceeds as follows.

- A. Fill manometer with clean oil of the proper specific gravity. Attach and leak check all pitot tube lines.
- B. Level and zero monometer.
- C. Position the standard pitot tube in the test section at the calibration point. If the flow system is large enough and does not interfere with the Type-S tube the standard tube may be left in the system.
- D. Insert the Type-S tube into the flow system.
- E. Checks for the effect of turbulence are made as follows:
  1. Read  $\Delta P$  on both Type-S and standard pitot tubes with the standard pitot tube in place and compare with readings when the standard tube is withdrawn from system.
  2. Read  $\Delta P$  on the Type-S tube at centerline of flow system, then take readings while moving the tube to the side of the system. This will define the boundary turbulence layer.
  3. Position the Type-S tube so that their impact openings are perpendicular to the duct cross sectional area and

check for null (zero) reading. Absence of a null reading at this position indicates non-laminar flow conditions.

- F. Read  $\Delta P_{std}$  and record on data table.
- G. With the Type-S "A" leg orientated into the flow read  $\Delta P_s$  and record on data table.
- H. Repeat steps F and G until three sets of velocity data have been obtained.
- I. Remove Type-S pitot tube and rotate probe nozzle until it aligns with side "B" impact openings.
- J. Insert the Type-S pitot tube and proceed as in steps F through H.
- K. Adjust flow system to new velocity and repeat F-J.
- L. Record air temperature in the test system and barometric pressure during testing.

#### IV. Calculations

1. At each "A"-side and "B"-side velocity setting, calculate the three values of  $C_p$  (s) as follows:

$$C_{ps} = C_{p\ std} \frac{\Delta P_{std}}{\Delta P_s}$$

Where:

$C_{ps}$  - Type-S pitot tube coefficient

$C_{p\ std}$  - Standard pitot tube coefficient (NBS)

$\Delta P_{std}$  - Velocity head, measured by Standard pitot tubing inches  $H_2O$

$\Delta P_s$  - Velocity head, measured by the Type-S pitot tube, inches  $H_2O$

2. Calculate  $\bar{C}_p$ , the average (mean of the three  $C_p$ (s) values.

3. For each  $\bar{C}_p$  calculated in step 2, calculate  $\sigma$ , the average deviation from the mean as follows:

$$\sigma(\text{Side "A" or "B"}) = \frac{\sum_3 |C_p(s) - \bar{C}_p(A \text{ or } B)|}{3}$$

4. The pitot is acceptable if:

- (a) The "A" and "B" side average deviations calculated by equation 2 are  $\leq 0.01$ .
- (b) The difference of the "A" and "B" sides  $\bar{C}_p$  calculated by equation 1 is  $\leq 0.01$  for each individual velocity.

5. Calculate the test section velocity as follows:

$$\bar{V} = K C_p \sqrt{\frac{T \bar{\Delta P} \text{ std}}{P M}}$$

Where:

$\bar{V}$  = Average test-section velocity, ft/min

$K$  = 5130 (constant)

$C_p$  = Coefficient of standard pitot tube

$T$  = Temperature of gas stream  $^{\circ}R$

$P$  = Barometric pressure, inches Hg

$M$  = Molecular weight of air = 29.0

$\bar{\Delta P} \text{ std}$  = Average of the three standard pitot tube readings, inches  $H_2O$

#### V. Record Keeping

Flow system data and information on each pitot tube shall be recorded in a bound book.

The flow system data shall include:

1. The tunnel cross-sectional area and length up-stream and down-stream of the test site (ft.) from disturbances.

check for null (zero) reading. Absence of a null reading at this position indicates non-laminar flow conditions.

- F. Read  $\Delta P_{std}$  and record on data table.
- G. With the Type-S "A" leg orientated into the flow read  $\Delta P_S$  and record on data table.
- H. Repeat steps F and G until three sets of velocity data have been obtained.
- I. Remove Type-S pitot tube and rotate probe nozzle until it aligns with side "B" impact openings.
- J. Insert the Type-S pitot tube and proceed as in steps F through H.
- K. Adjust flow system to new velocity and repeat F-J.
- L. Record air temperature in the test system and barometric pressure during testing.

#### IV. Calculations

1. At each "A"-side and "B"-side velocity setting, calculate the three values of  $C_p$  (s) as follows:

$$C_{ps} = C_{p_{std}} \sqrt{\frac{\Delta P_{std}}{\Delta P_S}}$$

Where:

$C_{p_S}$  - Type-S pitot tube coefficient

$C_{p_{std}}$  - Standard pitot tube coefficient (NBS)

$\Delta P_{std}$  - Velocity head, measured by Standard pitot tubing inches  $H_2O$

$\Delta P_S$  - Velocity head, measured by the Type-S pitot tube, inches  $H_2O$

2. Calculate  $\bar{C}_p$ , the average (mean of the three  $C_p$ (s) values.

2. Time tunnel used (hrs)
3. Air temperature ( $^{\circ}$ F) in flow system and barometric pressure (inches Hg).
4. All checks for turbulence and flow distribution.
5. Velocity range (ft/min).

The pitot tube information shall include:

1. I.D. number
2. Checks for physical damages, errors noted and modifications.
3. Dates and surveys pitot tubes were used.
4. Date of calibrations, coefficient and dates of re-calibration.

The calibration records will be kept on file at NEIC. Copies of the appropriate calibration dates will be furnished for each source test project.

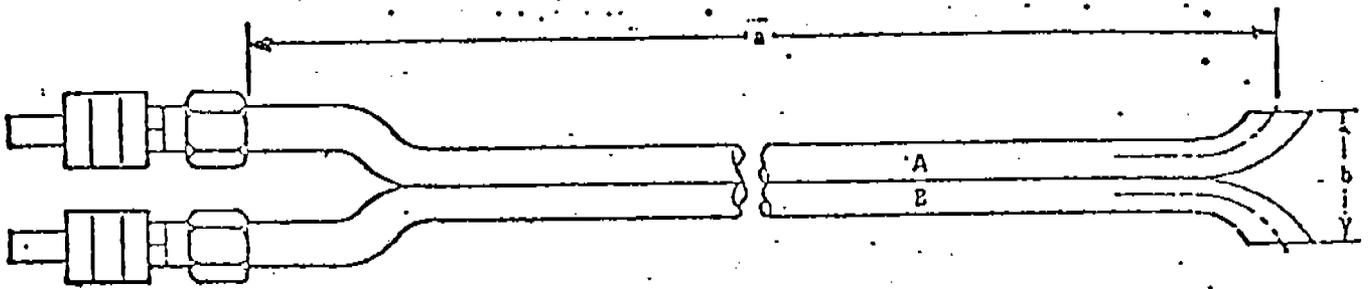


Figure 1. Measurement of Type-S pitot tube length (dimension "a") and impact-plane separation distance (dimension "b").

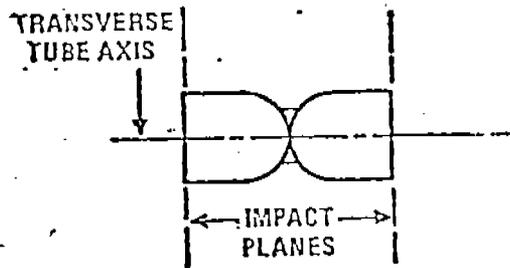


Figure 2. Type-S pitot tube, end view; impact-opening planes perpendicular to transverse tube axis.

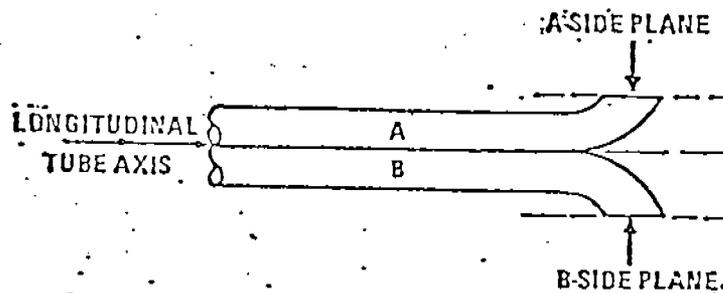


Figure 3. Type-S tube, top view; impact-opening planes parallel to longitudinal tube axis.

From "A TYPE-S PITOT TUBE CALIBRATION STUDY" by

Robert F. Vollaro, October 15, 1975

Calibration Pitot Tube: ID Number N135 Cp 0.99  
 Type-S Pitot Tube ID Number: 3-a

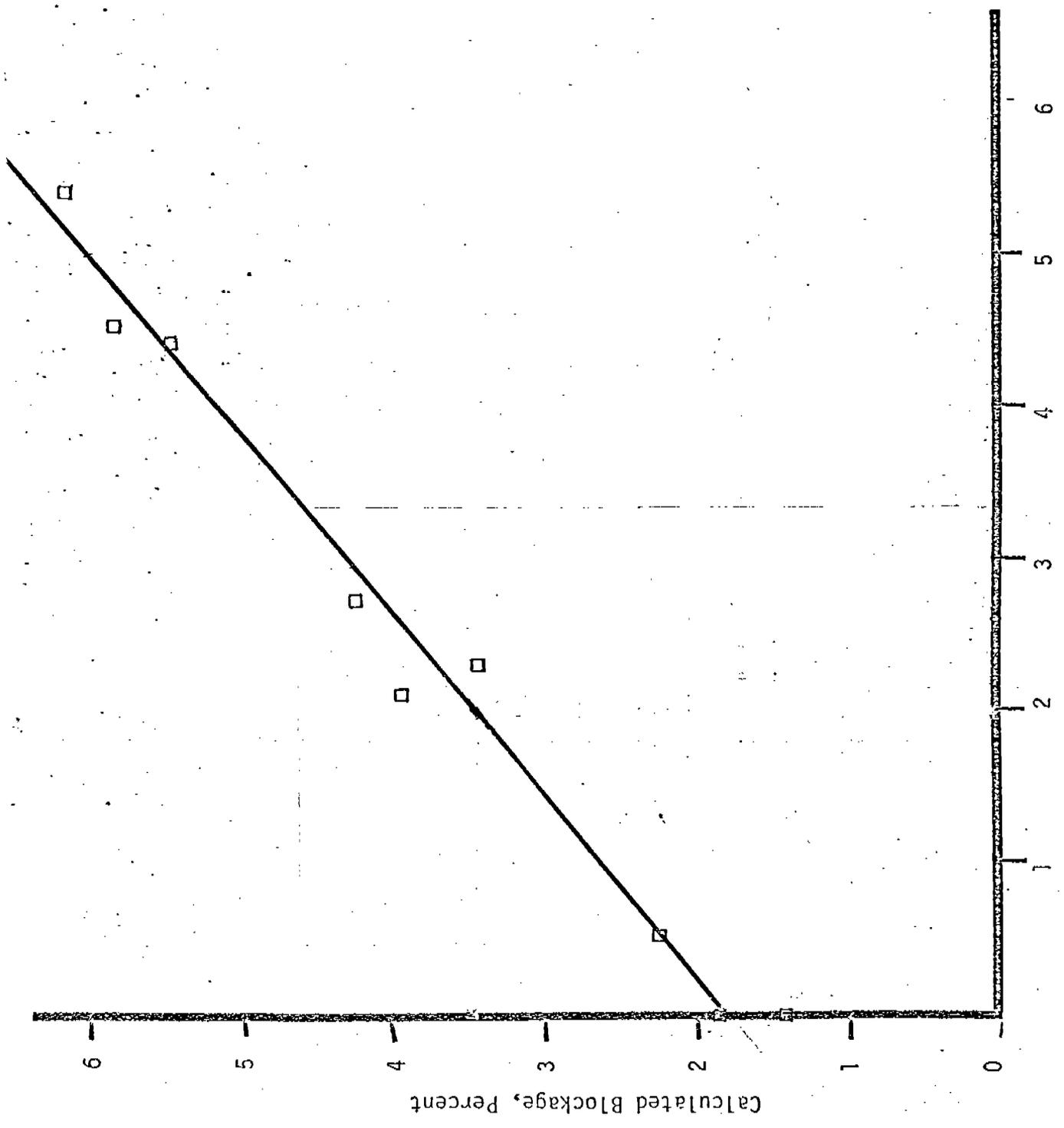
ΔP Standard Pitot	ΔP S-Type Pitot		Cp		Leak Check OK, Zero OK, Level OK, Comments
	A leg	B leg	A	B	
0.12	0.185	0.180	0.797	0.808	Null Point 0.0
	0.180	0.180	0.808	0.808	micro-man
0.12	0.180	0.180	0.808	0.808	"
0.27	0.43	0.43	0.784	0.784	"
	0.43	0.43	0.784	0.784	"
0.27	0.43	0.43	0.784	0.784	Zero OK, Level OK
0.565	0.91	0.91	0.780	0.780	Std. Man. Zero OK, Level OK
	0.91	0.91	0.780	0.780	
0.565	0.91	0.905	0.780	0.782	
0.82	1.30	<del>1.20</del> 1.30	0.786	0.786	
	1.30	1.30	0.786	0.786	
0.82	1.35	1.30	0.772	0.786	
1.22	1.85	1.85	0.797	0.797	
	1.90	1.85	0.787	0.797	
	1.90	1.85	0.787	0.797	
Probe only without sheath					
1.20	1.80	1.80			
	1.85	1.85			
	1.85	1.80			
			0.787	0.790	Leg Average Cp

During Pitot Calibration:  
 probe sheath attached yes  
 nozzle attached yes, 1/2"  
 sampling isokineticly yes

Performed By: JLW  
Matheway

Calibration Date: 2-23-77





Decrease in Pitot Tube Coefficient, Percent

# CALIBRATION OF 3 1/2" Radev Nozzle

1- 3.487

3.472

3.479

3.537

3.514

3.496

3.533

3.535

3.487

3.530

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3.505 AVE.

1 1.868

2 1.848

3 1.862

4 1.873

5 1.861

6 1.854

7 1.864

8 1.873

9 1.846

10 1.848

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1.860

5/2/78  
J. B. Kelly

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Appendix C

Sampling Train Construction Details



## Aerotherm HVSS Description

The Acurex/Aerotherm High Volume Source Sampler (HVSS) consists of a control unit, vacuum unit and a sampling unit. The units are connected together with quick disconnect electrical and air lines, and umbilical cords. Not all the equipment used was of Aerotherm manufacture and this equipment is described below the item it replaced.

A) The HVSS control unit contains the following (figure 1):

1. All temperature and electrical switches and controls.
2. Dry gas and orifice meters to accurately determine the sample volume and sampling rate.
3. Magnehelic gauges to indicate the pressure drop of the orifice meter and pitot tube.

The magnehelic gauges were not used during the Marana survey. Inclined manometers replaced the magnehelics.

4. Digital Temperature Indicator (DTI) which gives an instant readout from several points; stack, oven, impinger outlet, meter inlet, meter outlet by use of a selector switch.

The DTI was only used to monitor the meter inlet temperature. The duct temperature was measured with a dial or glass thermometer.

B) The vacuum unit (pump) is capable of drawing a high vacuum (65 CM Hg) and a high volume (280 lpm - free flow) of air. The pump is a rotary fiber vane type which does not require lubrication, but oil bath filters are used for pump protection. Attached directly to the pump are the flow control and bypass valves for adjusting sampling rates.

C) The sampling unit is made up of three distinct sections; impinger case (figure 2), oven and probe. All three units can be converted to form one sampling unit or can be separated for unusual sampling conditions. Below are the individual component descriptions:

*\*Information included in this description is from the report, "Operating and Service Manual, Source Assessment Sampling System," D. Blake, Aerotherm Report UM-77-80.*

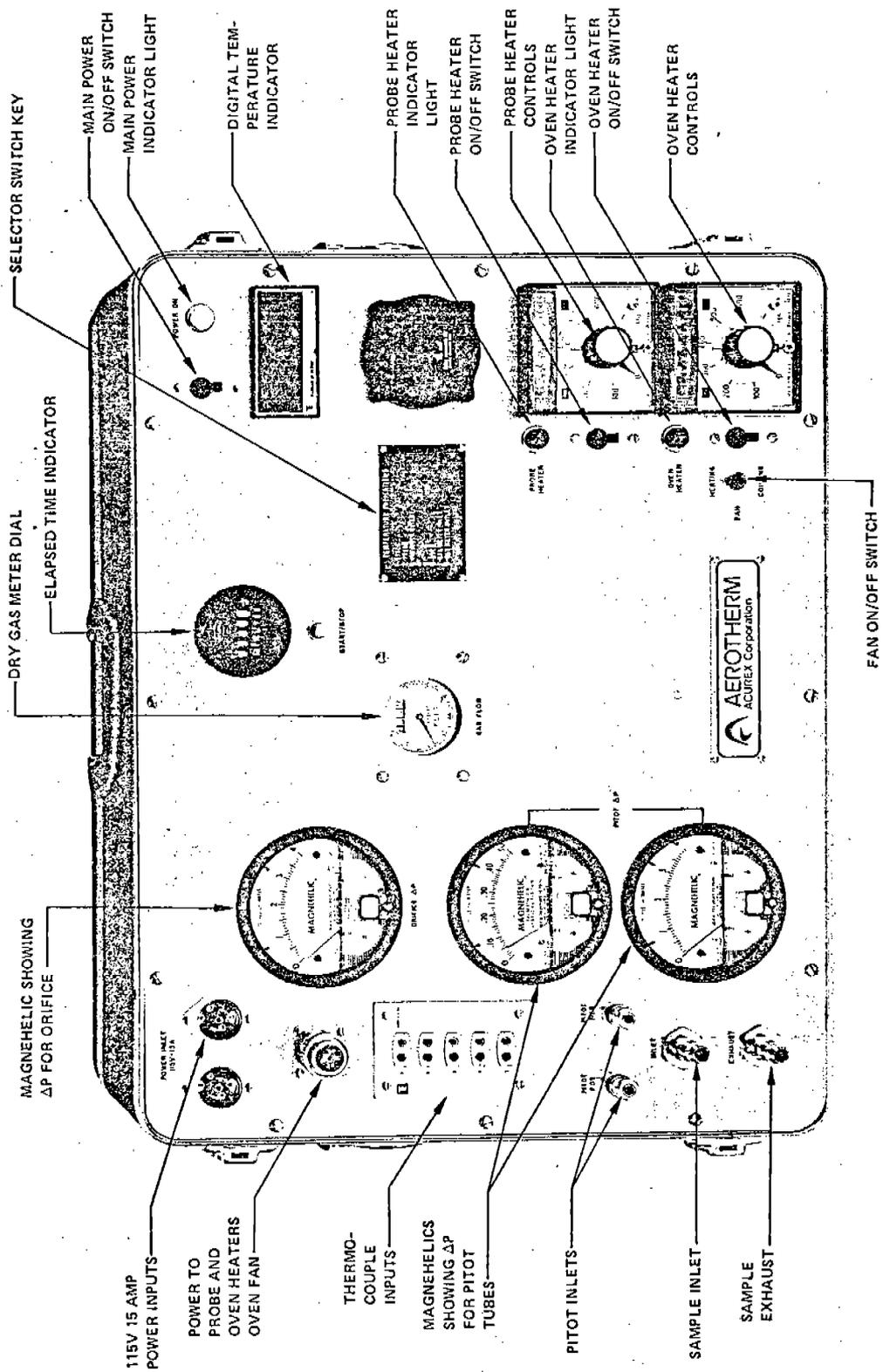
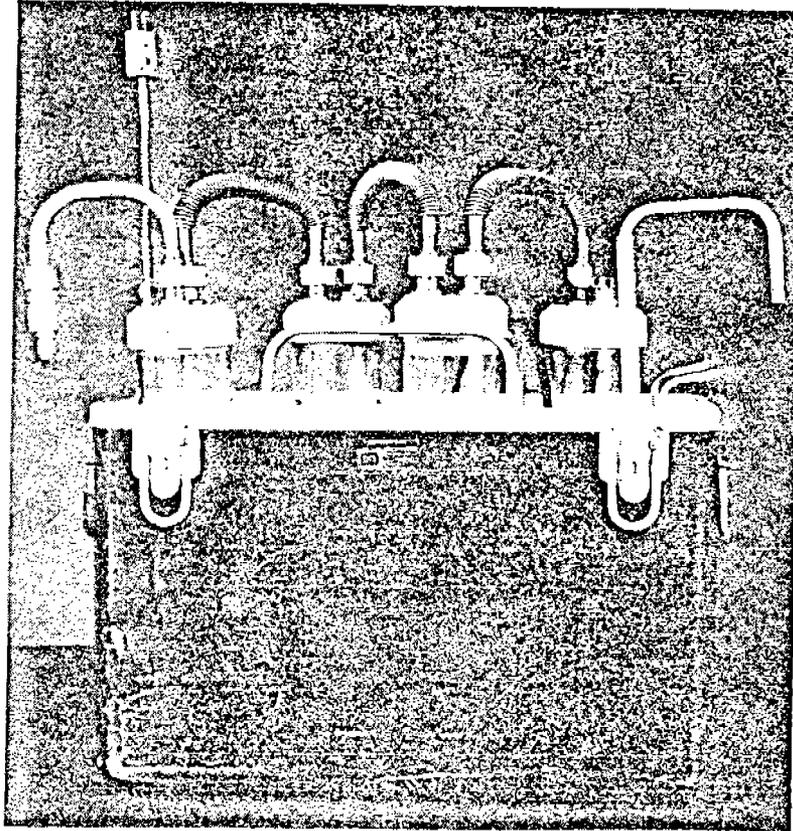


Figure 1. Control unit.



A53

Figure 2 Impinger train.

1. Impinger case - an uninsulated fiberglass case capable of holding four plastic impingers (1 liter capacity) in an ice bath.
2. Oven - an insulated, double walled, stainless steel (S.S.) box that can hold the cyclone and filter holder. The S.S. cyclone and filter-holder connect with S.S. fittings and Teflon seals. The filter support is a S.S. screen.
3. Probe - a S.S. lined, external sheathed probe. The sheath, which contains the liner, pitot tube, and thermocouple connections, is 6.4 cm (2.5 in) in diameter and connects directly to the cyclone inlet.

The HVSS probe was replaced with a Scientific Glass (S.G.) Inc. AP-5000 S.S. lined probe during the Marana survey. The S.G. probe was used because it has less duct blockage than the HVSS probe. A flexible Teflon probe connected the S.G. probe to the cyclone inlet.

## Rader HV Sampler Description\*

"The Rader Hi-Volume Sampler provides a means of determining particulate matter in emissions. It has developed over several years, and results obtained from a variety of sources have proven it to be a versatile and reliable sampler.

"The Sampler is illustrated by Fig. 1. It consists of four assemblies. (1) The Filter Holder Assembly houses the filter support and filter. (2) The Inlet Extension Section is clamped to one side of the Filter Holder. The 1-7/8" inlet nozzle is recommended for velocities below 2500 FPM, additional nozzle adapters are available for higher velocities. (3) The Control Section is clamped to the opposite side of the Filter Holder. It consists of the flow sensors, control valve and suction blower attached with flexible hose. (4) The Control Computer which performs all needed calculations to run the stack test.

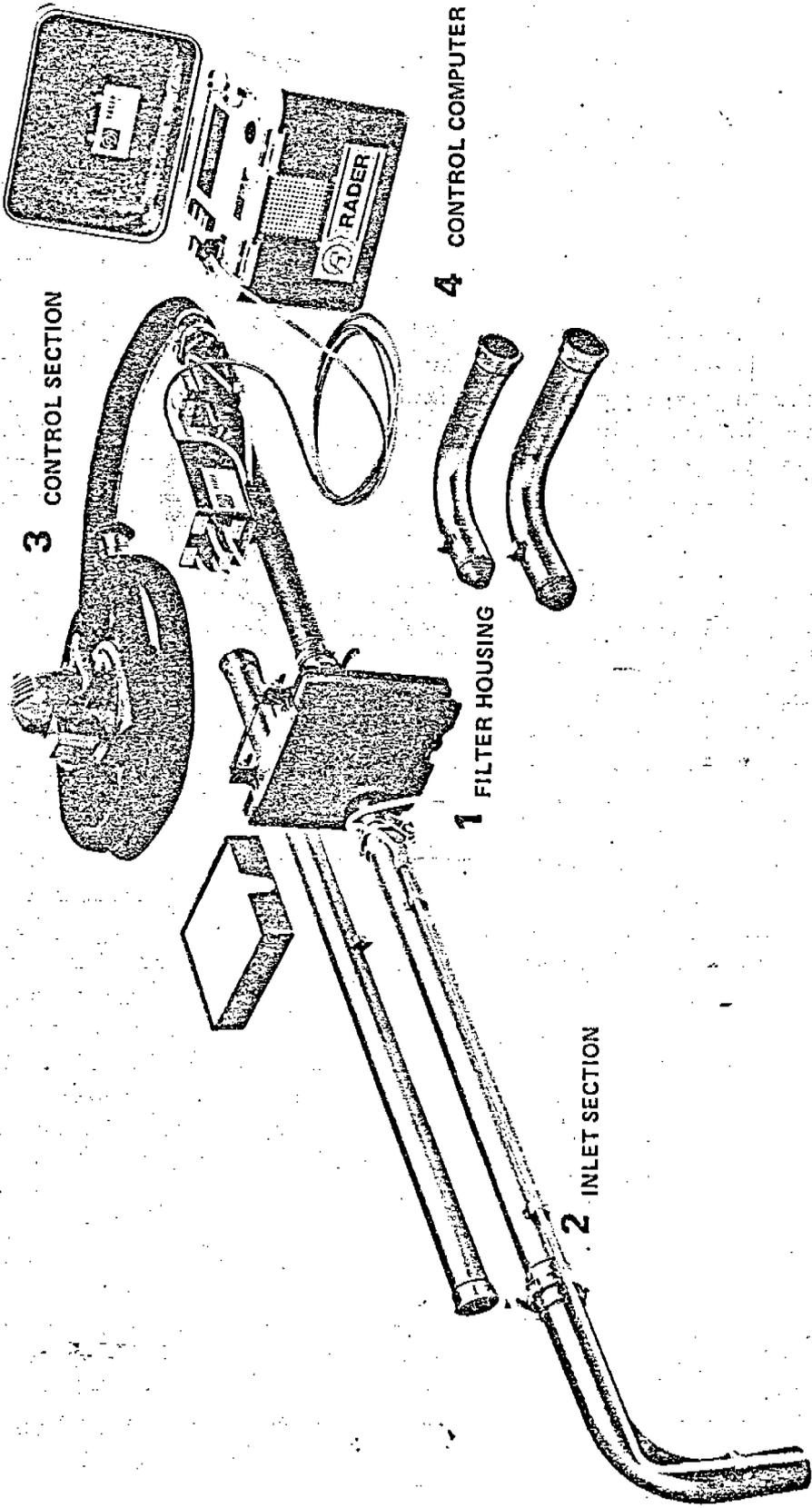
"These operating instructions have been developed to enable the operator to collect an accurate sample with a minimum of effort. Briefly, a pitot traverse is performed to determine the velocity at the sampling points. In some instances, the velocity may be calculated with sufficient accuracy to select the nozzle size. The sampler automatically regulates to achieve an isokinetic sampling rate, but the pitot traverse may be necessary to determine volume flow. Samples are then collected on pre-weighted filters using blanks for monitoring any changes to the filter tare weights.

"Since particulate will accumulate in the inlet probe during a test run, the procedure provides for the collection and inclusion of this particulate in the sampling results."

The HV sampler is all aluminum with rubber gaskets and seals. The maximum sampling rate is about 90 cfm.

*\*Information included in this description is from the instruction manual for the Rader Hi-Volume Sampler (Automatic) distributed by Rader Companies, Inc.*

SUCTION BLOWER



3 CONTROL SECTION

4 CONTROL COMPUTER

1 FILTER HOUSING

2 INLET SECTION

RADER MODEL A-2000 AUTOMATIC STACK SAMPLER

FIG. 1

The Rader HV sampler operates in the following manner:

1. A standard type pitot tube, adjacent to the sampling nozzle, senses the stack gas velocity and this pitobe differential pressure is transmitted to the control computer via air lines.
2. Simultaneously the unit sampling rate is measured by the orifice meter and the orifice differential pressure is transmitted via air lines to the computer.
3. Based on the velocity pressure, the computer adjusts the solenoid valve until the orifice meter pressure corresponds to the sampling rate necessary for isokinetic flow. The computer uses the sampling rate at the orifice meter and the sampling time period to indirectly determine the sample volume.

The Rader HV sampler does not meet the following Method 5 requirements:

1. No moisture determination is performed.
2. No direct measurement of the sample volume is made.
3. Stack temperature readout is not available.



Appendix D

NEIC Analytical Procedures and Data

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ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF ENFORCEMENT  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

TO : Mr. Paul dePercin, Field Coordinator  
Marana Cotton Gin Study

DATE: January 6, 1977

FROM : Chief  
Chemistry Branch

SUBJECT: Results of Particulates Analyses

Attached is a summary of the results of particulate analyses of filters and acetone washes collected for the Marana Cotton Gin Study.

In addition, several samples are being analyzed for phosphorus pesticides and those results will be sent to you shortly.



Theodore O. Meiggs

Attachment

cc: Harp  
Young  
Stager

ENVIRONMENTAL PROTECTION AGENCY  
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NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

TO : Chief  
Chemistry Branch

DATE: January 6, 1977

FROM : W. E. Stager  
(Reviewed by D. Vietti)

SUBJECT: Results of Particulates Analyses for the Marana Gin Study

Analytical Procedures

Filters

The filters to be tared were desiccated at  $20 \pm 5.6^{\circ}\text{C}$  ( $68 \pm 10^{\circ}\text{F}$ ) and ambient pressure for 24 hours and weighed to constant weight. The tare weights were recorded to the nearest 0.1 mg. During each weighing, the filters were not exposed to the laboratory for more than two minutes.

After sample collection the filters were returned from the field folded in field data cards in sealed envelopes. The data cards and filters were removed from the envelopes and placed into a desiccator after the circle charts had been stapled to the cards. Indicating Drierite, which removes uncombined water from the filters, was used as the desiccant. The filters were desiccated at  $20 \pm 5.6^{\circ}\text{C}$  ( $68 \pm 10^{\circ}\text{F}$ ) and ambient pressure for 24 hours and weighed to a constant weight, i.e., a difference of no more than  $< 0.5$  mg, or 1% of the gross weight minus the tare weight, whichever was greater, between two consecutive weighings.

The single pan analytical balance was calibrated against Class "S" weights before weighing the filters. Additionally, desiccator and weighing room temperature and relative humidity readings were recorded. All handling of the filters was performed with forceps.

Acetone Wash

The acetone probe washes were received in quart jars with Teflon lined lids. The level of liquid in the containers was noted and no leakage had occurred. It was noted, however, that the volume of acetone in the field blanks was considerably less than the average sample volume. The volume of acetone in each sample was measured volumetrically to within  $\pm 1$  ml and recorded on the bench sheets.

The samples were mixed to suspend the solids therein and transferred to tared 250 ml beakers, as was the acetone used to rinse the jars. The beakers were placed in an aluminum foil tunnel-designed to prevent particulate contamination of the sample, yet allow efficient air flow for escape of acetone vapors-in a hood. The hood door was kept closed and empty tared beakers were used as blanks to verify that the samples did not become contaminated.

After a minimum of 24 hours in the evaporating tunnel, the beakers were transferred into a desiccator having Drierite as the desiccant. After 24 hours the beakers were weighed to constant weight with at least 6 hours between consecutive weighings.

Field and Laboratory Blanks

For both sizes of filters-6" and 8 x 10"-and for acetone washes-both field and laboratory blanks were collected and weighed at the minimum rate of one blank of each type for every ten samples.

Statistical treatment of the field and lab blank data were used to determine the detection limit utilizing the formula:

$$D.L. = \bar{x} + 2\sigma \quad \sigma = \sqrt{\frac{\sum x^2}{n-1}}$$

and operating on the assumption that 95% of the weights fall within two + standard deviations of the mean in a normal distribution. The above formula for  $\sigma$  was used with the acetone washes.

Field Blank-acetone

$$\bar{x} = 0.3 \text{ mg}$$

$$\sigma = 0.2 \text{ mg}$$

$$DL = 0.7 \text{ mg}$$

Lab Blank-acetone

$$\bar{x} = 0.08 \text{ mg}$$

$$\sigma = 0.2 \text{ mg}$$

$$DL = 0.5 \text{ mg}$$

For the filter field blanks, the formula for maximum difference in paired weights,  $\sigma = \sqrt{\frac{\sum \Delta^2}{2N}}$  was used to determine the Detection Limit.

6" filters

$$\bar{x} = 0.9 \text{ mg}$$

$$\sigma = 0.2 \text{ mg}$$

$$DL = 1.3 \text{ mg}$$

8 x 10" filters

$$\bar{x} = 0.9 \text{ mg}$$

$$\sigma = 0.5 \text{ mg}$$

$$DL = 1.9 \text{ mg}$$

Further, with most of the 8 x 10" Hi-vol filters, particulate loadings were very large. Therefore, the paired weight formula for  $\sigma$  was used to determine significant numbers in reporting net weight. Because of extremely high loading, and to avoid spilling material from the filters, four filters were weighed on a top load balance and net weight reported to the nearest 0.1 g. The remaining filter weights were reported to the nearest 10 milligrams.

The results are summarized on the attached reporting forms.

*Wm. E. Stager*  
William E. Stager

Attachments

ANALYTICAL DATA REPORTING FORM

DATES COVERED 11/4/77 → 11/11/77

NAME OF SURVEY Morana Gin Morana, Arizona

SAMPLE NO.	STATION DESCRIPTION	TIME	ANALYSES PERFORMED	
			Stock Filters mg.	Acc. base Wash Dioxin, furans, PCBs
2211-01-1104	Morana Gin	1500	30	3327 <del>3324</del>
2211-02-1105	" "	1030	37	1536
2211-03-1105	" "	1345	53	2429
2211-04-1105	" "	1534	<del>78</del> 27	2530
2209-01-1107	" "	1100	13	423
2209-02-1107	" "	1340	14	719
2209-03-1107	" "	1530	9	517
2208-01-1109	" "	0845	1	120
2208-02-1109	" "	1045	1	130
2208-03-1109	" "	1315	<1	179
2208-04-1109	" "	1540	<1	152
2208-05-1110	" "	0857	1	186
2207-01-1110	" "	1252	2	555
2207-02-1110	" "	1600	2	470
2207-03-1111	" "	0852	3	509
2207-04-1111	" "	1036	2	403

ANALYTICAL DATA REPORTING FORM

DATES COVERED 11/11/77 → 11/16/77

NAME OF SURVEY Matawaq Gij Durana Atjona

SAMPLE NO.	STATION DESCRIPTION	TIME	ANALYSES PERFORMED	
			Stock Filters mg	Acid base micrograms
2205-01-1111	Matawaq Gij	1315	2	152
2205-02-1111	"	1500	1	146
2205-03-1112	"	0833	<1	111
2204-01-1112	"	1050	3	672
2204-02-1112	"	1356	11	911
2204-03-1112	"	1520	6	623
2204-04-1113	"	0842	17	921
2310-01-1119	"	1248	16	170
2310-02-1119	"	1448	43	176
2310-03-1119	"	1637	23	212
2309-01-1115	"	0908	27	292
2309-02-1115	"	1100	39	483
2309-03-1115	"	1330	18	349
2309-04-1115	"	1505	29	287
2307-01-1116	"	0840	1	101
2307-02-1116	"	1025	2	144
2307-03-1116	"	1308	2	139

## ANALYTICAL DATA REPORTING FORM

Page 3SITE OF SURVEY Marana Gully, Marana, ArizonaDATES COVERED 11/17/77 → 11/19/77

SAMPLE NO.	STATION DESCRIPTION	TIME	ANALYSES PERFORMED	
			Stocks to Filters mg	Acetone Wash mg
2360-01-1117	Marana Gully	0845	21	145
2360-02-1117	"	1025	1	159
2360-03-1117	"	1250	1	93
2360-01-1118	"	1310	17	309
2360-02-1118	"	1530	21	466
2360-03-1119	"	0821	5	188
2211-1104	Field Blank	1500	0.8	0.4
2211-1105	"	0900	1.2	0.1
2208-1109	"	1345	0.7	0.3
2207-1111	"	1025	0.8	0.1
2204-1112	"	1520	1.1	0.6
#6-1116	"	<del>1415</del>	0.6	0.5
2307-1116	"	1415	* -	0.4
11/25/77	Lab. Acetone Blank			0.4
11/28/77	"			0.0
11/28/77	"			-0.1
11/28/77	"			0.1
11/28/77	"			0.0

\* Stock filter field blanks were taken from filter box after field new references to KFC-80000. 12/17/77 6:17 PM

NAME OF SURVEY *Marana Con. Marana Arizona*

DATES COVERED *11/4/77 - 11/11/77*

SAMPLE NUMBER	STATION DESCRIPTION	TIME	ANALYSES PERFORMED	
			Hi-Vol Filter wt. g	
2201-01-1105	Lint Cage (Condenser)	1015	3.70	
2201-02-1105	" "	1350	4.75	
2201-03-1105	" "	1420	3.55	
2201-01-1109	" " HV	0810	1.12	
2201-01-1111	" " HV	0830	0.88	
2202-01-1104	Lint Cage	0920	0.83	
2202-02-1104	" "	1320	1.24	
2202-03-1104	" "	1514	2.03	
2203-01-1107	Lint Cage (Lint Cleaner)	1002	5.37	
2203-02-1107	" "	1248	5.06	
2203-03-1107	" "	1412	7.71	
2203-04-1109	" "	0956	3.13	
2203-05-1109	" "	1322	6.58	
2203-06-1109	" "	1410	4.97	
2203-01-1109	Lint Cage HV	1002	1.14	
2203-02-1109	" " "	1327	8.14	
2203-03-1109	" " "	1410	5.72	







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BUILDING 53, BOX 25227, DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

TO : Mr. Paul dePercin, Field Coordinator  
Marana Cotton Gin Study

DATE: January 23, 1978

FROM : Chief  
Chemistry Branch

SUBJECT: Results of Pesticide Analyses

Attached is Ms. Carlberg's report which summarizes the results of analyzing four different samples from Station 2211 at the Marana Cotton Gin for phosphorus pesticides. Trace amounts of methyl and ethyl parathion were found in the acetone washes ranging from 0.03 to 0.8 ug/kg (ppb). The filters did not contain sufficient particulate material to detect these low concentrations which appear to be too low to be of concern.



Theodore O. Meiggs

Attachment

cc: Young  
Harp  
Carlberg

ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF ENFORCEMENT  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

TO : Chief  
Chemistry Branch

DATE: January 19, 1978

FROM : K. A. Carlberg

SUBJECT: Analysis of Samples from Marana Cotton Gin in Arizona for Pesticides

Background

Eight samples from the Marana Cotton Gin in Arizona were submitted for pesticides analyses. These samples consisted of four filters and four particulates/acetone washes. The acetone wash samples had been taken to dryness and resuspended in acetone before they were submitted for pesticide analysis. The pesticides of concern were ethyl parathion, methyl parathion, malathion, and dimethoate.

Results

The four filters contained no detectable amounts of the pesticides of interest. All four of the acetone washes contained methyl parathion, ranging from 0.1 - 1.8 ug. Three of the acetone washes contained ethyl parathion in amounts ranging from 0.1 - 0.5 ug. Malathion was not found in any of the acetone washes. The analytical methods used to analyze ethyl and methyl parathion and malathion prohibited analyzing the acetone wash samples for dimethoate.

The results are given in the table following. In addition, the weight of particulates found on each filter and in each acetone wash, as reported in a memo by W. E. Stager dated January 6, 1977, is given. It is not surprising that pesticide levels in the acetone wash samples were greater than those on the filters due to the much higher particulate levels in the acetone wash samples.

Table of Results

FILTERS

Station #	Run #	Date	mg Particulates on Filter	Methyl Parathion	ug on Filter		
					Ethyl Parathion	Malathion	Dimethoate
2211	1	11/04/77	30	<0.05	<0.05	<0.1	<0.01
2211	2	11/05/77	37	<0.05	<0.05	<0.1	<0.01
2211	3	11/05/77	53	<0.05	<0.05	<0.1	<0.01
2211	4	11/05/77	78	<0.05	<0.05	<0.1	<0.1

PARTICULATE/ACETONE WASHES

Station #	Date	Time	Sequence	mg Particulates in Wash	ug in Acetone Wash		
					Methyl Parathion	Ethyl Parathion	Malathion
2211	11/04/77	1500	01	3327	0.6	0.1	<1.0
2211	11/05/77	1030	02	1536	0.1	<0.1	<1.0
2211	11/05/77	1345	03	2429	1.8	0.5	<1.0
2211	11/05/77	1534	04	2530	1.5	0.5	<1.0

Methodology

A. FILTERS: Each filter was extracted with 150 ml of acetone for 1 hour using a wrist action shaker. The extracts were then dried with sodium sulfate and concentrated to 10 ml in a Kuderna-Danish evaporative concentrator. The concentrated extracts were analyzed using a gas chromatograph equipped with an alkali-flame ionization detector. (GC-AFID)

B. PARTICULATE/ACETONE WASHES: Each acetone wash was filtered through Whatman #1 filter paper and concentrated to 10 ml in a Kuderna-Danish evaporative concentrator (KD). The concentrated extracts were then analyzed on a GC-AFID. The extracts were too dirty at this point to discern the presence or absence of the pesticides of interest. The concentrated extracts, therefore, were cleaned up using an Analytical Biochemistry Laboratories Gel Permeation Chromatograph (GPC) equipped with a column of SX-3 resin and eluted with 15% methylene chloride in cyclohexane. The cleaned-up extracts were concentrated to 5 ml in a KD, since 5 ml was injected onto the GPC. The extracts were then analyzed on a GC-AFID. At this point it appeared possible that all of the pesticides of interest were in each of the extracts. In order to confirm this, the extracts were analyzed on a gas chromatograph equipped with an electron capture detector. Once again, because of the extreme sensitivity of the EC detector, the extracts were too dirty to be analyzed. Therefore, the samples were subjected to a Florisil column cleanup. The cleanup used was the one described in the FDA, Pesticide Analytical Manual, Vol. 1, Section 211.14d,

for cleanup of organochlorine and organophosphorous pesticides. Unfortunately, dimethoate does not elute from this Florisil column and therefore confirmation of the presence of dimethoate was not possible. The peak which eluted at the same retention time as dimethoate in the GC-AFID chromatograms appears in an area of the chromatogram traditionally subject to many interference peaks. Therefore, in my judgment, the presence of dimethoate in the acetone wash samples is doubtful.

The Florisil cleanup referred to above involves eluting each sample through 4 inches of activated Florisil topped by one-half inch of sodium sulfate. The column is eluted with 200 ml of 6% ethyl ether in petroleum ether, followed by 200 ml of 15% ethyl ether in petroleum ether, 200 ml of 50% ethyl ether in petroleum ether and finally 200 ml of ethyl ether. Methyl and ethyl parathion elute in fraction 2 (15% EtO) while malathion elutes in fraction 3 (50% EtO). This Florisil cleanup proved to be insufficient to allow the samples to be analyzed by EC, however, using the AFID, it was found that 2 peaks still appeared in fraction 2 in the area of elution of methyl and ethyl parathion. However, fraction 3 was free of any peak corresponding to malathion, thus eliminating malathion as a constituent of the samples.

Fraction 2 of the extracts, which contained peaks suspected of being methyl and ethyl parathion, were submitted to an alumina column cleanup. The extracts were cleaned up on a 15 cm column of neutral alumina, deactivated with 3% water which was eluted with three 50 ml portions of benzene. Methyl parathion elutes from this column in fractions 2 and 3, while ethyl parathion elutes completely in fraction 2. After this cleanup, the extracts were clean enough to be analyzed on the EC-GC. The peaks suspected of being methyl and ethyl parathion were confirmed as such by proper retention times on the EC-GC and by their proper elution pattern from the neutral alumina column.

*Kathleen A. Carlberg*  
Kathleen A. Carlberg

Appendix E

Lint Cage Dimensions, Flow Data  
and Calculations.



# LINE GAGE FLOW CALCULATIONS

ARS AND NEIC VELOCITY TRAVERSE DATA WERE USED WITH THE EQUATION BELOW TO CALCULATE THE GAS VELOCITIES (FT/MIN).

$$V_s = 85.48 C_p \sqrt{\Delta P} \sqrt{\frac{T_s}{P_b MW}}$$

THE RESULTS OF THE CALCULATIONS ARE PRESENTED IN THE TABLE BELOW:

STATION NO.	AVERAGE DUCT VELOCITY			DUCT DIAMETER (IN.)
	ARS DATA (FPS)	NEIC DATA (FPS)	ADJUSTED FLOWS	
2201	29.2	—	25.1	42
2202	15.0	—	13.0	52
2203	43.3	—	37.0	42
2301	51.4	—	43.0	18
2302	52.5	43.9	—	18
2303	31.9	—	27.0	18
2304	31.8	30.5	—	18
2305	66.1	53.6	—	18

EXAMPLE: STATION 2201

$$V_s = 85.48 C_p \sqrt{\Delta P} \sqrt{\frac{T_s}{P_b \text{ MW}}}$$

$$V_s = 85.48 (.99) (.42) \sqrt{\frac{541}{(28.09)(28.8)}} \\ = 29.2 \text{ FT/min} - \text{NO cotton} \\ \text{being processed}$$

$V_s = \text{velocity}$

$$C_p = .99$$

$$T_s = 81^\circ\text{F} = 541^\circ\text{R}$$

$$P_b = 28.09 \text{ in Hg}$$

$$\text{MW} = 28.8 \frac{\text{lb}}{\text{lb-mol}}$$

$$\sqrt{\Delta P} = 0.43 \text{ in}$$

the velocity is ADJUSTED FOR THE PROCESSING  
OF COTTON (GRAPH E-1)

AN AIR VELOCITY OF 29.2 FPS

IS EQUIVALENT TO A VELOCITY OF

25.1 FPS WHEN COTTON IS BEING PROCESSED [NBIC].

LINT CAGE VOLUMETRIC FLOW RATE

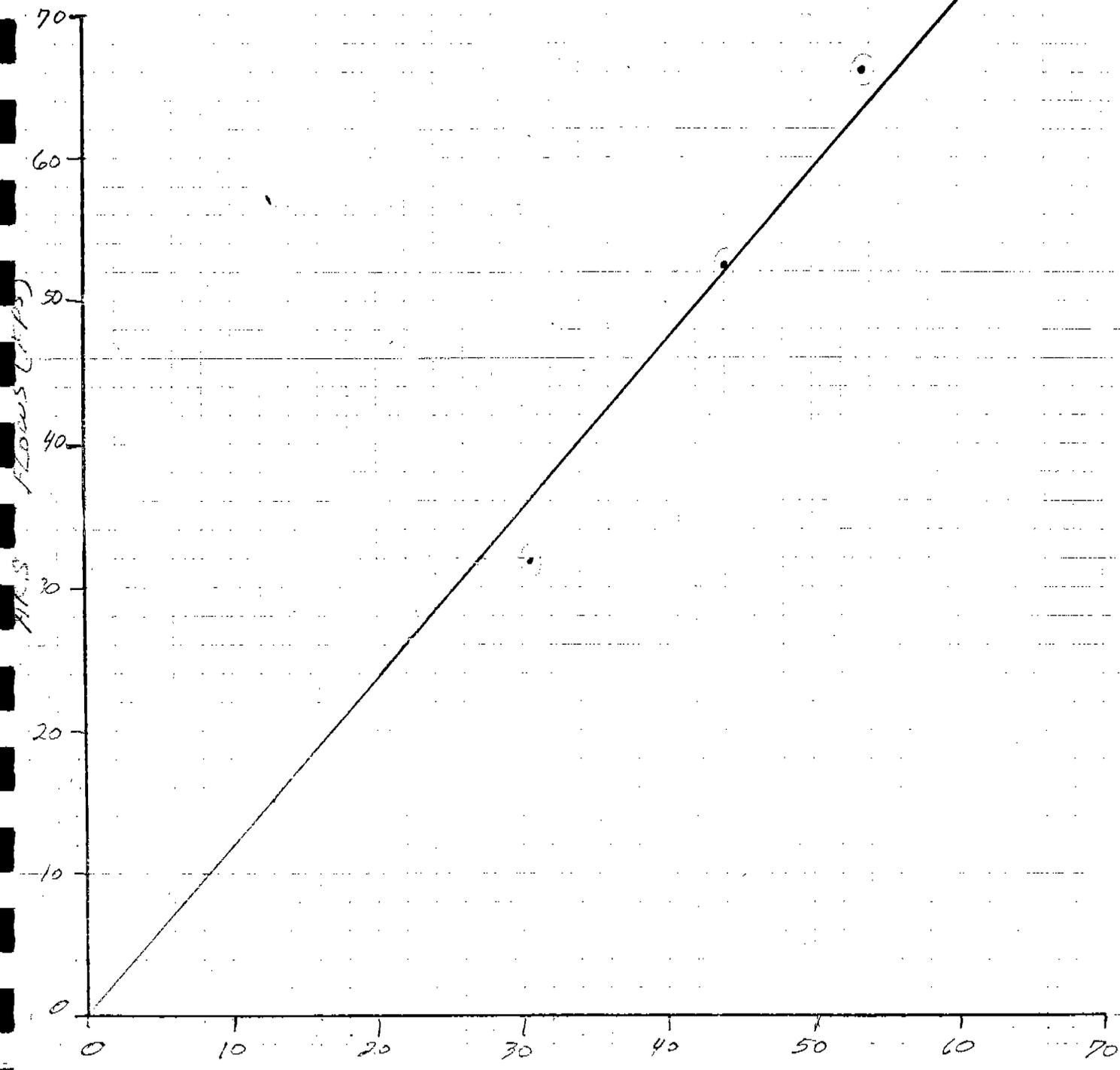
$$Q_s = 60(1 - B_{\text{loss}}) V_s A \left(\frac{528}{T_s}\right) \left(\frac{P_b}{29.92}\right)$$

$$= 60(1 - .01)(25.1)(9.62) \left(\frac{528}{541}\right) \left(\frac{28.09}{29.92}\right)$$

$$= 13100 \text{ FT}^3/\text{min}$$

ROUNDED OFF TO BE

$$Q_s = 13,000 \text{ SCFM}$$



NEIC FLOWS (FPS)  
(OR ADJUSTED ARS FLOWS)

Figure E-1 FLOW DATA COMPARISON.

Table E-1  
 LINT CAGE ISOKINETIC RATES\*  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Station Number	Sampling Rate ft <sup>3</sup> /min	Nozzle Area ft <sup>2</sup>	Nozzle Velocity ft/min	Gas Flow ft <sup>3</sup> /min	Lint Cage Area ft <sup>2</sup>	Screen Velocity ft/min	Isokinetic %
Short-Staple Cotton Gin							
2201	26.5	.0670	396	13,000	129.5	100	396
2202	27.1	.0189	1,430	10,300	110	93.6	1,532
2203	27.5	.0670	410	19,000	46.8	406	101
Long-Staple Cotton Gin							
2301	27.2	.0670	406	4,000	32.7	122	333
2302	27.2	.0670	406	4,150	31.9	130	312
2303	27.1	.0670	404	2,880	31.7	90.9	444
2304	27.0	.0670	403	2,880	33.3	86.5	466
2305	27.0	.0670	406	5,060	39.7	128	317

\* Average values for three runs, except for Station 2203 which is an average of six runs.

STA #2302

10

SO to North.

west to East

- 1 — .42
- 2 — .49
- 3 — .49
- 4 — .45
- 5 — .39
- 6 — .32
- 7 — .31
- 8 — .32
- 9 — .29

- 1 — .46
- 2 — .44
- 3 — .42
- 4 — .36
- 5 — .38
- 6 — .38
- 7 — .43
- 8 — .45
- 9 — .40

Velocities taken with  
 standard petot #2.

11/12/77 QJH

Psychrometer readings

	WET	Dry	
2301 -	58	84	17%
2302	56	78	22%
2303	58	83	19%
2304	58	84	17%
2305	57	83	16%

Above readings taken with sling-  
 psychrometer 11/12/77 QJH

# STA # 2304

SO - NO		East to West	
1	— .22	1	— .23
2	— .23	2	— .22
3	— .23	3	— .20
4	— .20	4	— .18
5	— .18	5	— .17
6	— .17	6	— .17
7	— .17	7	— .18
8	— .19	8	— .17
9	— .20	9	— .16

# STA # 2305

SO. to NO.		West to East	
1	— .65	1	— .60
2	— .68	2	— .72
3	— .67	3	— .72
4	— .64	4	— .68
5	— .60	5	— .64
6	— .52	6	— .57
7	— .46	7	— .55
8	— .43	8	— .59
9	— .41	9	— .60

Velocities taken with  
Petot (standard) #2.

11/14/77 JST

CCW

NEIC DATA  
DIMENSIONS OF  
CAGE SECTIONS

2201

B-1-1.13

X 3.75'

2-1.14

3-1.06

4-1.14

5-1.16

6-1.17

7-1.17

8-1.14

9-1.17

10-1.97 X 2.1'

DOOR  
PT.

11-1.17

12-1.18

13-1.15

14-1.16

15-1.70

A-15 1.18

4-1.17

X 3.76

14 1.15

3-1.16

13 1.18

2-1.18

12 1.08

1-1.17

11 1.14

10 1.18

9 1.15

8 1.08

7 1.19

6 1.18

5 1.14

CCW

2202

NEIC DATA  
DIMENSIONS OF  
CAGE SECTIONS

B-1 - 1.2 FT X 3.75'

B-2 1.18

1.07

1.15

1.14

1.13

1.18

1.15

1.16

1.07

1.04

1.19

1.26

A-1 1.16 X 3.77

A-2 1.07

1.19

1.13 ✓

1.17

1.16

1.16

1.26

1.84 X 2.1'

PR  
DOOR

1.16

1.17

1.15

1.19

NEIC DATA  
DIMENSIONS OF  
CORE SECTIONS

STA 2301

3.77'

1	1.12		4.222
2	1.12		4.222
3	1.16		4.373
4	1.16		4.373
5	1.17	X 2.08	2.434
6	1.15		4.335
7	1.17		4.411
8	1.14		4.298
			<hr/> 32.67 SFT

STA # 2302

1	1.12	X 3.77	4.222
2	1.11	"	4.185
3	1.13	"	4.260
4	1.10	"	4.147
5	1.16	X 2.08	2.413
6	1.10	3.77	4.147
7	1.13	"	4.260
8	1.13	"	4.260
			<hr/> 31.89 SFT

NEIC DATA  
DIMENSIONS OF  
CNGC SECTIONS

STA # 2303

1	1.13	x 3.76'	4.249
2	1.10		4.136
3	1.13		4.249
4	1.08		4.061
5	1.17	x 2.08	2.434
6	1.11		4.174
7	1.12		4.211
8	1.11		4.174

31.69 sft.

STA # 2304

1	1.11	3.77	4.185
2	1.13		4.260
3	1.08		4.072
4	1.07		4.034
5	1.16	2.08	4.373
6	1.09		4.109
7	1.05		3.958
8	1.14		4.298

33.29 sft.

STA # 2305

NEIC DATA  
DIMENSIONS OF  
CAGE SECTIONS

1.78	X 3.79'	2.956
.74		2.805
.74		2.805
.69		2.615
.74		2.805
1.07	X 2.15'	2.300
.74		2.805
.68		2.577
.74		2.805
.74		2.805
.69		2.615
.74		<del>2.805</del> 5 ft.
1.10		4.169
.74		2.805

---

39.61 78 ft.



AGRICULTURAL  
RESEARCH  
SERVICE

WESTERN  
REGION

OF UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

Southwestern Cotton Ginning  
Research Laboratory  
Box 578  
Mesilla Park, New Mexico 88047

December 23, 1977

Environmental Protection Agency  
Office of Enforcement  
National Enforcement Investigations Center  
Building 53, Box 25227, Denver Federal Center  
Denver, CO 80225

Attention: Mr. Paul dePercin

Enclosed are the air flow traverse work sheets you requested. The measurement locations in the saw gin were much less than ideal. The ducts were about one diameter long and connected directly to the inlet of the duct fans. Three traverse points indicated no flow in the direction of the exhaust. It is not known if the fans caused any cyclonic flow. The measurements were made with no cotton in the ginning systems. The effect of the lint batt on the condensers and lint fly on the screen cages on the air flow is not known. The percentage reduction in air flow in the saw gin will probably be greater due to the type of fans used. I am enclosing some typical fan tables for the types of fans used. Please note the volume delivered by duct-type fans is very pressure-dependent.

Sincerely,

A handwritten signature in cursive script that reads "M. N. Gillum".

M. N. Gillum  
Agricultural Engineer

cc:

C. R. Bell

PITOT TUBE TRAVERSE  
CIRCULAR DUCT

Study Maiana, ay.

Location No. \_\_\_\_\_

Date 10/12/77

Traverse 1445

Location 1st from east  
press condenser tent cage

Cage area  $45\frac{1}{2} \times 154 = 48.7 \text{ ft}^2$

VA. FACT

$T_d$  90 °F

$T_w$  63 °F

$P_b$  28.09 IN-HG

$\rho = 1.0782 \text{ HG/ft}^3$

Pipe Dia. 18

.021 D .378

.117 D 2.11

.184 D 3.31

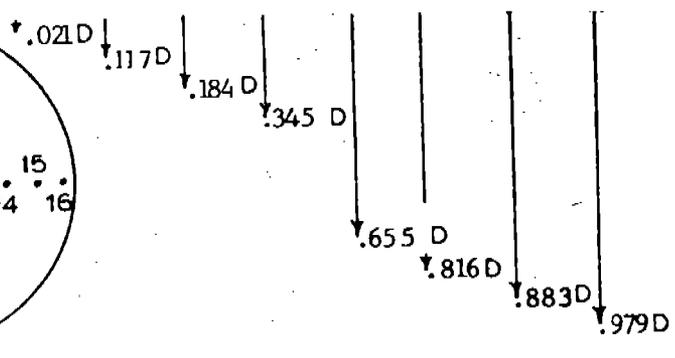
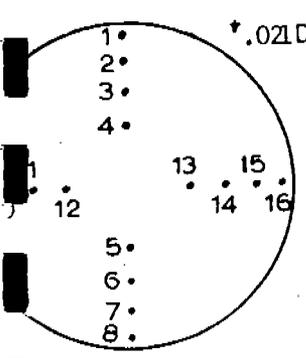
.345 D 6.21

.655 D 11.79

.816 D 14.69

.883 D 15.89

.979 D 17.62



west

north

Traverse Point No.	$P_v$	Traverse Point No.	$P_v$
1	.94	9	.8
2	1.05	10	.95
3	1.05	11	.90
4	.98	12	.75
5	.69	13	.99
6	.72	14	1.1
7	.80	15	1.1
8	.78	16	.84
		Pipe Center	.74

$V = 4007 \text{ ft/min}$   
 $Q = 7075 \text{ CFM}$

$\nabla$  cage face velocity =  $7075 / 48.7 = 145 \text{ ft/min}$

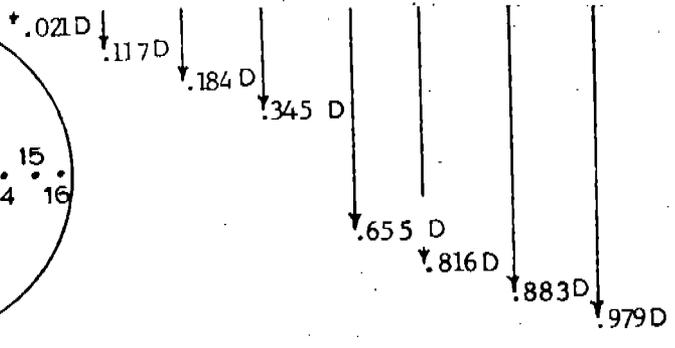
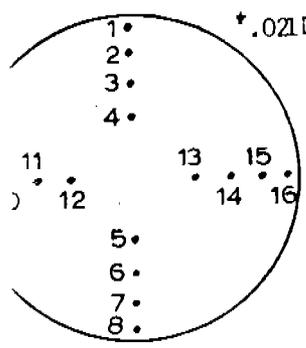
PITOT TUBE TRAVERSE  
CIRCULAR DUCT

Study Marana, RJ  
 Station No. \_\_\_\_\_  
 Date 10/12/77  
 Hour 1455

$T_d$  92 °F  
 $T_w$  62 °F  
 $P_b$  28.09 IN-HG  
 $\rho = 1.0751$  KG/M<sup>3</sup>

Location 2nd floor east  
split cage for second stage L.C. - South  
split stream 24" dia  
 Cage area =  $45\frac{1}{4} \times 116 = 36.5$  ft<sup>2</sup>

Pipe Dia. 18  
 .021 D .378  
 .117 D 2.11  
 .184 D 3.31  
 .345 D 6.21  
 .655 D 11.79  
 .816 D 14.69  
 .883 D 15.89  
 .979 D 17.62



Traverse Point No.	Pv	Traverse Point No.	Pv
1	.13	9	.18
2	.18	10	.27
3	.18	11	.25
4	.18	12	.21
5	.20	13	.19
6	.25	14	.22
7	.27	15	.24
8	.26	16	.22 .15
		Pipe Center	.19

$V = 1931$  ft/min  
 $Q = 3409$  CFM

split cage face velocity =  $3409 / 36.5 = 93$  ft/min

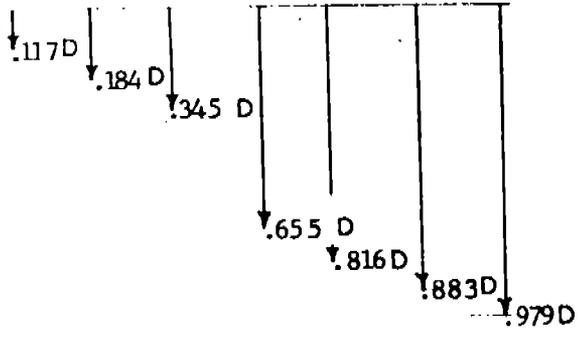
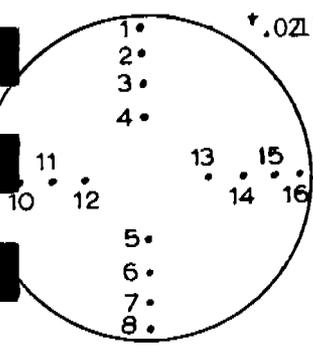
PITOT TUBE TRAVERSE  
CIRCULAR DUCT

Study Marina, Ag.  
 Station No. \_\_\_\_\_  
 Date 10/12/77  
 Hour 1505

Td 92 OF  
 Tw 63 OF  
 Pb 28.09 IN-HG  
~~28~~ 1.0746 MG/ft<sup>3</sup>

Location 320 ft from east limit cage for 2nd stage L.C. - north split stream Pipe Dia. 18

measured in 90° EL  
 cage area  $45\frac{1}{4} \times 120 = 37.7 \text{ ft}^2$



.021 D .378  
 .117 D 2.11  
 .184 D 3.31  
 .345 D 6.21  
 .655 D 11.79  
 .816 D 14.69  
 .883 D 15.89  
 .979 D 17.62

Traverse Point No.	Pv	Traverse Point No.	Pv
1	<del>.12</del> .17	9	0
2	.17	10	.21
3	.20	11	.34
4	.21	12	.34
5	.26	13	.18
6	.38	14	.13
7	.40	15	.14
8	.36	16	.16
		Pipe Center	.30

$V = 1934 \text{ ft/min}$   
 $Q = 3416 \text{ cfm}$

limit cage face velocity =  $\frac{3416}{37.7} = 91 \text{ ft/min}$

USED FOR PROGRAM

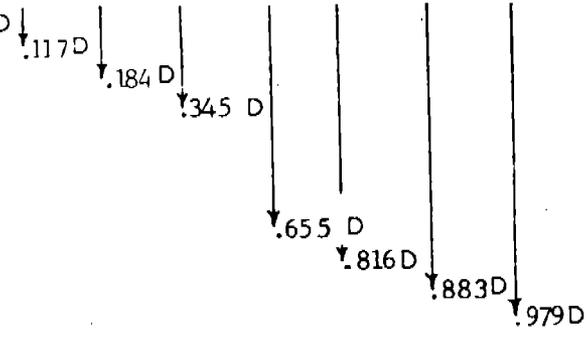
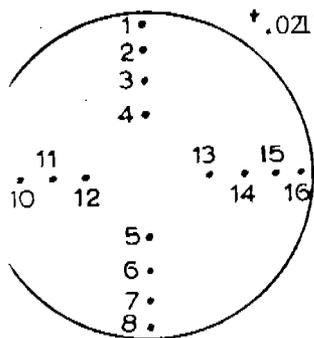
PITOT TUBE TRAVERSE  
CIRCULAR DUCT

Study mass flow  
 Station No. \_\_\_\_\_  
 Date 10/12/77  
 Hour 1515

$T_d$  91 °F  
 $T_w$  62 °F  
 $P_b$  28.09 IN-HG  
 $\rho = 1.0769$  kg/m<sup>3</sup>

Location 4th from east linkage for 1st stage L.C. south split stream Pipe Dia. 18

cross area =  $45 \frac{1}{4} \times 120 = 32.7$  ft<sup>2</sup>



- .021 D .378
- .117 D 2.11
- .184 D 3.31
- .345 D 6.21
- .655 D 11.79
- .816 D 14.69
- .883 D 15.89
- .979 D 17.62

Traverse Point No.	Pv	Traverse Point No.	Pv
1	.46	9	.49 <sup>49</sup>
2	.51	10	.63
3	.46	11	.59
4	.46	12	.53
5	.65	13	.60
6	.75	14	.70
7	.77	15	.73
8	.48	16	.35
		Pipe Center	.53

$V = 3184$  ft/min  
 $Q = 5622$  cfm

Est. core flow velocity =  $\frac{5622}{32.7} = 149$  ft/min

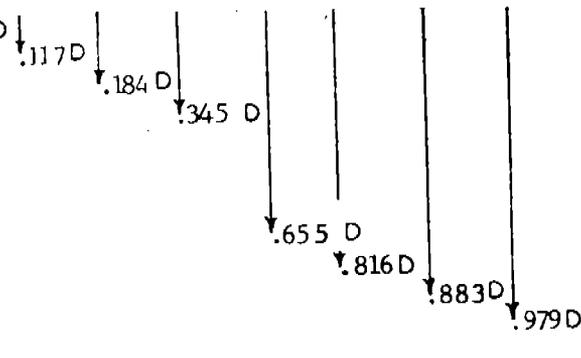
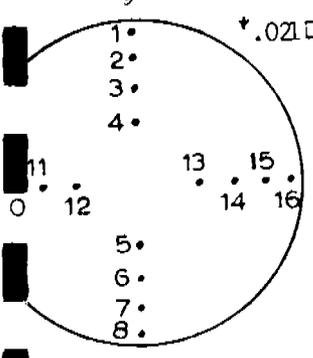
PITOT TUBE TRAVERSE  
CIRCULAR DUCT

Study mass flow  
 Station No. \_\_\_\_\_  
 Date 10/12/77  
 Hour 1525

T<sub>d</sub> 92 °F  
 T<sub>w</sub> 63 °F  
 P<sub>b</sub> 28.09 IN-HG  
KG/M<sup>3</sup> 1.0746 KG/M<sup>3</sup>

Location 5 from east  
limit cage for 1st stage L.C. - north of pt stream Pipe Dia. 18

measured in 90° sl.  
 Cage area =  $45\frac{1}{4} \times 120 = 37.7$  ft<sup>2</sup>



.021 D	<u>1.378</u>
.117 D	<u>2.11</u>
.184 D	<u>3.31</u>
.345 D	<u>6.21</u>
.655 D	<u>11.79</u>
.816 D	<u>14.69</u>
.883 D	<u>15.89</u>
.979 D	<u>17.62</u>

*TOP* (pointing to top of duct)  
*side* (pointing to side of duct)

Traverse Point No.	P <sub>v</sub>	Traverse Point No.	P <sub>v</sub>
1	<u>.16</u>	9	<u>.40</u>
2	<u>.29</u>	10	<u>.43</u>
3	<u>.34</u>	11	<u>.46</u>
4	<u>.46</u>	12	<u>.47</u>
5	<u>.75</u>	13	<u>.55</u>
6	<u>1.0</u>	14	<u>.55</u>
7	<u>1.1</u>	15	<u>.52</u>
8	<u>1.2</u>	16	<u>.51</u>
		Pipe Center	<u>.55</u>

$V = 3.119$  ft/min  
 $Q = 5508$  CFM

Cage face velocity =  $5508 / 37.7 = 146$  ft/min

CIRCULAR DUCT

Study Marana ay

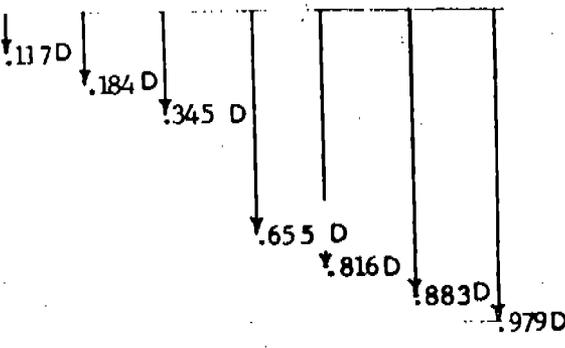
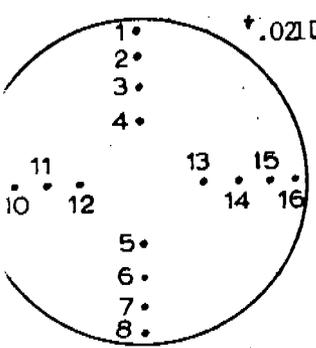
Lotton No. \_\_\_\_\_

Date 10/12/77

Hour 0935

North not, moss  
 Location lint cage underside (15 panels 81" x 12") (118 ft<sup>2</sup>) Pipe Dia. 42"

$T_d$  81 °F  
 $T_w$  61 °F  
 $P_b$  28.09 IN-Hg  
 $\rho = 1.0957 \text{ kg/m}^3$



42"  
 .021 D .38  
 .117 D 4.91  
 .184 D 7.73  
 .345 D 14.49  
 .655 D ~~34.27~~ 27.51  
 .816 D ~~37.09~~ 34.27  
 .883 D ~~41.12~~ 37.09  
 .979 D 41.12

*Ortale*

Traverse Point No.	Pv	Traverse Point No.	Pv
1	.46	9	<del>0.10</del> <i>fix up</i>
2	.48	10	.35
3	.49	11	.63
4	.42	12	.48
5	.40	13	.46
6	.44	14	.66
7	.47	15	.70 <i>fix up</i>
8	.37	16	.04 at 90°
		Pipe Center	.39

$V = 2600 \text{ ft/min}$

$Q = 24,992 \text{ cfm}$

lint cage face velocity =  $24992 / 118 = 212 \text{ ft/min}$

PITOT TUBE TRAVERSE  
CIRCULAR DUCT

Study normal way  
 Station No. \_\_\_\_\_

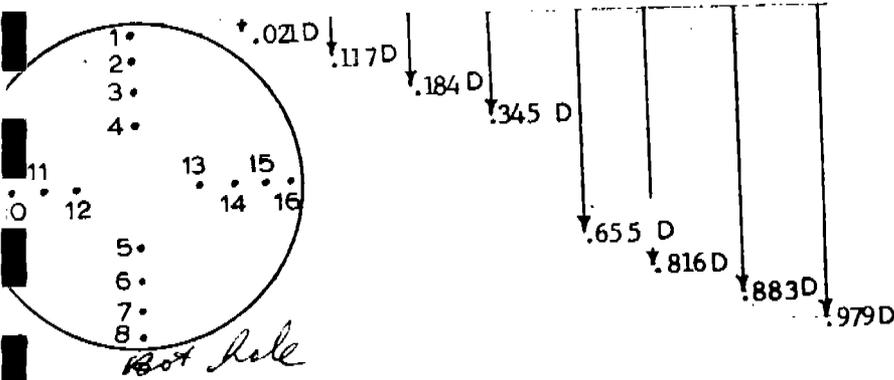
Date 10/12/77

Hour 0955

Location no. 2 main  
lint cage (15.5mils 93" x 14") (135.6 ft<sup>2</sup> area)

$T_d$  81 °F  
 $T_w$  61 °F  
 $P_b$  28.09 IN-H<sub>2</sub>O  
 $\rho = 1.0957 \text{ kg/m}^3$

Pipe Dia. 42"  
 .021 D .88  
 .117 D 4.91  
 .184 D 7.73  
 .345 D 14.49  
 .655 D 27.51  
 .816 D 34.27  
 .883 D 37.09  
 .979 D 41.12



from next (9)

Traverse Point No.	P <sub>v</sub>	Traverse Point No.	P <sub>v</sub>
1	.27	9	.28
2	.19	10	.32
3	.14	11	.27
4	.17	12	.18
5	.11	13	.23
6	.03	14	.29
7	"0"	15	.30
8	.05	16	.35
		Pipe Center	.13

$V = 1774 \text{ ft/min}$   
 $Q = 17,057 \text{ cfm}$

lint cage face velocity =  $17057 / 125 = 126 \text{ ft/min}$

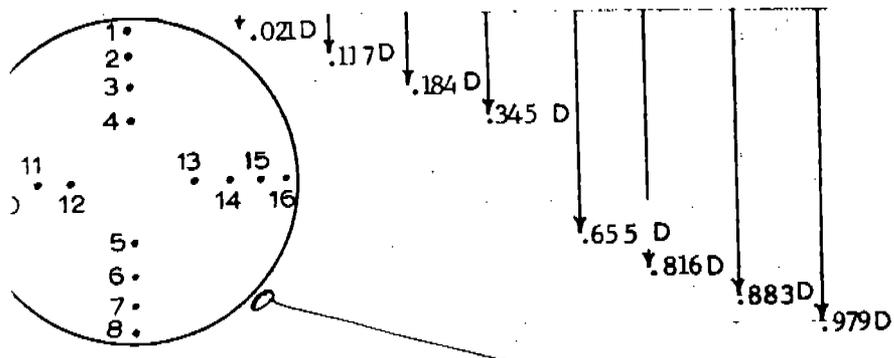
PITOT TUBE TRAVERSE  
CIRCULAR DUCT

Study Marana ay  
 Station No. \_\_\_\_\_  
 Date 10/12/77  
 Hour 10 10

$T_d$  81 °F  
 $T_w$  62 °F  
 $P_b$  28.09 IN-Hg  
 $\rho = 1.0952 \text{ kg/m}^3$

North press cond. ex  
 Location Int cage (30 panels 13" x 45 1/4") (122.6 ft<sup>2</sup>)  
Double unit

Pipe Dia. 52"  
 .021 D 1.09  
 .117 D 6.08  
 .184 D 9.57  
 .345 D 17.94  
 .655 D 34.06  
 .816 D 42.43  
 .883 D 45.92  
 .979 D 50.91



Traverse Point No.	Pv	Traverse Point No.	Pv
1	.03	9	.03
2	.04	10	.04
3	.035	11	.04
4	.035	12	.05
5	.05	13	.05
6	.06	14	.05
7	.065	15	.06
8	.07 at 48"	16	.06 at 48"
		Pipe Center	.045

$V = 910 \text{ ft/min}$   
 $Q = 13,409 \text{ cfm}$

Int cage face velocity =  $\frac{13409}{122.6} = 109 \text{ ft/min}$

Appendix F

High Volume Sampler Reference Procedures

and

Calibration Data



APPENDIX B—REFERENCE METHOD FOR THE DETERMINATION OF SUSPENDED PARTICULATES IN THE ATMOSPHERE (HIGH VOLUME METHOD)

1. Principle and Applicability.

1.1 Air is drawn into a covered housing and through a filter by means of a high-flow-rate blower at a flow rate (1.13 to 1.70 m.<sup>3</sup>/min.; 40 to 60 ft.<sup>3</sup>/min.) that allows suspended particles having diameters of less than 100  $\mu$ m. (Stokes equivalent diameter) to pass to the filter surface. (1) Particles within the size range of 100 to 0.1  $\mu$ m. diameter are ordinarily collected on glass fiber filters. The mass concentration of suspended particulates in the ambient air (ag./m.<sup>3</sup>) is computed by measuring the mass of collected particulates and the volume of air sampled.

1.2 This method is applicable to measurement of the mass concentration of suspended particulates in ambient air. The size of the sample collected is usually adequate for other analyses.

2. Range and Sensitivity.

2.1 When the sampler is operated at an average flow rate of 1.70 m.<sup>3</sup>/min. (60 ft.<sup>3</sup>/min.) for 24 hours, an adequate sample will be obtained even in an atmosphere having concentrations of suspended particulates as low as 1  $\mu$ g./m.<sup>3</sup>. If particulate levels are unusually high, a satisfactory sample may be obtained in 6 to 8 hours or less. For determination of average concentrations of suspended particulates in ambient air, a standard sampling period of 24 hours is recommended.

2.2 Weights are determined to the nearest milligram, airflow rates are determined to the nearest 0.03 m.<sup>3</sup>/min. (1.0 ft.<sup>3</sup>/min.), times are determined to the nearest 2 minutes, and mass concentrations are reported to the nearest microgram per cubic meter.

3. Interferences.

3.1 Particulate matter that is oily, such as photochemical smog or wood smoke, may block the filter and cause a rapid drop in airflow at a nonuniform rate. Dense fog or high humidity can cause the filter to become too wet and severely reduce the airflow through the filter.

3.2 Glass-fiber filters are comparatively insensitive to changes in relative humidity, but collected particulates can be hygroscopic. (2)

4. Precision, Accuracy, and Stability.

4.1 Based upon collaborative testing, the relative standard deviation (coefficient of variation) for single analyst variation (repeatability of the method) is 3.0 percent. The corresponding value for multilaboratory variation (reproducibility of the method) is 3.7 percent. (3)

4.2 The accuracy with which the sampler measures the true average concentration depends upon the constancy of the airflow rate through the sampler. The airflow rate is affected by the concentration and the nature of the dust in the atmosphere. Under these

conditions the error in the measured average concentration may be in excess of  $\pm 50$  percent of the true average concentration, depending on the amount of reduction of airflow rate and on the variation of the mass concentration of dust with time during the 24-hour sampling period. (4)

5. Apparatus.

5.1 Sampling.

5.1.1 *Sampler.* The sampler consists of three units: (1) the faceplate and gasket, (2) the filter adapter assembly, and (3) the motor unit. Figure B1 shows an exploded view of these parts, their relationship to each other, and how they are assembled. The sampler must be capable of passing environmental air through a 406.5 cm.<sup>3</sup> (63 in.<sup>3</sup>) portion of a clean 20.3 by 25.4 cm. (8- by 10-in.) glass-fiber filter at a rate of at least 1.70 m.<sup>3</sup>/min. (60 ft.<sup>3</sup>/min.). The motor must be capable of continuous operation for 24-hour periods with input voltages ranging from 110 to 120 volts, 50-60 cycles alternating current and must have third-wire safety ground. The housing for the motor unit may be of any convenient construction so long as the unit remains airtight and leak-free. The life of the sampler motor can be extended by lowering the voltage by about 10 percent with a small "buck or boost" transformer between the sampler and power outlet.

5.1.2 *Sampler Shelter.* It is important that the sampler be properly installed in a suitable shelter. The shelter is subjected to extremes of temperature, humidity, and all types of air pollutants. For these reasons the materials of the shelter must be chosen carefully. Properly painted exterior plywood or heavy gauge aluminum serve well. The sampler must be mounted vertically in the shelter so that the glass-fiber filter is parallel with the ground. The shelter must be provided with a roof so that the filter is protected from precipitation and debris. The internal arrangement and configuration of a suitable shelter with a gable roof are shown in Figure B2. The clearance area between the main housing and the roof at its closest point should be 680.5  $\pm$  193.5 cm.<sup>3</sup> (90  $\pm$  80 in.<sup>3</sup>). The main housing should be rectangular, with dimensions of about 29 by 35 cm. (11  $\frac{1}{2}$  by 14 in.).

5.1.3 *Rotameter.* Marked in arbitrary units, frequently 0 to 70, and capable of being calibrated. Other devices of at least comparable accuracy may be used.

5.1.4 *Orifice Calibration Unit.* Consisting of a metal tube 7.6 cm. (3 in.) ID and 15.9 cm. (6  $\frac{1}{4}$  in.) long with a static pressure tap 5.1 cm. (2 in.) from one end. See Figure B3. The tube end nearest the pressure tap is flanged to about 10.8 cm. (4  $\frac{1}{4}$  in.) OD with a male thread of the same size as the inlet end of the high-volume air sampler. A single metal plate 9.3 cm. (3  $\frac{1}{2}$  in.) in diameter and 0.24 cm. (  $\frac{3}{16}$  in.) thick with a central orifice 2.9 cm. (1  $\frac{1}{4}$  in.) in diameter is held in place at the air inlet end with a female threaded ring. The other end of the tube is flanged to

hold a loose female threaded coupling, which screws onto the inlet of the sampler. An 18-hole metal plate, an integral part of the unit, is positioned between the orifice and sampler to simulate the resistance of a clean glass-fiber filter. An orifice calibration unit is shown in Figure B3.

**5.1.5 Differential Manometer.** Capable of measuring to at least 40 cm. (16 in.) of water.

**5.1.6 Positive Displacement Meter.** Calibrated in cubic meters or cubic feet, to be used as a primary standard.

**5.1.7 Barometer.** Capable of measuring atmospheric pressure to the nearest mm.

### 5.2 Analysis.

**5.2.1 Filter Conditioning Environment.** Balance room or desiccator maintained at 15° to 85°C. and less than 50 percent relative humidity.

**5.2.2 Analytical Balance.** Equipped with a weighing chamber designed to handle unfolded 20.3 by 25.4 cm. (8- by 10-in.) filters and having a sensitivity of 0.1 mg.

**5.2.3 Light Source.** Frequently a table of the type used to view X-ray films.

**5.2.4 Numbering Device.** Capable of printing identification numbers on the filters.

### 6. Reagents.

**6.1 Filter Media.** Glass-fiber filters having a collection efficiency of at least 99 percent for particles of 0.3  $\mu$ m diameter, as measured by the DOP test, are suitable for the quantitative measurement of concentrations of suspended particulates, (5) although some other medium, such as paper, may be desirable for some analyses. If a more detailed analysis is contemplated, care must be exercised to use filters that contain low background concentrations of the pollutant being investigated. Careful quality control is required to determine background values of these pollutants.

### 7. Procedure.

#### 7.1 Sampling.

**7.1.1 Filter Preparation.** Expose each filter to the light source and inspect for pinholes, particles, or other imperfections. Filters with visible imperfections should not be used. A small brush is useful for removing particles. Equilibrate the filters in the filter conditioning environment for 24 hours. Weigh the filters to the nearest milligram; record tare weight and filter identification number. Do not bend or fold the filter before collection of the sample.

**7.1.2 Sample Collection.** Open the shelter, loosen the wing nuts, and remove the faceplate from the filter holder. Install a numbered, preweighed, glass-fiber filter in position (rough side up), replace the faceplate without disturbing the filter, and fasten securely. Undertightening will allow air leakage, overtightening will damage the sponge-rubber faceplate gasket. A very light application of talcum powder may be used on the sponge-rubber faceplate gasket to prevent the filter from sticking. During inclement weather the sampler may be removed to a protected area for filter change. Close the roof of the shelter, run the sampler for about

6 minutes, connect the rotameter to the nipple on the back of the sampler, and read the rotameter ball with rotameter in a vertical position. Estimate to the nearest whole number. If the ball is fluctuating rapidly, tip the rotameter and slowly straighten it until the ball gives a constant reading. Disconnect the rotameter from the nipple; record the initial rotameter reading and the starting time and date on the filter folder. (The rotameter should never be connected to the sampler except when the flow is being measured.) Sample for 24 hours from midnight to midnight and take a final rotameter reading. Record the final rotameter reading and ending time and date on the filter folder. Remove the faceplate as described above and carefully remove the filter from the holder, touching only the outer edges. Fold the filter lengthwise so that only surfaces with collected particulates are in contact, and place in a manila folder. Record on the folder the filter number, location, and any other factors, such as meteorological conditions or razing of nearby buildings, that might affect the results. If the sample is defective, void it at this time. In order to obtain a valid sample, the high-volume sampler must be operated with the same rotameter and tubing that were used during its calibration.

**7.2 Analysis.** Equilibrate the exposed filters for 24 hours in the filter conditioning environment, then reweigh. After they are weighed, the filters may be saved for detailed chemical analysis.

#### 7.3 Maintenance.

**7.3.1 Sampler Motor.** Replace brushes before they are worn to the point where motor damage can occur.

**7.3.2 Faceplate Gasket.** Replace when the margins of samples are no longer sharp. The gasket may be sealed to the faceplate with rubber cement or double-sided adhesive tape.

**7.3.3 Rotameter.** Clean as required, using alcohol.

### 8. Calibration.

**8.1 Purpose.** Since only a small portion of the total air sampled passes through the rotameter during measurement, the rotameter must be calibrated against actual airflow with the orifice calibration unit. Before the orifice calibration unit can be used to calibrate the rotameter, the orifice calibration unit itself must be calibrated against the positive displacement primary standard.

**8.1.1 Orifice Calibration Unit.** Attach the orifice calibration unit to the intake end of the positive displacement primary standard and attach a high-volume motor blower unit to the exhaust end of the primary standard. Connect one end of a differential manometer to the differential pressure tap of the orifice calibration unit and leave the other end open to the atmosphere. Operate the high-volume motor blower unit so that a series of different, but constant, airflows (usually six) are obtained for definite time periods. Record the reading on the differential manometer at each airflow. The different constant airflows are obtained by placing a

series of loadplates, one at a time, between the calibration unit and the primary standard. Placing the orifice before the inlet reduces the pressure at the inlet of the primary standard below atmospheric; therefore, a correction must be made for the increase in volume caused by this decreased inlet pressure. Attach one end of a second differential manometer to an inlet pressure tap of the primary standard and leave the other open to the atmosphere. During each of the constant airflow measurements made above, measure the true inlet pressure of the primary standard with this second differential manometer. Measure atmospheric pressure and temperature. Correct the measured air volume to true air volume as directed in 9.1.1, then obtain true airflow rate,  $Q$ , as directed in 9.1.3. Plot the differential manometer readings of the orifice unit versus  $Q$ .

8.1.2 *High-Volume Sampler.* Assemble a high-volume sampler with a clean filter in place and run for at least 5 minutes. Attach a rotameter, read the ball, adjust so that the ball reads 65, and seal the adjusting mechanism so that it cannot be changed easily. Shut off motor, remove the filter, and attach the orifice calibration unit in its place. Operate the high-volume sampler at a series of different, but constant, airflows (usually six). Record the reading of the differential manometer on the orifice calibration unit, and record the readings of the rotameter at each flow. Measure atmospheric pressure and temperature. Convert the differential manometer reading to  $m^3/min.$ ,  $Q$ , then plot rotameter reading versus  $Q$ .

8.1.3 *Correction for Differences in Pressure or Temperature.* See Addendum B.

### 9. Calculations.

#### 9.1 Calibration of Orifice.

9.1.1 *True Air Volume.* Calculate the air volume measured by the positive displacement primary standard.

$$V_a = \frac{(P_a - P_m)}{P_a} (V_m)$$

$V_a$  = True air volume at atmospheric pressure,  $m^3$

$P_a$  = Barometric pressure, mm. Hg.

$P_m$  = Pressure drop at inlet of primary standard, mm. Hg.

$V_m$  = Volume measured by primary standard,  $m^3$

#### 9.1.2 Conversion Factors.

Inches Hg.  $\times 25.4$  = mm. Hg.

Inches water  $\times 73.48 \times 10^{-3}$  = inches Hg.

Cubic feet air  $\times 0.0284$  = cubic meters air.

#### 9.1.3 True Airflow Rate.

$$Q = \frac{V_a}{T}$$

$Q$  = Flow rate,  $m^3/min.$

$T$  = Time of flow, min.

#### 9.2 Sample Volume.

9.2.1 *Volume Conversion.* Convert the initial and final rotameter readings to true airflow rate,  $Q$ , using calibration curve of 8.1.2.

#### 9.2.2 Calculate volume of air sampled

$$V = \frac{Q_1 Q_2}{2} \times T$$

$V$  = Air volume sampled,  $m^3$

$Q_1$  = Initial airflow rate,  $m^3/min.$

$Q_2$  = Final airflow rate,  $m^3/min.$

$T$  = Sampling time, min.

#### 9.3 Calculate mass concentration of suspended particulates

$$S.P. = \frac{(W_1 - W_2) \times 10^6}{V}$$

S.P. = Mass concentration of suspended particulates,  $\mu g/m^3$

$W_1$  = Initial weight of filter, g.

$W_2$  = Final weight of filter, g.

$V$  = Air volume sampled,  $m^3$

$10^6$  = Conversion of g. to  $\mu g.$

### 10. References.

- (1) Robson, O. D., and Foster, K. E., "Evaluation of Air Particulate Sampling Equipment", *Am. Ind. Hyg. Assoc. J.* 24, 404 (1962).
- (2) Tierney, G. P., and Conner, W. D., "Hygroscopic Effects on Weight Determinations of Particulates Collected on Glass-Fiber Filters", *Am. Ind. Hyg. Assoc. J.* 28, 363 (1967).
- (3) Unpublished data based on a collaborative test involving 12 participants, conducted under the direction of the Methods Standardization Services Section of the National Air Pollution Control Administration, October, 1970.
- (4) Harrison, W. K., Nader, J. S., and Fugman, F. S., "Constant Flow Regulators for High-Volume Air Sampler", *Am. Ind. Hyg. Assoc. J.* 21, 114-120 (1960).
- (5) Pate, J. B., and Tabor, E. C., "Analytical Aspects of the Use of Glass-Fiber Filters for the Collection and Analysis of Atmospheric Particulate Matter", *Am. Ind. Hyg. Assoc. J.* 23, 144-150 (1962).

### ADDENDA

#### A. Alternative Equipment.

A modification of the high-volume sampler incorporating a method for recording the actual airflow over the entire sampling period has been described, and is acceptable for measuring the concentration of suspended particulates (Henderson, J. S., Eighth Conference on Methods in Air Pollution and Industrial Hygiene Studies, 1967, Oakland,

Calif.). This modification consists of an exhaust orifice meter assembly connected through a transducer to a system for continuously recording airflow on a circular chart. The volume of air sampled is calculated by the following equation:

$$V=Q \times T.$$

Q=Average sampling rate, m.<sup>3</sup>/min.

T=Sampling time, minutes.

The average sampling rate, Q, is determined from the recorder chart by estimation if the flow rate does not vary more than 0.11 m.<sup>3</sup>/min. (4 ft.<sup>3</sup>/min.) during the sampling period. If the flow rate does vary more than 0.11 m.<sup>3</sup> (4 ft.<sup>3</sup>/min.) during the sampling period, read the flow rate from the chart at 2-hour intervals and take the average.

#### B. Pressure and Temperature Corrections.

If the pressure or temperature during high-volume sampler calibration is substantially different from the pressure or temperature during orifice calibration, a correction of the flow rate, Q, may be required. If the pressures differ by no more than 15 percent and the temperatures differ by no more than 100 percent (°C), the error in the un-

corrected flow rate will be no more than 15 percent. If necessary, obtain the corrected flow rate as directed below. This correction applies only to orifice meters having a constant orifice coefficient. The coefficient for the calibrating orifice described in 5.1.4 has been shown experimentally to be constant over the normal operating range of the high-volume sampler (0.6 to 2.2 m.<sup>3</sup>/min.; 20 to 78 ft.<sup>3</sup>/min.). Calculate corrected flow rate:

$$Q_2=Q_1 \left[ \frac{T_2 P_1}{T_1 P_2} \right]^{1/2}$$

Q<sub>2</sub>=Corrected flow rate, m.<sup>3</sup>/min.

Q<sub>1</sub>=Flow rate during high-volume sampler calibration (Section 8.1.2), m.<sup>3</sup>/min.

T<sub>1</sub>=Absolute temperature during orifice unit calibration (Section 8.1.1), °K or °R.

P<sub>1</sub>=Barometric pressure during orifice unit calibration (Section 8.1.1), mm. Hg.

T<sub>2</sub>=Absolute temperature during high-volume sampler calibration (Section 8.1.2), °K or °R.

P<sub>2</sub>=Barometric pressure during high-volume sampler calibration (Section 8.1.2), mm. Hg.

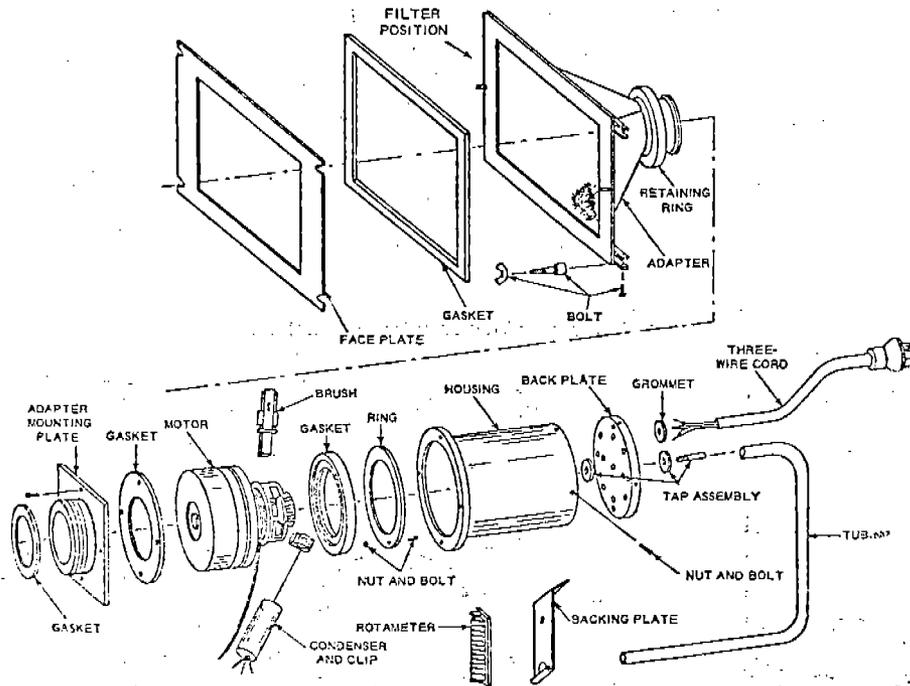


Figure 81. Exploded view of typical high-volume air sampler parts.

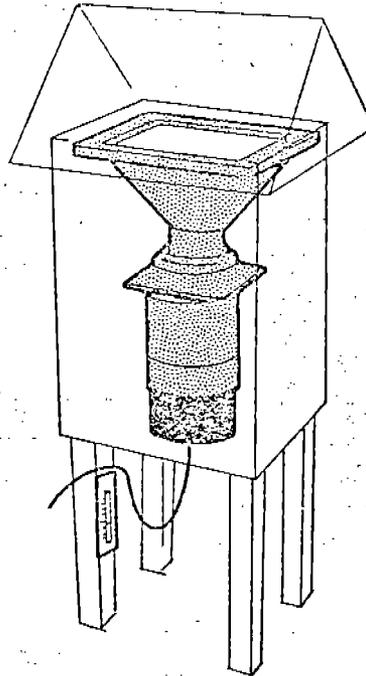


Figure B2. Assembled sampler and shelter.

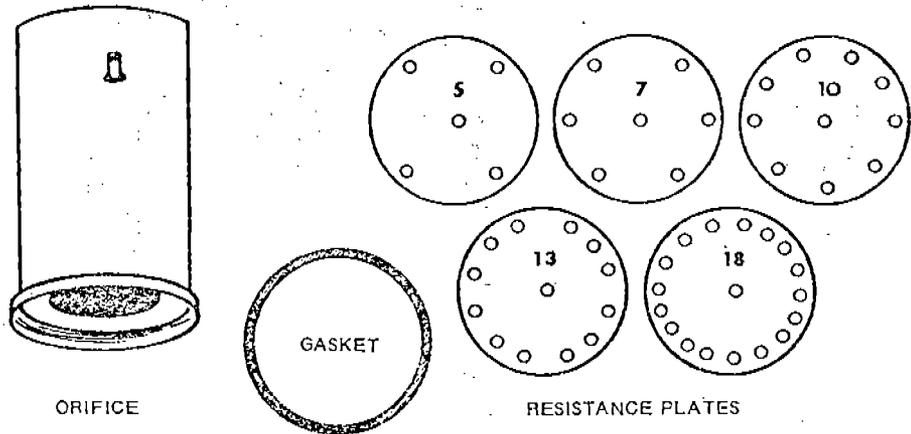


Figure B3. Orifice calibration unit.

ORIFICE CALIBRATION

Orifice Calibration Unit Number 10584

Roots Meter Number 7507-303

Laboratory Temperature 24.5 °C Pressure 752.6 mmHg

Motor Number 11383 Voltage 115 vac

DATE 8/11/77 OPERATOR R. J. Snyder

Verified by \_\_\_\_\_

Plate No.	Volume of Air Passed		Time of Total Airflow (min.)	Manometer Reading on Primary Standard		Manometer Reading on Orifice		True Air Flow Rate (m <sup>3</sup> /min.)
	ft <sup>3</sup>	m <sup>3</sup>		inches of H <sub>2</sub> O	mm. Hg	inches of H <sub>2</sub> O	mm. Hg	
18		5	2.59	24.2	45.2	12.18	1.81	
13		5	2.86	29.5	55.1	10.04	1.62	
10		5	3.12	35.1	65.5	8.04	1.46	
7		5	3.75	43.2	80.6	5.38	1.19	
5		5	4.665	50.4	94.1	3.31	0.94	

ORIFICE CALIBRATION CURVE

ORIFICE # 10584 ROOTSMETER # 7507303 DATE 8/11/77  
 TEMP. 24.5 °C BAROMETER 752.6 mm Hg  
 VOLTS 115 AC  
 NAME R. J. Snyder

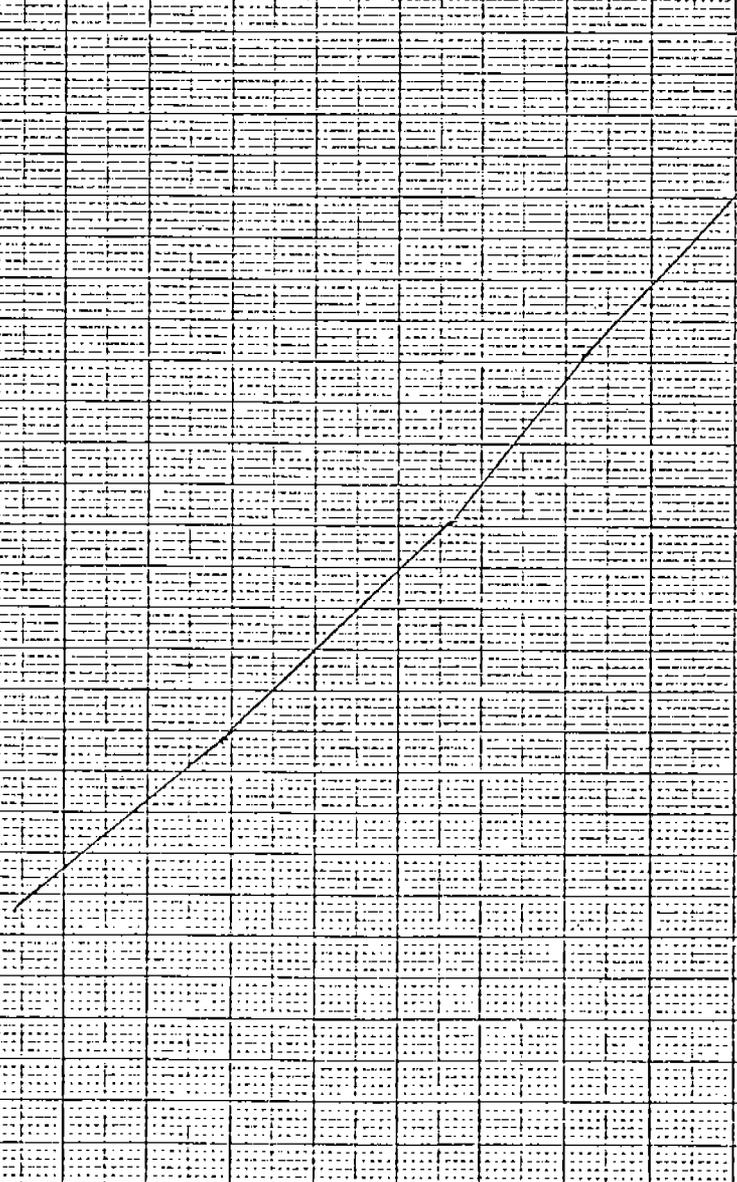
46 1320

K<sub>o</sub>E  
 10 X 10 TO 1/8 INCH 7 X 10 INCHES  
 KEUFFEL & ESSER CO. MADE IN U.S.A.

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0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0  
 m<sup>3</sup>/min.



HiVol Flow DATA  
PRODUCERS Cotton Oil Co.

TC	STATION	NIvOL	FILTER #	Total Flow m <sup>3</sup> /
1/77	2203	42	1040401	895.1
	2203	42	1040404	899.2
	2203	42	1040409	4578
	2203	42	1040412	1146.4
	2203	42	1040420	78.1
	2203	42	1040416	761.4
	2203	42	1040417	1756.9
	2203	42	1040419	779.3
	2203	42	1040422	1042.9
	2201	41	1040423	1770.3
	2301	42	1040424	1752.3
	2300	41	1040425	1560.5
	2301	42	1040429	1971.3
	2310	41	1040437	1552.6
	2301	42	1040442	1771.6

COMPUTED 1/5/78  
BX *Reynold J. [Signature]*

Appendix G

Cotton Gin Production Data



TABLE H-1  
 PROCESS DATA  
 PRODUCERS COTTON OIL CO. \*  
 MARATHA, AR.  
 11/5-16/77

SHORT STAPLE GIN

TOTAL TRASH SEED LINT BALES Bales  
 COTTON per hour

(Lb) Kg (Lb) Kg Lb Kg Lb Kg #

11/5/77	(225,130) 102,208	(37,216) 16,896	(137,914) 61,312	(75,657) 34,125	154	6.8
11/6/77	(243,160) 110,712	(42,353) 19,451	(201,807) 91,862	(20,506) 9,284	167	7.4
11/7/77	(289,620) 131,519	(53,056) 24,011	(236,564) 107,508	(92,252) 41,882	191	8.5
11/8/77	(192,200) 87,111	(11,762) 5,331	(180,438) 81,780	(9,783) 4,451	40	—
11/9/77	(316,380) 143,436	(59,768) 27,055	(256,612) 116,381	(104,564) 47,472	217	9.6
11/10/77	(277,525) 125,076	(46,238) 20,972	(231,287) 104,104	(100,514) 45,633	211	9.4
11/11/77	(307,410) 139,549	(49,153) 22,342	(258,257) 117,207	(103,302) 46,877	214	9.5
11/12/77	(288,720) 129,809	(41,383) 18,758	(247,337) 111,051	(87,334) 39,688	202	9.0
11/13/77	(296,770) 134,734	(51,200) 23,345	(245,570) 111,389	(88,139) 39,755	200	8.9

LONG STAPLE GIN

11/12/77	(312,100) 141,169	(57,657) 26,117	(254,443) 115,052	(9,178) 4,161	22	2.0
11/13/77	(418,200) 189,782	(99,900) 45,308	(318,300) 144,474	(5,522) 2,510	33	2.9
11/14/77	(117,230) 53,510	(20,802) 9,434	(96,428) 44,076	(39,551) 17,838	85	3.8
11/15/77	(149,719) 68,008	(17,149) 7,808	(132,570) 60,200	(66,789) 30,200	80	3.6
11/16/77	(100,189) 45,281	(14,350) 6,515	(85,839) 38,766	(8,420) 3,816	77	3.4

\* DATA FROM GIN PRODUCTION DATA SUMMARY



Appendix H

Agricultural Research Service Trash Analysis  
Analytical Procedure and Data





AGRICULTURAL  
RESEARCH  
SERVICE

WESTERN  
REGION

OF UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

Southwestern Cotton Ginning  
Research Laboratory  
Box 578  
Mesilla Park, New Mexico 88047

December 20, 1977

Environmental Protection Agency  
Office of Enforcement  
National Enforcement Investigations Center  
Building 53, Box 25227, Denver Federal Center  
Denver, CO 80225

Attention: Mr. Paul dePercin

Enclosed are two copies of the fractionation results from the Marana gins. We normally publish total percent trash based on original weight, although I prefer percent on clean base. The hulls, sticks, and motes are separated from the sample by hand and with the aid of a 6-mesh screen in the exhaust. The fines are air washed (for one minute with 60 p.s.i. compressed air) from the agitated sample and collected on a 200-mesh screen (74-micron openings) in the exhaust. Two photographs of the fractionator are also included. I am very interested in the results of the testing of the Marana gins and hope to get preliminary results from you as soon as you have had time to look at the data.

Sincerely,

*M. N. Gillum*

M. N. Gillum  
Agricultural Engineer

3 Enclosures



BAS12 READY

>RUN

PROGRAM 'FRAC' TO REDUCE FRACTIONATION DATA...

INPUT SAMPLE TYPE, I.E. WAGON, FEEDER

?WAGON, UPLAND, EPA, SAW GIN, MARANA

INPUT COTTON #, # OF TREATMENTS TO BE RUN, AND SAMPLES/TREATMENT

?7718, 1, 4

ENTER DATA IN ORDER OF TREAT, HULLS

STICKS, NOTES, FINE, AND CLEAN SAMPLE WEIGHT

4 LINES OF DATA REQUIRED; OMIT TOTAL TRASH WEIGHT

?248, 5.3, 1.3, .6, 15.3, 224

C?252, 2.9, 3.7, 1.8, 19.1, 231

C?391, 4.7, 1.4, 2.6, 22, 367

C?324, 5.6, 2, 3.7, 27.2, 295

C

RAW FRACTIONATION DATA FOR COTTON NUMBER 7718

WAGON, UPLAND, EPA, SAW GIN, MARANA

	1	2	3	4	5	6	7
1	1.1	248 ✓	5.3 ✓	1.3 ✓	.6 ✓	15.3 ✓	224 ✓
2	1.2	252 ✓	2.9 ✓	3.7 ✓	1.8 ✓	19.1 ✓	231 ✓
3	1.3	391 ✓	4.7 ✓	1.4 ✓	2.6 ✓	22 ✓	367 ✓
4	1.4	324 ✓	5.6 ✓	2 ✓	3.7	27.2 ✓	295 ✓

TO REPRINT RAW DATA -1,...

FOR END EDIT .....

TO EDIT RAW DATA:

INPUT LINE NO, COLUMN NO, AND NEW DATA

?.....

EDIT ENDED

PERCENTS BASED ON ORIGINAL WT FOR COTTON 7718

WAGON, UPLAND, EPA, SAW GIN, MARANA

TREAT	HULLS	STICKS	MOTES	FINE	TOTAL
1	2.14	.52	.24	6.17	9.07
1	1.15	1.47	.71	7.53	10.91
1	1.2	.36	.66	5.63	7.85
1	1.73	.62	1.14	3.4	11.83
AVE	1.52	.69	.72	6.88	9.81

PERCENTS BASED ON CLEANED WT FOR COTTON 7718

WAGON, UPLAND, EPA, SAW GIN, MARANA

TREAT	HULLS	STICKS	MOTES	FINE	TOTAL
1	2.37	.58	.27	6.83	10.04
1	1.36	1.6	.78	3.27	11.9
1	1.27	.38	.71	5.99	8.37
1	1.9	.63	1.25	9.22	13.05
AVE	1.66	.75	.78	7.48	10.67



BASIC READY

>RUN

PROGRAM 'FRAC' TO REDUCE FRACTIONATION DATA...

INPUT SAMPLE TYPE, I.E. WAGON, FEEDER

WAGON, DINA, EPA, HAPANA ROLLER GIN

INPUT COTTON #, # OF TREATMENTS TO BE RUN, AND SAMPLES/TREATMENT

27713, 1, 5

ENTER DATA IN ORDER OF TREAT, HULLS

STICKS, NOTES, FINE, AND CLEAN SAMPLE WEIGHT

5 LINES OF DATA REQUIRED; OMIT TOTAL TRASH WEIGHT

2364, 2.2, 4.2, 1.2, 25.4, 322

2321, 5.2, 2.3, .4, 13.4, 231

2322, 2.2, 2.3, .4, 25.5, 238

2327, 4.3, 1.9, .5, 24.7, 334

2342, 3.1, 3.1, .4, 24.3, 375

C

RAW FRACTIONATION DATA FOR COTTON NUMBER 7713

WAGON, DINA, EPA, HAPANA ROLLER GIN

	1	2	3	4	5	6	7
1	1.1	364 ✓	2.2 ✓	4.2 ✓	1.2 ✓	25.4 ✓	322 ✓
2	1.2	210 ✓	5.2 ✓	2.8 ✓	.4 ✓	13.4 ✓	231 ✓
3	1.3	202 ✓	2.2 ✓	2.3 ✓	.4 ✓	25.5 ✓	238 ✓
4	1.4	357 ✓	4.3 ✓	1.9 ✓	.5 ✓	24.7 ✓	334 ✓
5	1.5	412 ✓	3.1 ✓	3.1 ✓	.4 ✓	24.3 ✓	375 ✓

TO PRINT RAW DATA -1...

FOR END EDIT .....

TO EDIT RAW DATA:

INPUT LINE NO, COLUMN NO, AND NEW DATA

.....

EDIT SWELL

PERCENTS BASED ON ORIGINAL WT FOR COTTON 7718

WAGON, PIMA, EPA, MARANA ROLLER GIN

TREAT	HULLS	STICKS	MOTES	FINE	TOTAL
1	2.45	1.15	.33	6.98	10.91
1	1.9	.9	.13	5.94	8.87
1	2.8	.7	.12	7.77	11.4
1	1.17	.52	.14	6.73	8.56
1	1.97	.75	.1	5.9	8.71
AVE	2.04	.8	.16	6.64	9.65

PERCENTS BASED ON CLEANED WT FOR COTTON 7718

WAGON, PIMA, EPA, MARANA ROLLER GIN

TREAT	HULLS	STICKS	MOTES	FINE	TOTAL
1	2.76	1.3	.37	7.89	12.33
1	2.1	1	.14	6.55	9.79
1	3.19	.8	.14	8.85	12.99
1	1.29	.57	.15	7.4	9.4
1	2.15	.83	.11	6.43	9.57
AVE	2.23	.89	.18	7.39	10.74



Appendix I

Chain-of-Custody Procedures and Records

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## Chain-of-Custody Procedures

All samples collected by the Aerotherm HVSS, the Radar HV and the HiVol samplers were handled by the chain-of-custody procedures in this appendix. The samples of seed cotton taken from the wagons, however, were not. The cotton samples were given to ARS personnel, and not maintained under these procedures.

ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER

CHAIN OF CUSTODY PROCEDURES  
June 1, 1975

GENERAL

The evidence gathering portion of a survey should be characterized by the minimum number of samples required to give a fair representation of the water, air or solid waste sampled. To the extent possible, the quantity of samples and sample locations will be determined prior to the survey.

Chain of Custody procedures must be followed to maintain the documentation necessary to trace sample possession from the time taken until the evidence is introduced into court. A sample is in your "custody" if:

1. It is in your actual physical possession, or
2. It is in your view, after being in your physical possession, or
3. It was in your physical possession and then you locked it up in a manner so that no one could tamper with it.

All survey participants will receive a copy of the survey study plan and will be knowledgeable of its contents prior to the survey. A pre-survey briefing will be held to re-appraise all participants of the survey objectives, sample locations and Chain of Custody procedures. After all Chain of Custody samples are collected, a de-briefing will be held in the field to determine adherence to Chain of Custody procedures and whether additional evidence type samples are required.

SAMPLE COLLECTION

1. To the maximum extent achievable, as few people as possible should handle the sample.
2. Water, air, or solid waste samples shall be obtained, using standard field sampling techniques.
3. Sample tags (Exhibit I) shall be securely attached to the sample container at the time the complete sample is collected and shall contain, at a minimum, the following information: station number, station location, data taken, time taken, type of sample, sequence number (first sample of the day - sequence No. 1, second sample - sequence No. 2, etc.), analyses required and samplers. The tags must be legibly filled out in ballpoint (waterproof ink).
4. Blank samples shall also be taken with preservatives which will be analyzed by the laboratory to exclude the possibility of container or preservative contamination.
5. A pre-printed, bound Field Data Record logbook shall be maintained to record field measurements and other pertinent information necessary to refresh the sampler's memory in the event he later takes the stand to testify regarding his actions during the evidence gathering activity. A separate set of field notebooks shall be maintained for each survey and stored in a safe place where they could be protected and accounted for at all times. Standard formats (Exhibits II and III) have been established to minimize field entries and include the date, time, survey, type of samples taken, volume of each sample, type of analysis, sample numbers, preservatives, sample location and field measurements such as temperature, conductivity,

DO, pH, flow and any other pertinent information or observations. The entries shall be signed by the field sampler. The preparation and conservation of the field logbooks during the survey will be the responsibility of the survey coordinator. Once the survey is complete, field logs will be retained by the survey coordinator, or his designated representative, as a part of the permanent record.

6. The field sampler is responsible for the care and custody of the samples collected until properly dispatched to the receiving laboratory or turned over to an assigned custodian. He must assure that each container is in his physical possession or in his view at all times, or locked in such a place and manner that no one can tamper with it.
7. Colored slides or photographs should be taken which would visually show the outfall sample location and any water pollution to substantiate any conclusions of the investigation. Written documentation on the back of the photo should include the signature of the photographer, time, date and site location. Photographs of this nature, which may be used as evidence, shall be handled recognizing Chain of Custody procedures to prevent alteration.

#### TRANSFER OF CUSTODY AND SHIPMENT

1. Samples will be accompanied by a Chain of Custody Record which includes the name of the survey, samplers' signatures, station number, station location, date, time, type of sample, sequence number, number of containers and analyses required (Fig. IV). When turning over the possession of samples, the transferor and transferee will sign, date and time the sheet. This record sheet allows transfer of custody of a group of samples in the field, to the mobile laboratory or when samples are dispatched to the NEIC - Denver laboratory. When transferring a portion of the samples identified on the sheet to the field mobile laboratory, the individual samples must be noted in the column with the signature of the person relinquishing the samples. The field laboratory person receiving the samples will acknowledge receipt by signing in the appropriate column.
2. The field custodian or field sampler, if a custodian has not been assigned, will have the responsibility of properly packaging and dispatching samples to the proper laboratory for analysis. The "Dispatch" portion of the "Chain of Custody Record shall be properly filled out, dated, and signed.
3. Samples will be properly packed in shipment containers such as ice chests, to avoid breakage. The shipping containers will be padlocked for shipment to the receiving laboratory.
4. All packages will be accompanied by the Chain of Custody Record showing identification of the contents. The original will accompany the shipment, and a copy will be retained by the survey coordinator.
5. If sent by mail, register the package with return receipt requested. If sent by common carrier, a Government Bill of Lading should be obtained. Receipts from post offices, and bills of lading will be retained as part of the permanent Chain of Custody documentation.
6. If samples are delivered to the laboratory when appropriate personnel are not there to receive them, the samples must be locked in a designated area within the laboratory in a manner so that no one can tamper with them. The same person must then return to the laboratory and unlock the samples and deliver custody to the appropriate custodian.

LABORATORY CUSTODY PROCEDURES

1. The laboratory shall designate a "sample custodian." An alternate will be designated in his absence. In addition, the laboratory shall set aside a "sample storage security area." This should be a clean, dry, isolated room which can be securely locked from the outside.
2. All samples should be handled by the minimum possible number of persons.
3. All incoming samples shall be received only by the custodian, who will indicate receipt by signing the Chain of Custody Sheet accompanying the samples and retaining the sheet as permanent records. Couriers picking up samples at the airport, post office, etc. shall sign jointly with the laboratory custodian.
4. Immediately upon receipt, the custodian will place the sample in the sample room, which will be locked at all times except when samples are removed or replaced by the custodian. To the maximum extent possible, only the custodian should be permitted in the sample room.
5. The custodian shall ensure that heat-sensitive or light-sensitive samples, or other sample materials having unusual physical characteristics, or requiring special handling, are properly stored and maintained.
6. Only the custodian will distribute samples to personnel who are to perform tests.
7. The analyst will record in his laboratory notebook or analytical worksheet, identifying information describing the sample, the procedures performed and the results of the testing. The notes shall be dated and indicate who performed the tests. The notes shall be retained as a permanent record in the laboratory and should note any abnormalities which occurred during the testing procedure. In the event that the person who performed the tests is not available as a witness at time of trial, the government may be able to introduce the notes in evidence under the Federal Business Records Act.
8. Standard methods of laboratory analyses shall be used as described in the "Guidelines Establishing Test Procedures for Analysis of Pollutants," 38 F.R. 28758, October 16, 1973. If laboratory personnel deviate from standard procedures, they should be prepared to justify their decision during cross-examination.
9. Laboratory personnel are responsible for the care and custody of the sample once it is handed over to them and should be prepared to testify that the sample was in their possession and view or secured in the laboratory at all times from the moment it was received from the custodian until the tests were run.
10. Once the sample testing is completed, the unused portion of the sample together with all identifying tags and laboratory records, should be returned to the custodian. The returned tagged sample will be retained in the sample room until it is required for trial. Strip charts and other documentation of work will also be turned over to the custodian.
11. Samples, tags and laboratory records of tests may be destroyed only upon the order of the laboratory director, who will first confer with the Chief, Enforcement Specialist Office, to make certain that the information is no longer required or the samples have deteriorated.

EXHIBIT I

\* ORO 10/27/77

EPA, NATIONAL ENFORCEMENT INVESTIGATIONS CENTER

Station No.	Date	Time	Sequence No.
Station Location			<input type="checkbox"/> Grab <input type="checkbox"/> Comp.
<input type="checkbox"/> BOD	<input type="checkbox"/> Metals	Remarks/Preservative:	
<input type="checkbox"/> Solids	<input type="checkbox"/> Oil and Grease		
<input type="checkbox"/> COD	<input type="checkbox"/> D.O.		
<input type="checkbox"/> Nutrients	<input type="checkbox"/> Bact.		
	<input type="checkbox"/> Other		
Samplers:			

Front

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 Building 53, Box 25227, Denver Federal Center  
 Denver, Colorado 80225

**CHAIN OF CUSTODY RECORD**

SURVEY				SAMPLERS: (Signature)					
<i>Immuna St. Brown, Ar.</i>				<i>P. de Leon</i> <i>BRIAN RAGONE</i> <i>UTAH HADY</i> <i>STEVE NEMCE</i>					
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
				Water		Air			
				Comp.	Grab.				
2211	cyclone	11/4/77	1500			X	1	1	PART. ACETONE WASH
2211	cyclone	11/4/77	1400			X	1	1	PART. FILTER #131
2211	ACETONE BLANK	11/4/77	1500			X	1	1	PART.
2202	LIT CAGE	11/4/77	0920			X	1	1	PART. FILTER #403
2202	LIT CAGE	11/4/77	1320			X	2	1	PART. FILTER #403
2202	LIT CAGE	11/4/77	1514			X	3	1	PART. FILTER #405
2211	CYCLONE	11/5/77	1230			X	2	1	PART. ACETONE WASH
2211	CYCLONE	11/5/77	1230			X	2	1	PART. FILTER #102
2211	CYCLONE	11/5/77	1345			X	3	1	PART. ACETONE WASH
2211	CYCLONE	11/5/77	1345			X	3	1	PART. FILTER #102
2211	CYCLONE	11/5/77	1534			X	4	1	PART. ACETONE WASH
2211	CYCLONE	11/5/77	1534			X	4	1	PART. FILTER #104
Relinquished by: (Signature)				Received by: (Signature)				Date/Time	
<i>P. de Leon</i>				<i>W.E. Stager</i>				11/5/77 1100	
Relinquished by: (Signature)				Received by: (Signature)				Date/Time	
Relinquished by: (Signature)				Received by: (Signature)				Date/Time	
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**CHAIN OF CUSTODY RECORD**

SURVEY				SAMPLERS: (Signature)						
<i>Marion G. ...</i>				<i>W. E. Stager</i> <i>C. Rogase</i> <i>W. E. Stager</i> <i>Steve ...</i>						
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED	
				Water		Air				
				Comp.	Grab.					
2209	cyclone	11/7/77	1100			X	1	1	PART, ACETONE WASH	
2209	cyclone	11/7/77	1100			X	1	1	PART, FILTER # 105	
2209	cyclone	11/7/77	1340			X	2	1	PART, ACETONE WASH	
2209	cyclone	11/7/77	1340			X	2	1	PART, FILTER # 106	
2209	cyclone	11/7/77	1550			X	3	1	PART, ACETONE WASH	
2209	cyclone	11/7/77	1550			X	3	1	PART, FILTER # 107	
2208	cyclone	11/9/77	0845			X	1	1	PART, ACETONE WASH	
2207	cyclone	11/9/77	0845			X	1	1	PART, FILTER # 108	
2209	cyclone	11/9/77	1045			X	2	1	PART, ACETONE WASH	
2208	cyclone	11/9/77	1045			X	2	1	PART, FILTER # 109	
2207	cyclone	11/9/77	1355			X	3	1	PART, ACETONE WASH	
2208	cyclone	11/9/77	1355			X	3	1	PART, FILTER # 110	
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
<i>Paul R. de ...</i>				<i>W. E. Stager</i>				11/12/77 1100		
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
Relinquished by: (Signature)				Received by Mobile Laboratory for field analysis: (Signature)				Date/Time		
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**CHAIN OF CUSTODY RECORD**

SURVEY				SAMPLERS: (Signature)						
<i>Marian E. Stager</i>				<i>P. R. Stager</i> <i>V. Hardy</i> <i>Steve Brown</i> <i>B. Brown</i>						
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED	
				Water		Air				
				Comp.	Grob.					
2208	acetone blank	11/9/77	1345			X	3	1	PART.	
2211	acetone blank	11/9/77	0900			X	2	1	PART.	
2207	cyclone	11/9/77	1540			X	4	1	PART. acetone wash	
2207	cyclone	11/9/77	1540			X	4	1	PART. FILTER # 111	
2207	cyclone	11/10/77	0857			X	5	1	PART. acetone wash	
2207	cyclone	11/10/77	0757			X	5	1	PART. FILTER # 112	
2207	cyclone	11/10/77	1257			X	1	1	PART. acetone wash	
2207	cyclone	11/10/77	1352			X	1	1	PART. FILTER # 113	
2207	cyclone	11/10/77	1400			X	2	1	PART. acetone wash	
2207	cyclone	11/10/77	1600			X	2	1	PART. FILTER # 114	
2207	cyclone	11/10/77	0752			X	3	1	PART. acetone wash	
2207	cyclone	11/10/77	0752			X	3	1	PART. FILTER # 115	
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
<i>P. R. Stager</i>				<i>M. E. Stager</i>				11/9/77 1100		
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
Relinquished by: (Signature)				Received by Mobile Laboratory for field analysis: (Signature)				Date/Time		
Dispatched by: (Signature)			Date/Time	Received for Laboratory by:				Date/Time		
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CHAIN OF CUSTODY RECORD

SURVEY				SAMPLERS: (Signature)						
<i>Marana, AZ</i>				<i>B. Brown, S. Jones, C. Hardy</i>						
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED	
				Water		Air				
				Comp.	Grab.					
2207	Cyclone	11/17/77	1036			X	4	1	PART. Acetone wash	
2207	Cyclone	11/17/77	1036			X	4	1	PART. FILTER #116	
2207	acetone blank	11/17/77	1025			X	4	1	PART.	
2205	Cyclone	11/17/77	1315			X	1	1	PART. acetone wash	
2205	Cyclone	11/17/77	1315			X	1	1	PART. FILTER #117	
2205	"	11/17/77	1500			X	2	1	PART. acetone wash	
2205	"	11/17/77	1500			X	2	1	PART. FILTER #117	
2205	"	11/17/77	0833			X	3	1	PART. acetone wash	
2205	"	11/17/77	0833			X	3	1	PART. FILTER #119	
2204	"	11/17/77	1050			X	1	1	PART. acetone wash	
2204	"	11/17/77	1050			X	1	1	PART. FILTER #120	
2204	Acetone blank	11/17/77	1520			X	5	1	PART.	

Relinquished by: (Signature) <i>P. R. Brown</i>	Received by: (Signature) <i>W. E. Stager</i>	Date/Time 12/15/77 1100
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
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**CHAIN OF CUSTODY RECORD**

SURVEY				SAMPLERS: (Signature)					
<i>Marana San Juan, AZ</i>				<i>P. L. ... O. Hardy S. ... B. ...</i>					
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
				Water		Air			
				Comp.	Grab.				
2204	cyclone	11/12/77	1356			X	2	1	PART, ACETONE WASH
2204	"	11/12/77	1354			X	2	1	PART, FILTER #121
2301	LINT cage	11/6/77	1002			X	1	1	PART, FILTER #40
2301	"	11/12/77	1410			X	2	1	PART, FILTER #436
2303	"	11/2/77	1540			X	3	1	PART, FILTER #427
2302	"	11/13/77	0824			X	1	1	PART, FILTER #428
2302	"	11/13/77	1024			X	2	1	PART, FILTER #430
2302	"	11/14/77	1328			X	3	1	PART, FILTER #431
2303	"	11/13/77	1416			X	1	1	PART, FILTER #432
2204	cyclone	11/12/77	1555			X	3	1	PART, ACETONE WASH
2204	cyclone	11/12/77	1555			X	3	1	PART, FILTER #121
	Acetone blank	11/15/77				X	6	1	PART

Relinquished by: (Signature) <i>P. L. ...</i>	Received by: (Signature) <i>W. E. Stager</i>	Date/Time 11/15/77 1100
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature)	Date/Time	Received for Laboratory by: Date/Time
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**CHAIN OF CUSTODY RECORD**

SURVEY				SAMPLERS: (Signature)						
<i>Maras In, Maras, AZ</i>				<i>K. H. ...</i>			<i>U. ...</i>			
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED	
				Water		Air				
				Comp.	Grob.					
2309	cyclone	11/15/77	0907			X	1	1	PART, ACETONE WASH	
2309	"	11/15/77	0907			X	1	1	PART, FILTER #127	
2309	"	11/15/77	1100			X	2	1	PART, ACETONE WASH	
2309	"	11/15/77	1100			X	2	1	PART, FILTER #127	
2309	"	11/15/77	1330			X	3	1	PART, ACETONE WASH	
2309	"	11/15/77	1330			X	3	1	PART, FILTER #129	
2309	"	11/15/77	1505			X	4	1	PART, ACETONE WASH	
2309	"	11/15/77	1505			X	4	1	PART, FILTER #130	
2307	"	11/16/77	0840			X	1	1	PART, ACETONE WASH	
2307	"	11/16/77	0840			X	1	1	PART, FILTER #131	
2307	"	11/16/77	1025			X	2	1	PART, ACETONE WASH	
2307	"	11/16/77	1025			X	2	1	PART, FILTER #132	

Relinquished by: (Signature) <i>Paul R. ...</i>	Received by: (Signature) <i>W. E. Hager</i>	Date/Time 11/17/77 1100	
Relinquished by: (Signature)	Received by: (Signature)	Date/Time	
Relinquished by: (Signature)	Received by: (Signature)	Date/Time	
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time	
Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
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P. R. de...

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CHAIN OF CUSTODY RECORD

SURVEY				SAMPLERS: (Signature)						
<i>Marianne Elie</i>				<i>W. C. Klein, R. Fogare, S. Zeman, D. Handy</i>						
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED	
				Water		Air				
				Comp.	Grab.					
2307	cyclone	11/16/77	1308			X	3	1	PART, acetone wash	
2307	"	11/16/77	1308			X	3	1	PART, FILTER #133	
2307	acetone blank	11/16/77	1415			X	7	1	PART	
2306	cyclone	11/17/77	0845			X	1	1	PART, acetone wash	
2306	"	11/17/77	0845			X	1	1	PART, FILTER #134	
2306	"	11/17/77	1035			X	2	1	PART, acetone wash	
2306	"	11/17/77	1035			X	2	1	PART, FILTER #135	
2306	"	11/17/77	1250			X	3	1	PART, acetone wash	
2306	"	11/17/77	1250			X	3	1	PART, FILTER #136	
2307	"	11/17/77	1310			X	1	1	PART, acetone wash	
2307	"	11/17/77	1310			X	1	1	PART, FILTER #137	
2307	"	11/17/77	1530			X	2	1	PART, acetone wash	

Relinquished by: (Signature) <i>P. R. de...</i>		Received by: (Signature) <i>W. E. Stager</i>		Date/Time 11/17/77 1100
Relinquished by: (Signature)		Received by: (Signature)		Date/Time
Relinquished by: (Signature)		Received by: (Signature)		Date/Time
Relinquished by: (Signature)		Received by Mobile Laboratory for field analysis: (Signature)		Date/Time
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CHAIN OF CUSTODY RECORD

SURVEY				SAMPLERS: (Signature)						
<i>Marianne St. Jacques, Ok</i>				<i>P. J. Perain, B. Ryan, S. Jensen, D. Harty</i>						
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED	
				Water		Air				
				Comp.	Grab.					
2308	CYCLONE	11/7/77	1530			X	2	1	PART. FILTER # 138	
2307	"	11/9/77	0821			X	3	1	PART. FILTER WASH	
2305	"	11/9/77	0821			X	3	1	PART. FILTER # 139	
2204	"	11/13/77	0842			X	4	1	PART. FILTER WASH	
2204	"	11/13/77	0842			X	4	1	PART. FILTER # 123	
2310	"	11/14/77	1247			X	1	1	PART. FILTER WASH	
2310	"	11/14/77	1247			X	1	1	PART. FILTER # 124	
2310	"	11/14/77	1447			X	2	1	PART. FILTER WASH	
2310	"	11/14/77	1447			X	2	1	PART. FILTER # 125	
2310	"	11/14/77	1632			X	3	1	PART. FILTER WASH	
2310	"	11/14/77	1632			X	3	1	PART. FILTER # 126	

Relinquished by: (Signature) <i>P. J. Perain</i>		Received by: (Signature) <i>W. S. Stager</i>		Date/Time 11/14/77 1100	
Relinquished by: (Signature)		Received by: (Signature)		Date/Time	
Relinquished by: (Signature)		Received by: (Signature)		Date/Time	
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**CHAIN OF CUSTODY RECORD**

<b>SURVEY</b> <i>Marathon Gas Station, etc.</i>	<b>SAMPLERS:</b> (Signature) <i>P. Rubin</i> <i>V. Harty</i> <i>B. Rogers</i> <i>S. Hanson</i>
--	--

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
				Water		Air			
				Comp.	Grab.				
2201	LINT cage	11/5/77	1015			X	1	1	PART FILTER # 406
2201	"	11/5/77	1350			X	2	1	PART FILTER # 407
2201	"	11/5/77	1420			X	3	1	PART FILTER # 408
2203	"	11/9/77	1202			X	1	1	PART FILTER # 411
2203	"	11/9/77	1247			X	2	1	PART FILTER # 413
2203	"	11/9/77	1412			X	3	1	PART FILTER # 414
2203	"	11/9/77	0956			X	4	1	PART FILTER # 415
2203	"	11/9/77	1322			X	5	1	PART FILTER # 418
2203	"	11/9/77	1412			X	6	1	PART FILTER # 421
2305	"	11/6/77	0907			X	2	1	PART FILTER # 440
2305	"	11/13/77	1534			X	1	1	PART FILTER # 439
2305	"	11/15/77	1134			X	3	1	PART FILTER # 441

Relinquished by: (Signature) <i>Paul R. Rubin</i>	Received by: (Signature) <i>W. E. Hager</i>	Date/Time 11/1/77 1100
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Relinquished by: (Signature)	Received by: (Signature)	Date/Time
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Relinquished by: (Signature)	Received by: (Signature)	Date/Time
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Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
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CHAIN OF CUSTODY RECORD

SURVEY				SAMPLERS: (Signature)						
<i>Matthew E. DelBian, et al</i>				<i>P. delBian</i>			<i>B. Rogosa</i>			
				<i>V. Sanchez</i>			<i>S. Jones</i>			
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED	
				Water		Air				
				Comp.	Grab.					
2203	Lint cage - HV	11/9/77	1052			X	1	1	PART. FILTER #416	
2203	Lint cage - HV	11/9/77	1322			X	2	1	PART. FILTER #419	
2203	Lint cage - HV	11/9/77	1410			X	3	1	PART. FILTER #420	
2201	Ambient AIR - HV	11/9/77	0710			X	1	1	PART. FILTER #417	
2201	Ambient AIR - HV	11/9/77	0730			X	1	1	PART. FILTER #423	
2301	Ambient AIR - HV	11/10/77	1000			X	1	1	PART. FILTER #424	
2301	Ambient AIR - HV	11/10/77	1200			X	1	1	PART. FILTER #429	
2301	Ambient AIR - HV	11/10/77	1500			X	1	1	PART. FILTER #412	
2310	Ambient AIR - HV	11/13/77	1000			X	1	1	PART. FILTER #425	
2310	Ambient AIR - HV	11/13/77	1500			X	1	1	PART. FILTER #437	
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
<i>P. delBian</i>				<i>W. E. Stager</i>				11/9/77 1100		
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
Relinquished by: (Signature)				Received by: (Signature)				Date/Time		
Relinquished by: (Signature)				Received by Mobile Laboratory for field analysis: (Signature)				Date/Time		
Dispatched by: (Signature)			Date/Time	Received for Laboratory by:				Date/Time		
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12/3/77  
P. de Bruijn

ENVIRONMENTAL PROTECTION AGENCY  
Office Of Enforcement  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
Building 53, Box 25227, Denver Federal Center  
Denver, Colorado 80225

CHAIN OF CUSTODY RECORD

SURVEY				SAMPLERS: (Signature)					
<i>Johnson, G. J. / Brown, A.</i>				<i>S. Adams</i>		<i>V. Hagg</i>		<i>B. Rogers</i>	
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
				Water		Air			
				Comp.	Grab.				
2207	W. 1st St - HV	11/1/77	0800			X	1	1	PART. FILTER # 410
2207	W. 1st St - HV	11/1/77	0800			X	1	1	PART. FILTER # 411
2207	W. 1st St - HV	11/1/77	0800			X	1	1	PART. FILTER # 412
2207	W. 1st St - HV	11/7/77	0800			X	1	1	PART. FILTER # 413
2207	W. 1st St - HV	11/1/77	0800			X	1	1	PART. FILTER # 414
2302	LWT CAGE	11/13/77	1557			X	2	1	PART. FILTER # 435
2303	"	11/14/77	0820			X	3	1	PART. FILTER # 436
2304	"	11/14/77	0940			X	1	1	PART. FILTER # 437
2304	"	11/14/77	1246			X	2	1	PART. FILTER # 438
2304	"	11/14/77	1410			X	3	1	PART. FILTER # 439

Relinquished by: (Signature) <i>P. de Bruijn</i>		Received by: (Signature) <i>W. E. Stager</i>		Date/Time 11/1/77 1100	
Relinquished by: (Signature)		Received by: (Signature)		Date/Time	
Relinquished by: (Signature)		Received by: (Signature)		Date/Time	
Relinquished by: (Signature)		Received by Mobile Laboratory for field analysis: (Signature)		Date/Time	
Dispatched by: (Signature)		Date/Time	Received for Laboratory by:		Date/Time
Method of Shipment:					

Distribution: Orig. - Accompany Shipment  
1 Copy - Survey Coordinator Field Files

Appendix J

Emission Data Summary



Table J-1  
 DATA SUMMARY - STATION 2201  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3
Sample Date (November)	5	5	5
Sampling Rate			
m <sup>3</sup> /min	0.85	0.85	0.85
ft <sup>3</sup> /min	30	30	30
Sampling Time (min)	60	60	60
Moisture (%) <sup>*</sup>	1	1	1
Gas Temperature			
°C	35 <sup>**</sup>	35	35
°F	95	95	96
Sample Volume (STP) <sup>***</sup>			
m <sup>3</sup>	44.9	44.9	44.9
ft <sup>3</sup>	1590	1590	1590
Volymetric Flow Rate (STP) <sup>†</sup>			
m <sup>3</sup> /min	367	367	367
ft <sup>3</sup> /min	13,000	13,000	13,000
Lint Cage Area			
m <sup>2</sup>	12.0	12.0	12.0
ft <sup>2</sup>	129.5	129.5	129.5
Particulate Collected (gm)			
filter	3.70	4.75	3.55
Particulate Concentration			
mg/m <sup>3</sup>	82.4	105.8	79.1
gr/scf	0.036	0.046	0.034
Particulate Emissions			
kg/hr	1.81	2.33	1.74
lb/hr	3.99	5.14	3.84

\* Assumed to be same as cyclone gas moisture.

\*\* Reading not taken, assumed to be the same as Run 2.

\*\*\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

† USDA, ARS adjusted gas flow rate.

*Table J-2*  
 DATA SUMMARY - STATION 2202  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3
Sample Date (November)	4	4	4
Sampling Rate			
m <sup>3</sup> /min	0.85	0.85	0.85
ft <sup>3</sup> /min	30	30	30
Sampling Time (min)	78	78	78
Moisture (%) <sup>*</sup>	1	1	1
Gas Temperature			
°C	23.9	27.8	31.7
°F	75	82	89
Sample Volume (STP) <sup>**</sup>			
m <sup>3</sup>	60.4	59.6	58.9
ft <sup>3</sup>	2140	2110	2090
Volumetric Flow Rate (STP) <sup>***</sup>			
m <sup>3</sup> /min	291	291	291
ft <sup>3</sup> /min	10,300	10,300	10,300
Lint Cage Area			
m <sup>2</sup>	10.2	10.2	10.2
ft <sup>2</sup>	110	110	110
Particulate Collected (gm) filter	0.83	1.24	2.03
Particulate Concentration			
mg/m <sup>3</sup>	13.7	20.8	34.5
gr/scf	0.0060	0.0091	0.015
Particulate Emissions			
kg/hr	0.24	0.36	0.60
lb/hr	0.53	0.80	1.33

<sup>\*</sup> Assumed to be same as cyclone gas moisture.

<sup>\*\*</sup> STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

<sup>\*\*\*</sup> USDA, ARS adjusted gas flow rate.

Table J-3  
 DATA SUMMARY - STATION 2203  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3	4	5	6
Sample Date (November)	7	7	7	9	9	9
Sampling Rate						
m <sup>3</sup> /min	0.85	0.85	0.85	0.39	0.85	1.21
ft <sup>3</sup> /min	30	30	30	13.7	30	43
Sampling Time (min)	64	64	64	64	64	64
Moisture (%) <sup>*</sup>	1	1	1	1	1	1
Gas Temperature						
°C	21	23	23	21	26	26
°F	69	73	73	69	79	79
Sample Volume (STP) <sup>**</sup>						
m <sup>3</sup>	50.3	49.7	49.7	22.9	49.2	70.6
ft <sup>3</sup>	1780	1760	1760	810	1740	2500
Volymetric Flow Rate (STP) <sup>***</sup>						
m <sup>3</sup> /min	539	539	539	539	539	539
ft <sup>3</sup> /min	19,000	19,000	19,000	19,000	19,000	19,000
Lint Cage Area						
m <sup>2</sup>	4.3	4.3	4.3	4.3	4.3	4.3
ft <sup>2</sup>	46.8	46.8	46.8	46.8	46.8	46.8
Particulate Collected (gm) filter	5.37	5.06	7.71	3.13	6.58	4.97
Particulate Concentration						
mg/m <sup>3</sup>	107	102	155	137	134	70.4
gr/scf	0.047	0.044	0.068	0.060	0.058	0.031
Particulate Emissions						
kg/hr	3.43	3.26	4.98	4.39	4.29	2.26
lb/hr	7.56	7.20	11.0	9.67	9.46	4.98

*\* Assumed to be same as cyclone gas moisture.*

*\*\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.*

*\*\*\* USDA, ARS adjusted gas flow rate.*

Table J-4  
 DATA SUMMARY - STATION 2204  
 SHORT STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	2	3	4
Sample Date (November)	12	12	13
Volume Sampled (STP)*			
ft <sup>3</sup>	292.1	292.0	290.1
m <sup>3</sup>	8.27	8.27	8.21
Moisture %	0.4	0.7	1.0
Barometric Pressure			
cm of Hg	71.42	71.37	71.42
in of Hg	28.12	28.10	28.12
Stack Gas Temperature			
°F	158	159	153
°C	70	71	67
Molecular Weight (dry)	28.82	28.82	28.82
% Isokinetic	94.3	94.4	98.1
Stack Gas Velocity			
ft/sec	87.2	88.1	88.0
m/sec	26.6	26.9	26.8
Volumetric Flow Rate (STP)*			
ft <sup>3</sup> /min	9100	9200	9200
m <sup>3</sup> /min	260	260	260
Particulate Collected (mg)			
acetone wash	911	236	921
filter	11	6	17
Total	922	629	938
Particulate Concentration			
gr/scf	0.048	0.033	0.050
mg/m <sup>3</sup>	111	76.0	114
Particulate Emissions			
lb/hr	3.81	2.62	3.92
kg/hr	1.73	1.19	1.78

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-5  
 DATA SUMMARY - STATION 2205  
 SHORT STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1	2	3
Sample Date (November)	11	11	12
Volume Sampled (STP)*			
ft <sup>3</sup>	177.1	195.7	198.7
m <sup>3</sup>	5.01	5.54	5.63
Moisture %	1.1	0.7	0.7
Barometric Pressure			
cm of Hg	71.42	71.42	71.50
in of Hg	28.12	28.12	28.15
Stack Gas Temperature			
°F	109	111	95
°C	43	44	35
Molecular Weight (Dry)	28.82	28.82	28.82
% Isokinetic	106.3	105.1	105.0
Stack Gas Velocity			
ft/sec	34.0	38.0	38.6
m/sec	10.4	11.6	11.8
Volumetric Flow Rate (STP)*			
ft <sup>3</sup> /min	3800	4300	4500
m <sup>3</sup> /min	110	120	130
Particulate Collected (mg)			
acetone wash	152	146	111
filter	1	1	1
Total	153	147	112
Particulate Concentration			
gr/scf	0.013	0.012	0.0086
mg/m <sup>3</sup>	30.7	26.6	19.8
Particulate Emissions			
lb/hr	0.44	0.42	0.33
kg/hr	0.20	0.19	0.15

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-6  
 DATA SUMMARY - STATION 2207  
 SHORT STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1*	2	3	4
Sample Date (November)	10	10	11	11
Volume Sampled (STP)**				
ft <sup>3</sup>	320.0	321.3	305.7	311.3
m <sup>3</sup>	9.06	9.10	8.65	8.81
Moisture %	0.4	0.4	0.9	0.8
Barometric Pressure				
cm of Hg	71.45	71.45	71.55	71.58
in of Hg	28.13	28.13	28.17	28.18
Stack Gas Temperature				
°F	114	112	104	115
°C	46	44	40	46
Molecular Weight (Dry)	28.82	28.82	28.82	28.82
% Isokinetic	96.7	99.6	102.3	98.6
Stack Gas Velocity				
ft/sec	65.8	65.3	62.0	64.3
m/sec	20.1	19.9	19.0	19.6
Volumetric Flow Rate (STP)**				
ft <sup>3</sup> /min	7400	7400	7100	7200
m <sup>3</sup> /min	210	210	200	200
Particulate Collected (mg)				
acetone wash	555	470	509	403
filter	2	2	3	2
Total	557	472	512	405
Particulate Concentration				
gr/scf	0.027	0.023	0.026	0.020
mg/m <sup>3</sup>	61.5	51.9	59.2	45.9
Particulate Emissions				
lb/hr	1.70	1.43	1.56	1.21
kg/hr	0.77	0.65	0.71	0.55

\* Leak check unacceptable (>0.2 cfm).

\*\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-7  
 DATA SUMMARY - STATION 2208  
 SHORT STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1*	2*	3	4	5
Sample Date (November)	9	9	9	9	10
Volume Sampled (STP)**					
ft <sup>3</sup>	145.1	154.5	184.1	173.8	182.9
m <sup>3</sup>	4.11	4.37	5.21	4.92	5.18
Moisture %	0.7	0.8	0.5	0.7	0.6
Barometric Pressure					
cm of Hg	71.53	71.53	71.42	71.40	71.50
in of Hg	28.16	28.16	28.12	28.11	28.15
Stack Gas Temperature					
°F	73	86	92	90	80
°C	23	30	33	32	27
Molecular Weight (Dry)	28.82	28.82	28.82	28.82	28.82
% Isokinetic	113.3	115.9	99.4	99.9	100.2
Stack Gas Velocity					
ft/sec	32.9	25.5	36.3	34.6	35.8
m/sec	10.0	7.8	11.1	10.5	10.9
Volumetric Flow Rate (STP)**					
ft <sup>3</sup> /min	4000	3000	4200	4000	4300
m <sup>3</sup> /min	110	85	120	110	120
Particulate Collected (mg)					
acetone wash	120	130	179	152	186
filter	1	1	1	1	1
Total	121	131	180	153	187
Particulate Concentration					
gr/sgf	0.013	0.013	0.015	0.014	0.016
mg/m <sup>3</sup>	29.3	30.1	34.4	31.0	36.0
Particulate Emissions					
lb/hr	0.42	0.33	0.55	0.44	0.57
kg/hr	0.19	0.15	0.25	0.20	0.26

\* Run outside isokinetic range of 90-110%, results not used in determining average emissions.

\*\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-8  
 DATA SUMMARY - STATION 2209  
 SHORT STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1	2	3
Sample Date (November)	7	7	7
Volume Sampled (STP)*			
ft <sup>3</sup>	190.9	177.0	179.9
m <sup>3</sup>	5.40	5.01	5.09
Moisture %	0.6	0.4	0.9
Barometric Pressure			
cm of Hg	70.79	70.71	70.71
in of Hg	27.87	27.84	27.84
Stack Gas Temperature			
°F	83	87	85
°C	28	31	29
Molecular Weight (Dry)	28.82	28.82	28.82
% Isokinetic	107.3	101.7	104.9
Stack Gas Velocity			
ft/sec	45.6	45.2	45.2
m/sec	13.9	13.8	13.8
Volumetric Flow Rate (STP)*			
ft <sup>3</sup> /min	5500	5300	5300
m <sup>3</sup> /min	160	150	150
Particulate Collected (mg)			
acetone wash	423	719	517
filter	13	14	9
Total	436	733	526
Particulate Concentration			
gr/ssf	0.035	0.064	0.045
mg/m <sup>3</sup>	80.7	146	103
Particulate Emissions			
lb/hr	1.70	2.89	2.05
kg/hr	0.77	1.31	0.93

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

*Table J-9*  
 DATA SUMMARY - STATION 2211  
 SHORT STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1*	2	3	4
Sample Date (November)	4	5	5	5
Volume Sampled (STP)**				
ft <sup>3</sup>	292.1	176.0	182.1	179.3
m <sup>3</sup>	8.27	4.98	5.16	5.08
Moisture %	0.2	0.9	0.6	0.8
Barometric Pressure				
cm of Hg	71.07	71.09	71.09	70.84
in of Hg	27.98	27.99	27.99	27.89
Stack Gas Temperature				
°F	97	96	101	99
°C	36	36	38	37
Molecular Weight (Dry)	28.82	28.82	28.82	28.82
% Isokinetic	180.6	108.4	108.0	106.0
Stack Gas Velocity				
ft/sec	44.2	44.3	46.2	46.2
m/sec	13.5	13.5	14.1	14.1
Volumetric Flow Rate (STP)**				
ft <sup>3</sup> /min	5100	5100	5300	5300
m <sup>3</sup> /min	140	140	150	150
Particulate Collected (mg)				
acetone wash	3327	1536	2429	2530
filter	30	37	53	78
Total	3357	1573	2482	2608
Particulate Concentration				
gr/scf	0.18	0.14	0.21	0.22
mg/m <sup>3</sup>	406	316	481	514
Particulate Emissions				
lb/hr	7.51	5.84	9.54	10.2
kg/hr	3.41	2.65	4.33	4.63

\* Run outside isokinetic range of 90-110%, results not used in determining average emissions.

\*\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-10  
 DATA SUMMARY - STATION 2301  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3
Sample Date (November)	6	12	12
Sampling Rate			
$m^3/min$	0.85	0.85	0.85
$ft^3/min$	30	30	30
Sampling Time (min)	64	64	64
Moisture (%)	1	1	1
Gas Temperature			
$^{\circ}C$	16	32	32
$^{\circ}F$	61	90	90
Sample Volume (STP)*			
$m^3$	50.9	48.2	48.2
$ft^3$	1800	1710	1710
Volymetric Flow Rate (STP)**			
$m^3/min$	114	114	114
$ft^3/min$	4000	4000	4000
Lint Cage Area			
$m^2$	3.03	3.03	3.03
$ft^2$	32.7	32.7	32.7
Particulate Collected (gm)			
filter	3.87	3.38	4.00
Particulate Concentration			
$mg/m^3$	76.0	70.1	83.0
$gr/scf$	0.033	0.031	0.036
Particulate Emissions			
$kg/hr$	0.52	0.48	0.57
$lb/hr$	1.14	1.05	1.25

\* STP - Standard Temperature ( $68^{\circ}F$ ) and Pressure (29.92 in Hg)-dry.

\*\* USDA, ARS adjusted gas flow rate.

Table J-11  
 DATA SUMMARY - STATION 2302  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3
Sample Date (November)	13	13	13
Sampling Rate m <sup>3</sup> /min ft <sup>3</sup> /min	0.85 30	0.85 30	0.85 30
Sampling Time (min)	64	64	64
Moisture (%)	1	1	1
Gas Temperature °C °F	20 68	25 77	34 93
Sample Volume (STP)* m <sup>3</sup> ft <sup>3</sup>	50.2 1780	49.4 1750	47.8 1690
Volymetric Flow Rate (STP)* m <sup>3</sup> /min ft <sup>3</sup> /min	117 4150	117 4150	117 4150
Lint Cage Area m <sup>2</sup> ft <sup>2</sup>	2.95 31.9	2.95 31.9	2.95 31.9
Particulate Collected (gm) filter	1.19	1.65	2.35
Particulate Concentration mg/m <sup>3</sup> gr/scf	23.7 0.0107	33.4 0.015	49.2 0.021
Particulate Emissions kg/hr lb/hr	0.17 0.37	0.23 0.52	0.35 0.76

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-12  
 DATA SUMMARY - STATION 2303  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3
Sample Date (November)	13	13	14
Sampling Rate			
m <sup>3</sup> /min	0.85	0.85	0.85
ft <sup>3</sup> /min	30	30	30
Sampling Time (min)	64	64	64
Moisture (%)	1	1	1
Gas Temperature			
°C	34	32	19
°F	93	90	67
Sample Volume (STP)*			
m <sup>3</sup>	47.8	48.1	51.0
ft <sup>3</sup>	1690	1700	1810
Volymetric Flow Rate (STP)**			
m <sup>3</sup> /min	7.18	71.8	71.8
ft <sup>3</sup> /min	2540	2540	2540
Lint Cage Area			
m <sup>2</sup>	2.94	2.94	2.94
ft <sup>2</sup>	31.7	31.7	31.7
Particulate Collected (gm)			
filter	1.42	2.93	0.84
Particulate Concentration			
mg/m <sup>3</sup>	29.7	60.9	16.5
gr/scf	0.013	0.027	0.0072
Particulate Emissions			
kg/hr	0.12	0.26	0.07
lb/hr	0.27	0.59	0.16

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.  
 \*\* USDA, ARS adjusted gas flow rate.

Table J-13  
 DATA SUMMARY - STATION 2304  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3
Sample Date (November)	14	14	14
Sampling Rate m <sup>3</sup> /min ft <sup>3</sup> /min	0.85 30	0.85 30	0.85 30
Sampling Time (min)	64	64	64
Moisture (%)	1	1	1
Gas Temperature °C °F	23 73	30 86	32 90
Sample Volume (STP)* m <sup>3</sup> ft <sup>3</sup>	49.7 1760	48.6 1720	48.1 1700
Volumetric Flow Rate (STP)* m <sup>3</sup> /min ft <sup>3</sup> /min	81.4 2880	81.4 2880	81.4 2880
Lint Cage Area m <sup>2</sup> ft <sup>2</sup>	3.08 33.3	3.08 33.3	3.08 33.3
Particulate Collected (gm) filter	0.62	1.88	6.44
Particulate Concentration mg/m <sup>3</sup> gr/scf	12.5 0.0054	38.7 0.017	134 0.058
Particulate Emissions kg/hr lb/hr	0.061 0.13	0.19 0.42	0.65 1.44

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-14  
 DATA SUMMARY - STATION 2305  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA

Run Number	1	2	3
Sample Date (November)	14	15	15
Sampling Rate			
m <sup>3</sup> /min	0.85	0.85	0.85
ft <sup>3</sup> /min	30	30	30
Sampling Time (min)	52	52	52
Moisture (%)	1	1	1
Gas Temperature			
°C	32	20	26
°F	90	68	78
Sample Volume (STP)*			
m <sup>3</sup>	39.1	40.7	40.2
ft <sup>3</sup>	1390	1440	1420
Volymetric Flow Rate (STP)*			
m <sup>3</sup> /min	143	143	143
ft <sup>3</sup> /min	5060	5060	5060
Link Cage Area			
m <sup>2</sup>	3.68	3.68	3.68
ft <sup>2</sup>	39.7	39.7	39.7
Particulate Collected (gm)			
filter	1.71	0.70	2.23
Particulate Concentration			
mg/m <sup>3</sup>	43.7	17.2	55.5
gr/scf	0.019	0.0075	0.024
Particulate Emissions			
kg/hr	0.38	0.15	0.48
lb/hr	0.83	0.33	1.05

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-15  
 DATA SUMMARY - STATION 2306  
 LONG STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1	2	3
Sample Date (November)	17	17	17
Volume Sampled (STP)*			
ft <sup>3</sup>	288.0	229.8	234.0
m <sup>3</sup>	8.15	6.51	6.62
Moisture %	0.5	0.5	0.5
Barometric Pressure			
cm of Hg	71.25	71.25	71.17
in of Hg	28.05	28.05	28.02
Stack Gas Temperature			
°F	87	98	105
°C	31	37	41
Molecular Weight (Dry)	28.82	28.82	28.82
% Isokinetic	96.8	97.2	98.1
Stack Gas Velocity			
ft/sec	63.3	66.3	66.2
m/sec	19.3	20.2	20.2
Volumetric Flow Rate (STP)*			
ft <sup>3</sup> /min	7400	7600	7500
m <sup>3</sup> /min	210	220	210
Particulate Collected (mg)			
acetone wash	145	159	93
filter	1	1	1
Total	146	160	94
Particulate Concentration			
gr/scf	0.0078	0.011	0.0061
mg/m <sup>3</sup>	17.8	24.6	14.1
Particulate Emissions			
lb/hr	0.48	0.70	0.40
kg/hr	0.22	0.32	0.18

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-16  
 DATA SUMMARY - STATION 2302  
 LONG STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1	2	3
Sample Date (November)	16	16	16
Volume Sampled (STP)*			
ft <sup>3</sup>	219.4	214.1	218.7
m <sup>3</sup>	6.21	6.06	6.19
Moisture %	0.6	1.0	1.0
Barometric Pressure			
cm of Hg	71.25	71.25	71.22
in of Hg	28.05	28.05	28.04
Stack Gas Temperature			
°F	121	142	148
°C	49	61	64
Molecular Weight (Dry)	28.82	28.82	28.82
% Isokinetic	102.6	98.9	97.0
Stack Gas Velocity			
ft/sec	48.7	49.6	51.1
m/sec	14.8	15.1	15.6
Volumetric Flow Rate (STP)*			
ft <sup>3</sup> /min	5400	5300	5400
m <sup>3</sup> /min	150	150	150
Particulate Collected (mg)			
acetone wash	101	144	139
filter	1	2	2
Total	102	146	140
Particulate Concentration			
gr/scf	0.0072	0.011	0.0099
mg/m <sup>3</sup>	16.4	24.1	22.6
Particulate Emissions			
lb/hr	0.33	0.48	0.44
kg/hr	0.15	0.22	0.20

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-17  
 DATA SUMMARY - STATION 2308  
 LONG STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1*	2	3
Sample Date (November)	18	18	19
Volume Sampled (STP)**			
ft <sup>3</sup>	73.9	83.7	79.3
m <sup>3</sup>	2.09	2.37	2.24
Moisture %	0.7	0.7	1.0
Barometric Pressure			
cm of Hg	70.87	70.82	70.74
in of Hg	27.90	27.88	27.85
Stack Gas Temperature			
°F	98	96	84
°C	37	36	29
Molecular Weight (Dry)	28.82	28.82	28.82
% Isokinetic	89.3	90.9	90.6
Stack Gas Velocity			
ft/sec	17.6	19.7	18.9
m/sec	5.36	6.00	5.76
Volumetric Flow Rate (STP)**			
ft <sup>3</sup> /min	2000	2300	2200
m <sup>3</sup> /min	57	65	62
Particulate Collected (mg)			
acetone wash	309	466	188
filter	17	21	5
Total	326	487	193
Particulate Concentration			
gr/scf	0.068	0.089	0.038
mg/m <sup>3</sup>	156	205	86.2
Particulate Emissions			
lb/hr	1.17	1.76	0.70
kg/hr	0.53	0.80	0.32

\* Run outside isokinetic range of 90-110%, results not used in determining average emissions.

\*\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-18  
 DATA SUMMARY - STATION 2309  
 LONG STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1*	2	3	4
Sample Date (November)	15	15	15	15
Volume Sampled (STP)**				
ft <sup>3</sup>	111.3	142.6	145.4	142.6
m <sup>3</sup>	3.15	4.04	4.12	4.04
Moisture %	1.5	1.5	1.4	1.4
Barometric Pressure				
cm of Hg	71.07	71.09	70.97	70.94
in of Hg	27.98	27.99	27.94	27.93
Stack Gas Temperature				
°F	164	180	187	187
°C	73	82	86	86
Molecular Weight (Dry)	28.82	28.82	28.82	28.82
% Isokinetic	117.0	109.0	105.2	102.0
Stack Gas Velocity				
ft/sec	31.0	32.0	33.4	34.0
m/sec	9.49	9.75	10.2	10.4
Volumetric Flow Rate (STP)**				
ft <sup>3</sup> /min	3200	3200	3300	3300
m <sup>3</sup> /min	91	91	93	93
Particulate Collected (mg)				
acetone wash	292	483	349	287
filter	27	39	18	29
Total	319	522	367	316
Particulate Concentration				
gr/sqft	0.044	0.056	0.039	0.034
mg/m <sup>3</sup>	101	129	89.3	78.2
Particulate Emissions				
lb/hr	1.21	1.54	1.10	0.97
kg/hr	0.55	0.70	0.50	0.44

\* Run outside isokinetic range of 90-110%, results not used in determining average emissions.

\*\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-19  
 DATA SUMMARY - STATION 2310  
 LONG STAPLE GIN  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Run Number	1	2	3
Sample Date (November)	14	14	14
Volume Sampled (STP)*			
ft <sup>3</sup>	196.3	192.1	190.1
m <sup>3</sup>	5.56	5.54	5.38
Moisture %	1.4	1.4	1.5
Barometric Pressure			
cm of Hg	70.97	70.87	70.82
in of Hg	27.94	27.90	27.88
Stack Gas Temperature			
°F	190	189	186
°C	88	87	86
Molecular Weight (Dry)	28.82	28.82	28.82
% Isokinetic	102.0	96.4	107.2
Stack Gas Velocity			
ft/sec	60.8	62.7	56.5
m/sec	18.5	19.1	17.2
Volumetric Flow Rate (STP)*			
ft <sup>3</sup> /min	6000	6100	5600
m <sup>3</sup> /min	170	170	160
57                  65                  6			
Particulate Collected (mg)			
acetone wash	170	176	212
filter	16	43	23
Total	186	219	235
Particulate Concentration			
gr/ssf	0.015	0.017	0.019
mg/m <sup>3</sup>	33.5	39.5	43.6
Particulate Emissions			
lb/hr	0.75	0.88	0.92
kg/hr	0.34	0.40	0.42

\* STP - Standard Temperature (68°F) and Pressure (29.92 in Hg)-dry.

Table J-20  
 ADJUSTED DATA SUMMARY  
 PRODUCERS COTTON OIL COMPANY  
 MARANA, ARIZONA  
 NOVEMBER 1977

Station Number	Original Data				Adjusted Data*			
	Flow**		Emissions		Flow**		Emissions	
	m <sup>3</sup> /min	ft <sup>3</sup> /min	kg/hr	lb/hr	m <sup>3</sup> /min	ft <sup>3</sup> /min	kg/hr	lb/hr
Short Staple Cotton Gin								
2204	260	9170	1.56	3.45	251	8870	1.51	3.33
2205	119	4200	0.18	0.40	115	4060	0.17	0.38
2207	204	7230	0.64	1.40	197	6990	0.61	1.35
2208	118	4170	0.24	0.52	114	4030	0.23	0.50
2209	152	5370	1.00	2.21	147	5190	0.97	2.14
2211	148	5230	3.87	8.53	143	5060	3.74	8.25
Long Staple Cotton Gin								
2306	212	7500	0.24	0.53	205	7250	0.23	0.51
2307	152	5370	0.19	0.42	147	5190	0.18	0.40
2308	61	2170	0.55	1.21	59	2100	0.53	1.17
2309	92	3270	0.55	1.20	89	3160	0.53	1.16
2310	167	5900	0.39	0.85	161	5700	0.37	0.82

\*Adjusted for blockage effect; 96.7% of original data.

\*\*STP-Standard Temperature (68°F) and Pressure (29.92 in Hg).

Appendix K

Field Data Sheets and  
Example Calculations



EXAMPLE CALCULATIONS  
MARANA GIN

STATION 2201 (LINT CAGE)  
RUN 1

① SAMPLE VOLUME

$$\begin{aligned} V &= \text{SAMPLING RATE} \times \text{TIME} \\ &= (30 \text{ FT}^3/\text{min}) (60 \text{ min}) \\ &= 1800 \text{ FT}^3 \end{aligned}$$

CORRECTED TO STANDARD CONDITIONS (STP)  
(68°F) (29.92 in Hg) - DRY

$$\begin{aligned} V_{m, \text{STD}} &= 1800 \text{ FT}^3 (1.00 - .01) \left( \frac{528}{555} \right) \left( \frac{29.99}{29.92} \right) \\ &= 1590 \text{ SCF} \end{aligned}$$

CONCENTRATION - C

$$\begin{aligned} C &= \text{PARTICULATE COLLECTED} / V_{m, \text{STD}} \\ &= (3.70 \text{ gm}) / (1590 \text{ SCF}) \left( 15.4 \frac{\text{GRAINS}}{\text{GM}} \right) \\ &= 0.036 \text{ GR/SCF} \text{ or } 826 \text{ mg/m}^3 \end{aligned}$$

EMISSION RATE - ER

$$\begin{aligned} ER &= C (\text{VOLUMETRIC FLOW RATE})^* \\ &= 0.036 (13000 \text{ SCFM}) \left( \frac{1 \text{ LB}}{7000 \text{ GR}} \right) \left( \frac{60 \text{ min}}{1 \text{ hr}} \right) \\ &= 3.99 \text{ LB/hr} \text{ or } 1.81 \text{ kg/hr} \end{aligned}$$

\* APPENDIX F

Plant HOBANA GILL

Location MARANA, ARIZONA

Unit 2204 - Cyclones

Run No. 2 Date 11/12/77

$V_m$ - volume of gas metered	<u>292.1</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.12</u> in Hg
$\Delta H$ - average orifice pressure	<u>2.46</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>560</u> °R
$V_{Lc}$ - volume of water collected	<u>20.3</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<del>CONCENTRATION OF</del> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>2.19</u> in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>618</u> °R
P <sub>s</sub> - average stack pressure	<u>28.12</u> in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
A <sub>n</sub> - area of the nozzle	<u>.00103</u> Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>.9220</u> lbs
<del>H - energy input</del>	<del>106.97</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

Plant Marana Silo Location Marana, Ar.

Unit 2204 - cyclones Run No. 2 Date 11/2/77

1. Meter Volume

$$\begin{aligned} V_{m_{std}} &= 17.65 V_m \left[ \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \right] \\ &= 17.65 (292.1) \left[ \frac{28.12 + \frac{2.45}{13.6}}{560} \right] \\ &= 260.5 \text{ Ft}^3 \end{aligned}$$

2. Volume of water collected

$$\begin{aligned} V_w &= .0472 V_{Lc} \\ &= .0472 (20.3) \\ &= .958 \text{ Ft}^3 \end{aligned}$$

3. Moisture

$$\begin{aligned} B_{ws} &= V_w / (V_w + V_{m_{std}}) \\ &= .958 / (.958 + 260.5) \\ &= .00366 \end{aligned}$$

4. Dry Molecular Weight

$$\begin{aligned} M_d &= .44 (\text{CO}_2) + .32 (\text{O}_2) + .28 (\text{N}_2 + \text{CO}) \\ &= .44 (0) + .32 (20.3) + .28 (79.5) \\ &= 23.82 \text{ lb/lb-mole} \end{aligned}$$

6.56                  22.26

5. Wet Molecular Weight

$$\begin{aligned}
 M_s &= M_d (1 - B_{ws}) + 18 (B_{ws}) \\
 &= 28.82(1 - .0036) + 18 (.0036) \\
 &= 28.77 + 0.66 \\
 &= 28.87 \text{ lb/lb-mole}
 \end{aligned}$$

6. Stack Gas Velocity

$$\begin{aligned}
 v_s &= (85.48) C_p \sqrt{\Delta P} \sqrt{\frac{T_s}{P_s M_s}} \\
 &= 85.48 (.79) \sqrt{2.19} \sqrt{\frac{(618)}{(28.12)(28.87)}} \\
 &= 87.25 \text{ Ft/sec}
 \end{aligned}$$

7. Stack Gas Volumetric Flow Rate

$$\begin{aligned}
 Q_s &= 3600 (1 - B_{ws}) v_s A_s \left[ \frac{528}{T_s} \right] \left[ \frac{P_s}{29.92} \right] \\
 &= 3600 (1 - .0036) (87.25) (2.18) \left[ \frac{528}{618} \right] \left[ \frac{28.12}{29.92} \right] \\
 &= 547,800 \text{ Ft}^3/\text{hr} \quad 9100
 \end{aligned}$$

8. Isokinetic

$$\begin{aligned}
 I &= \frac{100 T_s \left[ (.00267) v_{LC} + \frac{V_m}{T_m} (P_\Delta + \frac{\Delta H}{136}) \right]}{60 (\text{Theta}) v_s P_s A_n} \\
 &= \frac{100 (618) \left[ (.00267) (20.3) + \frac{(292)}{(560)} (28.12) \frac{2.46}{13.6} \right]}{60 (64) (87.25) (28.12) (.00103)} \\
 &= \frac{(61800) (.054 + 14.76)}{(9704)} \\
 &= 94.34 \%
 \end{aligned}$$

9. MASS EMISSIONS (Cyclones)

3

PARTICULATE CONCENTRATION - C

$$\begin{aligned} C &= m_s / V_{mSTD} \\ &= 922 \text{ mg} / 8.27 \text{ m}^3 \\ &= 111 \text{ mg/m}^3 \text{ or } .648 \text{ gr/SCF} \end{aligned}$$

MASS EMISSION RATE - MER

$$MER = C Q_s$$

$$\begin{aligned} MER &= (111 \text{ mg/m}^3)(260 \text{ m}^3/\text{min}) \left( \frac{1 \text{ kg}}{1,000,000 \text{ mg}} \right) \left( \frac{60 \text{ min}}{1 \text{ hr}} \right) \\ &= 1.73 \text{ kg/hr or } 3.81 \text{ lb/hr} \end{aligned}$$



PARTICULAR FIELD DATA

Plant MARANA GIN. Ambient Temp °F \_\_\_\_\_  
 Run No. 111 Bar. Press. "Hg \_\_\_\_\_  
 Location MARRAMA ARIZ. Assumed Moisture % \_\_\_\_\_  
 Date 11/5/77 Probe Tip Dia. In. \_\_\_\_\_  
 Operator H. J. Kelly Pitot Tube No. \_\_\_\_\_  
 Sample Box No. RADER A-2030-C Probe Length/type \_\_\_\_\_  
 Meter Box No. \_\_\_\_\_ Filter No. \_\_\_\_\_  
 Time: Start Time 1015 End Time 1130

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

*pic bore check*

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O AP	Sampling RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet			
A-1	1015				30			59%		
B-1	1019				30			59%		
A-2	1021				30			37%		
A-3	1023				30			59%		
B-3	1025				30			39%		
B-4	1027				30			39%		
B-4	1029				30			59%		
A-4	1031				30			5%		
A-5	1033				30			39%		
B-5	1035				30			29%		
B-6	1037				30			2%		
A-6	1042				30					
A-7	1044				30					
B-7	1046				30					
B-8	1048				30					

1000 H15

\* A - Top sect.  
 B - BOTT

*No Meter 3.5"*  
*Filter # 10404406*

*skt. DOWN TO move* →

Comments: *same above*

2 min/point.

Point	Clock	Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet					
A-8	1100				30							
A-9	1102				30							
B-9	1104				30							
B-10	1106				30							
A-10	1108				30							
A-11	1110				30							
B-11	1112				30							
B-12	1114				30							
A-12	1116				30							
A-13	1118				30							
B-13	1120				30							
B-14	1122				30							
A-14	1124				30							
A-15	1126				30							
B-15	1128				30							

shut down to move

Comments:

PARTICULAR FIELD DATA

Plant MARANA GUL Ambient Temp °F \_\_\_\_\_  
 Run No. # 2 Bar. Press. "Hg \_\_\_\_\_  
 Location MARANA ARTZ, Assumed Moisture % \_\_\_\_\_  
 Date 5/77 Probe Tip Dia. In. \_\_\_\_\_  
 Operator Handy Pitot Tube No. \_\_\_\_\_  
 Sample Box No. Under A2000c Probe Length/type \_\_\_\_\_  
 Meter Box No. \_\_\_\_\_ Filter No. \_\_\_\_\_  
WZ 3.5"

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

Time: Start Time 1350  
 End Time 1452

are-Leak check 0

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Sampling Rate (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet			
	<u>1250</u>									
A-15	<u>1352</u>			<u>30</u>	<u>30</u>	<u>90°</u>	<u>90°</u>	<u>16%</u>		
B-15	<u>1354</u>			<u>30</u>	<u>30</u>	<u>90°</u>	<u>90°</u>	<u>5%</u>		
A-14	<u>1356</u>			<u>30</u>	<u>30</u>	<u>90°</u>	<u>90°</u>	<u>5%</u>		
A-14	<u>1358</u>			<u>30</u>	<u>30</u>	<u>90°</u>	<u>90°</u>	<u>5%</u>		
A-13	<u>1300</u>			<u>30</u>	<u>30</u>	<u>92°</u>	<u>92°</u>	<u>10%</u>		
B-13	<u>1302</u>			<u>30</u>	<u>30</u>	<u>92°</u>	<u>92°</u>	<u>5%</u>		
B-12	<u>1304</u>			<u>30</u>	<u>30</u>	<u>92°</u>	<u>92°</u>	<u>5%</u>		
A-12	<u>1306</u>			<u>30</u>	<u>30</u>	<u>92°</u>	<u>92°</u>	<u>5%</u>		
A-11	<u>1308</u>			<u>30</u>	<u>30</u>	<u>93°</u>	<u>93°</u>	<u>5%</u>		
B-11	<u>1310</u>			<u>30</u>	<u>30</u>	<u>93°</u>	<u>93°</u>	<u>15%</u>		
B-10	<u>1312</u>			<u>30</u>	<u>30</u>	<u>93°</u>	<u>93°</u>	<u>40%</u>		
A-10	<u>1314</u>			<u>30</u>	<u>30</u>	<u>93°</u>	<u>93°</u>	<u>10%</u>		
A-9	<u>1316</u>			<u>30</u>	<u>30</u>	<u>95°</u>	<u>95°</u>	<u>1</u>		
B-9	<u>1318</u>			<u>30</u>	<u>30</u>	<u>95°</u>	<u>95°</u>			
B-8	<u>1320</u>			<u>30</u>	<u>30</u>	<u>97</u>	<u>97</u>			

Comments: 1200 check 0

Run # 2  
Run 220

Point	Clock	Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Airt Curvar.	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet					
A-8	1322				30	30	97	10%				
A-7	1324				30	30	97	5%				
B-7	1326				30	30	97	10%				
B-6	1328				30	30	100°	5%				
A-6	1330				30	30	100°	5%				
A-5	1332				30	30	100°	5%				
B-5	1334				30	30	100°	5%				
B-4	1336				30	30	100°	5%				
A-4	1338				30	30	100°	5%				
A-3	1340				30	30	100°	5%				
B-3	1342				30	30	100°	5%				
B-2	1344				30	30	100°	5%				
A-2	1346				30	30	100°	3%				
A-1	1348				30	30	100°	3%				
B-1	1350				30	30	100°	5%				

Comments:

PARTICULATE FIELD DATA

VERY IMPORTANT - FILL IN ALL BLANKS

Plant MARANA Gir

Ambient Temp °F \_\_\_\_\_

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Run No. 3

Location MARANA AR 12

Assumed Moisture % \_\_\_\_\_

Time: Start Time 1420

Probe Tip Dia. In. \_\_\_\_\_

Date 11/5/77

End Time \_\_\_\_\_

Pitot Tube No. \_\_\_\_\_

Operator Handy

Sample Box No. Order A2000-C

Probe Length/type \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter Box No. \_\_\_\_\_

3.5"

Filter 1644208

Pre Leak check 0

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Sampling Rate (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet			
	1420									
B-1	1420			30		95°	52°			
A-1	1420			30		95°	52°			
B-2	1420			30		95°	52°			
A-2	1428			30		95°	52°			
B-3	1430			30		95°	52°			
A-3	1432			30		95°	52°			
A-4	1434			30		95°	52°			
B-4	1436			30		95°	52°			
B-5	1438			30		97°	52°			
A-5	1440			30		97°	52°			
A-6	1442			30		97°	52°			
B-6	1444			30		97°	52°			
B-7	1446			30		97°	52°			
A-7	1448			30		97°	52°			
A-8	1450			30		98°	52°			

Comments: same check as

2201  
Run #3

Point	Clock	Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet				
B-8	1452				30		97				25%
B-9	1500				30		97				25%
A-9	1502				30		97°				10%
A-10	1509				30		97				15
B-10	1516				30		97°				40%
B-11	1512				30		97				40%
A-11	1514				30		97				10%
A-12	1516				30		97				5%
B-12	1518				30		97				5%
B-13	1520				30		95°				5%
A-13	1522				30		95				10%
A-14	1524				30		95°				15%
B-14	1526				30		95				10%
B-15	1528				30		95				10%
A-15	1530				30		95				15%

slow  
down  
no  
more

down  
to  
more

1532 end sampling run.

Comments: OK check O

PARTICULATE FIELD DATA

Plant MARANA CEM.

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. #1

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location Tuscon ARID

Assumed Moisture % \_\_\_\_\_

Date 11/11/77

Time: Start Time 0926

Probe Tip Dia. In. \_\_\_\_\_

Operator U.Z. Haxby

End Time \_\_\_\_\_

Pitot Tube No. \_\_\_\_\_

Sample Box No. A-2000-C Rader

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

NO 7 meter 1.860

Filter # 1010402

*Pre Leak Check*

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O AP	Sampling RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet			
A-1	0926				30.0	75°	75°	75		
A-2	0927	30.0			30.0	75°	70%			
A-3	0929				30.0	75°	70%			
A-4	0932				30	75°	70			
A-5	0935				30	75°	95%			
A-6	0938				30	75°	100%			
A-7	0951				30	75°	100%			
A-8	0954				30	75°	50%			
A-9	0957				30	75°	20%			
A-10	1000				30	75°	60%			
A-11	1003				30	75°	90%			
A-12	1006				30	75°	100%			
A-13	1009				30	75°	100%			
1002					shut down to more 70" section.					

*shut down  
touching  
prints.*

Comments: *A = Top section, "B" = Bottom sect.*

2202 574

Point	Clock	Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet				
B-13	1019				30	75					
B-12	1022				30	75					
B-11	1026				30	75					
B-10	1028				30	75					
B-9	1031				30	75					
B-8	1033				30	75					
B-7	1036				30	75					
<del>B-6</del>	Shut										
B-6	1043				30	75					
B-5	1043				30	75					
B-4	1048				30	75					
B-3	1051				30	75					
B-2	1054				30	75					
B-1	1057										
	1100				END of Sampling run.						
					LEAK CHECK - 0						

Comments:

PARTICULAR FIELD DATA

Ambient Temp °F \_\_\_\_\_  
 Bar. Press. "Hg \_\_\_\_\_  
 Assumed Moisture % \_\_\_\_\_  
 Probe Tip Dia. In. \_\_\_\_\_  
 Pitot Tube No. \_\_\_\_\_  
 Probe Length/type \_\_\_\_\_  
 Filter No. \_\_\_\_\_

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.

Plant MARANA GIN  
 Run No. # 2  
 Location MIRAMBA AVIZ  
LINTAGE

Time: Start Time 1320  
 End Time \_\_\_\_\_

Operator LIZ HARDY  
 Sample Box No. A-2000-C ROLVER  
 Meter Box No. \_\_\_\_\_  
 Meter NOR  
1.860

Pre Leak Check

Point Clock	Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
			Desired	Actual	Outlet	Inlet			
A-1 1320				30.0	78				
A-1 1320				30.0	78				
A-2 1323				30.0	78				
A-3 1326				30.0	78				
A-4 1329				30.0	78				
A-5 1332				30.0	78				
A-6 1335				30.0	78				
A-7 1338				30.0	78				
A-8 1341				30.0	78				
A-9 1344				30.0	78				
A-10 1347				30.0	78				
A-11 1350				30.0	80				
A-12 1353				30.0	70				
A-13 1356				30.0	80				
1359				shut down	70				

Comments:

Point	Clock	Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet				
B-13	1405			30	30	80	80	20%			
B-12	1405			30	30	85	85	10%			
B-11	1401			30	30	85	85	5%			
B-10	1414			30	30	85	85	5%			
B-9	1417			30.0	30.0	85	85	5%			
B-8	1420			30.0	30.0	85	85	10%			
B-7	1423			30	30	85	85	40%			
	1426										
B-6	1429			30	30	85	85	16%			
B-5	1432			30	30	85	85	5%			
B-4	1435			30	30	85	85	5%			
B-3	1438			30	30	85	85	15%			
B-2	1441			30	30	85	85	10%			
B-1	1444			30	30	85	85	10%			
	1447										

Down to max.

End of run.

Comments: Leak check 0

Plant MARANA CEIK  
 Run No. #3  
 Location MARANA ARIZ.  
 Date 1/4/77  
 Operator Hardy  
 Sample Box No. A-2000-C  
 Meter Box No. 1.860

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1514  
 End Time \_\_\_\_\_

Ambient Temp °F \_\_\_\_\_  
 Bar. Press. "Hg \_\_\_\_\_  
 Assumed Moisture % \_\_\_\_\_  
 Probe Tip Dia. In. \_\_\_\_\_  
 Pitot Tube No. \_\_\_\_\_  
 Probe Length/type \_\_\_\_\_  
 Filter No. \_\_\_\_\_

File - 1110408

Pre-Leak check

Point Clock	Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
			Desired	Actual	Outlet	Inlet			
A-1 1514				30		87			85%
A-2 1417				30		87			80
A-3 1420				30		87			70%
A-4 1423				30		87			50%
A-5 1426				30		87			50%
A-6 1429				30		87			60%
A-7 1432				30		87			90%
A-8 1435				30		87			60%
A-9 1438				30		87			35%
A-10 1441				30		87			10%
A-11 1444				30		87			10%
A-12 1447				30		87			10%
A-13 1450				30		87			90%
1453				shut down to move					

Comments: Leak check

STA-2200

Point	Clock	Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)	
				Desired	Actual	Outlet	Inlet					
B-13	1657				30	90	10%					
B-12	1600				30	90	10%					
B-11	1603				30	90	5%					
B-10	1606				30	90	16%					
B-9	1609				30	90	15%					
B-8	1612				30	90	15%					
B-7	1615				30	90	45%					
	1618	shut down to make										
B-6	1622				30	90	20%					
B-5	1625				30	90	10%					
B-4	1628				30	90	10%					
B-3	1631				30	90	15%					
B-2	1634				30	90	15%					
B-1	1637				30	90	10%					
	1640	end of sample Run										

Comments: less clear

PARTICULATE FIELD DATA

Plant WARRANA AIN Ambient Temp °F \_\_\_\_\_  
 Run No. 1 Bar. Press, "HG \_\_\_\_\_  
 Location 33503 Assumed Moisture % \_\_\_\_\_  
 Date 11/7/77 Probe Tip Dia. In. \_\_\_\_\_  
 Operator H ZVDY Pitot Tube No. \_\_\_\_\_  
 Sample Box No. Box # A2000-2 Probe Length/type \_\_\_\_\_  
 Meter Box No. \_\_\_\_\_ Filter No. \_\_\_\_\_

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

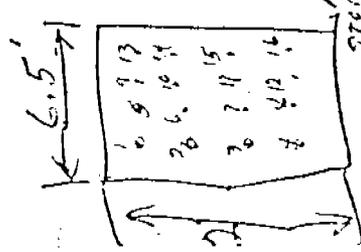
Time: Start Time 1002  
 End Time 1108

Meter 3.5" NOZZLE

Filter # 10110411

Pre-Leak Check

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Sampling RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet			
1	1002			30	30		61			
2	1006			30	30		65			
3	1010			30	30		65			
4	1016			30	30		66			
5	1020			30	30		66			
6	1024			30	30		66			
7	1028			30	30		68			
8	1032			30	30		69			
9	1038			30	30		70			
10	1040			30	30		70			
11	1044			30	30		70			
12	1048			30	30		70			
13	1052			30	30		70			
14	1054			30	30		70			
15	1100			30	30		71			
16	1104			30	30		71			



Stacked Pitot  
 Sampled 16 points, 4 min/point

Comments: 1108 End of Sample Run

PARTICULATE FIELD DATA

Plant MEYERS ARMY VERY IMPORTANT - FILL IN ALL BLANKS

Run No. # 2 Ambient Temp °F \_\_\_\_\_  
 Location 2303 Bar. Press. "Hg \_\_\_\_\_  
 Date 11/7/77 Assumed Moisture % \_\_\_\_\_  
 Operator H. J. [unclear] Probe Tip Dia. In. \_\_\_\_\_  
 Sample Box No. Randev # A200dc Pitot Tube No. \_\_\_\_\_  
 Meter Box No. \_\_\_\_\_ Probe Length/type \_\_\_\_\_  
 Filter No. \_\_\_\_\_

Read and record at the start of each test point.

Time: Start Time 1248  
 End Time 1350

Meter: 3.5" NOZZLE

Filter # 1040413

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet			
1	1248			30	30		65°			
2	1252			30	30		67°			
3	1256			30	30		68°			
4	1300			30	30		68°			
5	1304			30	30		69°			
6	1308			30	30		70°			
7	1312			30	30		70°			
8	1316			30	30		72°			
9	1320			30	30		72°			
10	1324			30	30		75°			
11	1328			30	30		75°			
12	1332			30	30		75°			
13	1336			30	30		75°			
14	1340			30	30		77°			
15	1344			30	30		77°			
16	1348			30	30		77°			

1350 End of Sample Run

3066 # 110

ST# 2203

PARTICULATE FIELD DATA

Ambient Temp °F \_\_\_\_\_  
Bar. Press. "Hg \_\_\_\_\_  
Assumed Moisture % \_\_\_\_\_  
Probe Tip Dia. In. \_\_\_\_\_  
Pitot Tube No. \_\_\_\_\_  
Probe Length/type \_\_\_\_\_  
Filter No. \_\_\_\_\_

VERY IMPORTANT - FILL IN ALL BLANKS  
Read and record at the start of each test point.  
Time: Start Time 1412  
End Time \_\_\_\_\_

Plant Benway Gen  
Run No. 3  
Location Marathon, ARIZ.  
Date 11/7/77  
Operator Hardy  
Sample Box No. Reader A2000-c  
Meter Box No. Run # 3  
Meter 3.5" NOZZLE  
Filter 10412414

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O ΔP	SAMPLING RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet			
1	1412		30		30		68°			
2	1416				30		70°			
3	1420				30		70°			
4	1424				30		71°			
5	1428				30		71°			
6	1432				30		73°			
7	1436				30		74°			
8	1440				30		74°			
9	1444				30		74°			
10	1448				30		74°			
11	1452				30		75°			
12	1456				30		75°			
13	1500				30		75°			
14	1504				30		75°			
15	1508				30		75°			
16	1512				30		75°			

Comments: 15/16 End of sample run

PARTICULATE FIELD DATA

Plant MARANA GIN  
 Run No. 3  
 Location 2204  
 Date 11/12/77  
 Operator B. RAGASE  
 Sample Box No. AERO  
 Meter Box No. AERO  
 Meter Δ H .072  
 C Factor .79

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1555  
 End Time \_\_\_\_\_

Ambient Temp °F 85  
 Bar. Press. "Hg 28.10  
 Assumed Moisture % 5  
 Probe Tip Dia. In. 1/435  
 Pitot Tube No. 3-2  
 Probe Length/type 2" SS  
 Filter No. 00, 102.

PRE LEAK TEST 0.02 CFM @ 30 in. H<sub>2</sub>O for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
N8	4	<del>7399.8</del> 7402.1	2.6	2.9	2.9	35	9					160
7	8	7399.2	2.5	2.8	2.8	34	9					158
4	12	7358.3	2.5	2.8	2.8	35	9					159
5	14	7378.6	2.5	2.8	2.8	35	9					161
4	20	7398.8	2.1	2.35	2.35	36	8					160
3	24	7416.9	1.8	2.0	2.0	37	7					158
2	28	7428.9	1.7	1.9	1.9	37	7					158
1	32	7446.5	1.8	2.0	2.0	37	7					157
N8	4	7446.5	2.2	2.5	2.5	36	8					157
7	8	7444.1	2.3	2.6	2.6	36	9					157
6	12	7482.7	2.2	2.5	2.5	36	8					158
5	16	7501.2	2.2	2.5	2.5	37	8					157
4	20	7519.2	2.4	2.7	2.7	37	9					155
3	24	7538.5	2.2	2.5	2.5	38	8					156
2	28	7558.9	2.3	2.6	2.6	38	9					156
3	32	7577.7	2.3	2.6	2.6	38	8					156

POST LEAK CHECK 0.02 CFM @ 32 in. H<sub>2</sub>O for 1 min

SAMPLE CLEANUP SHEET

Plant: Wideman Air Date: 11/12/77  
Address: Sumner Rd Operators: \_\_\_\_\_  
Station No.: 2204 \_\_\_\_\_  
Run No.: #3 Ambient Temperature: 85  
Barometric Pressure: 28.10 Sample Box Number: ACRO

Impinger 1

Final Volume 2.2 ml of distilled water  
Initial Volume 0.0 ml  
Volume collected 2.2 ml

Impinger 2

Final Volume 0 ml of empty  
Initial Volume 0 ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 758.5 gm of Silica gel  
Initial weight 722.0 gm  
Weight collected 36.5 gm

Total Volume Collected 38.7 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-122</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by J. Hardy on \_\_\_\_\_

Plant MARANA GIN  
Unit 2204

Location MARANA, ARIZONA  
Run No. 04 Date 11/13/77

$V_m$ - volume of gas metered	<u>290.1</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.12</u> in Hg
$\Delta H$ - average orifice pressure	<u>2.49</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>530</u> °R
$V_{LC}$ - volume of water collected	<u>59.5</u> ml
$CO_2$ - concentration of $CO_2$	<u>0.0</u> %
$O_2$ - concentration of $O_2$	<u>20.5</u> %
$CO$ - concentration of $CO$	<u>0.0</u> %
<small>- CONCENTRATION OF</small> $C_p$ - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>2.22</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>613</u> °R
$P_s$ - average stack pressure	<u>28.12</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
$A_n$ - area of the nozzle	<u>0.00103</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>937.9</u> g
<del>H</del> - energy input	<u>105-BTU's</u>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULATE FIELD DATA

Plant MARANA CIV

VERY IMPORTANT - FILL IN ALL BLANKS

Run No. 04

Read and record at the start of each test point.

Location R2014

Date 11/13/77

Time: Start Time 0842

Operator S.M. NEMEC

End Time 0953

Sample Box No. AERO

Meter Box No. AERO

Meter Δ H .072

C Factor .79

Ambient Temp °F 62

Bar. Press. "Hg 28.12

Assumed Moisture % 5

Probe Tip Dia. In. .435

Pitot Tube No. 3-2

Probe Length/type 2"SS

Filter No. ∞, 123

LEAK CHECK .02 cfm @ 21 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
W8	4	7600.0	2.4	2.7	2.7	12	9	N/A	N/A	N/A	N/A	152
7	8	7631.2	2.6	2.9	2.9	14	10					153
6	12	7656.5	2.6	2.9	2.9	16	10					154
5	16	7675.1	2.3	2.6	2.6	18	9					156
4	20	7692.8	2.1	2.35	2.35	19	9					153
3	24	7710.5	2.1	2.35	2.35	20	9					154
2	28	7727.3	1.8	2.0	2.0	21	8					157
1	32	7743.0	1.6	1.8	1.8	21	8					155
N8	4	7743.0	2.1	2.35	2.35	21	9					152
7	8	7760.4	2.3	2.6	2.6	22	9					154
6	12	7778.9	2.2	2.45	2.45	23	9					150
5	16	7797.0	2.4	2.7	2.7	24	9					150
4	20	7815.9	2.4	2.7	2.7	25	9					149
3	24	7834.8	2.4	2.7	2.7	26	9					148
2	28	7854.0	2.3	2.6	2.6	26	9					154
1	32	7872.7	1.9	2.15	2.15	27	8					
Comments		7890.1										

LEAK POST CHECK .06 cfm @ 19 in. Hg for 1 min

SAMPLE CLEANUP SHEET

Plant: Indiana Elm Date: 11/13/77  
 Address: Mabers Rd. Operators: \_\_\_\_\_  
 Station No.: 2204  
 Run No.: 44 Ambient Temperature: 62  
 Barometric Pressure: 28.12 Sample Box Number: A600

Impinger 1

Final Volume 2.8 ml of empt  
 Initial Volume 0 ml  
 Volume collected 2.8 ml

Impinger 2

Final Volume 2.0 ml of empt  
 Initial Volume 0 ml  
 Volume collected 2.0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_~~  
~~Initial Volume \_\_\_\_\_ ml~~  
~~Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_~~  
~~Initial Volume \_\_\_\_\_ ml~~  
~~Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 744.1 gm of silica gel  
 Initial weight 689.4 gm  
 Weight collected 54.7 gm

Total Volume Collected 5.8 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-123</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Brian P. Ague on 11/13/77

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2205

Run No. 1 Date 11/11/77

$V_m$ - volume of gas metered	<u>177.1</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.12</u> in Hg
$\Delta H$ - average orifice pressure	<u>.82</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>541</u> °R
$V_{Lc}$ - volume of water collected	<u>37.55</u> ml
$CO_2$ - concentration of $CO_2$	<u>0.0</u> %
$O_2$ - concentration of $O_2$	<u>20.5</u> %
$CO$ - concentration of $CO$	<u>0.0</u> %
<del>CONCENTRATION OF</del>	<u>      </u> %
$C_p$ - Pitot tube coefficient	<u>.79</u>
$\Delta P$ - average velocity pressure	<u>.36</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>569</u> °R
$P_s$ - average stack pressure	<u>28.12</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
$A_n$ - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
$w_s$ - weight collected	<u>153.7</u> <del>mg</del> gm
<del>H</del> - energy input	<u>      </u> <del>105</del> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

Molecular Weight Determination

Station Number 2205

Method of Analysis: Fryrite X

Orsat \_\_\_\_\_

Sample Type: Grab X

Integrated \_\_\_\_\_

Run No.	Time		CO <sub>2</sub>	O <sub>2</sub>	CO
	Collected	Analyzed			
1	2:35 pm		0	20.5	—
2			0	20.8	—
3			0	20.3	—

Leak Check: Yes

O<sub>2</sub> Check 20.5 % against AIR

CO<sub>2</sub> Check \_\_\_\_\_ % against \_\_\_\_\_

Signature: Paul R. Alessi Date: 11/17/77

Remarks:

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2205

Run No. 2 Date 11/11/77

$V_m$ - volume of gas metered	<u>195.7</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.12</u> in Hg
$\Delta H$ - average orifice pressure	<u>1.05</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>541</u> °R
$V_{Lc}$ - volume of water collected	<u>28.3</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small>	<u>0.0</u> %
$C_p$ - Pitot tube coefficient	<u>.79</u>
$\Delta P$ - average velocity pressure	<u>0.45</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>571</u> °R
$P_s$ - average stack pressure	<u>28.12</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
$A_n$ - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>147.2</u> mg
<del>H</del> - energy input	<u>105</u> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULATE FIELD DATA

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

Plant Blaine  
 Run No. 2  
 Location 2205  
 Date 11/16/77  
 Operator \_\_\_\_\_  
 Sample Box No. 1660  
 Meter Box No. 14500  
 Meter Δ H .072  
 C Factor .79

Ambient Temp °F 75  
 Bar. Press. "Hg 28.12  
 Assumed Moisture % 7  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 2FT-SS  
 Filter No. 00-118

Time: Start Time 1500  
 End Time 1610

**PRE LEAK CHECK 0.03 FT<sup>3</sup> @ 2 in H<sub>2</sub>O for 1 min**

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. HG	Impinger Temp. °F	Oven Temp. °F	Probe Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet					
108	4	6380.8	.44	1.02	1.02	26		6				111
7	8	6405.8	.46	1.08	1.08	26		6				111
6	12	6417.1	.46	1.08	1.08	26		6				111
5	16	6428.5	.45	1.05	1.05	27		6				110
4	20	6440.5	.34	.79	.79	27		5				111
3	24	6451.8	.36	.83	.83	27		6				111
2	28	6463.4	.42	.98	.98	27		6				111
1	32	6474.0	.30	.70	.70	27		5				111
N 8	4	6474.0	.49	1.15	1.15	27		6				111
7	8	6486.7	.52	1.21	1.21	27		7				111
6	12	6498.8	.52	1.21	1.21	27		7				111
5	16	6511.7	.52	1.21	1.21	28		7				110
4	20	6524.6	.52	1.25	1.25	28		7				111
3	24	6537.7	.52	1.21	1.21	28		7				110
2	28	6550.7	.49	1.12	1.12	28		6				110
1	32	6563.7	.41	.95	.95	28		6				111
Comments: <u>6575.7</u>												

**POST LEAK CHECK .05 FT<sup>3</sup> @ 2 in H<sub>2</sub>O for 1 min**

SAMPLE CLEANUP SHEET

Plant: MARANA GIN Date: 11/11/77  
Address: MARANA ARIZ. Operators: V. HARDY  
Station No.: 2205 : B. PALASE  
Run No.: 2 Ambient Temperature: 75  
Barometric Pressure: 28.12 Sample Box Number: AEROTHERM

Impinger 1

Final Volume 1 ml of EMPTY  
Initial Volume 0 ml  
Volume collected 1 ml

Impinger 2

Final Volume / ml of \_\_\_\_\_  
Initial Volume / ml  
Volume collected / ml

Impinger 3

Final Volume / ml of \_\_\_\_\_  
Initial Volume / ml  
Volume collected / ml

Impinger

Final Volume / ml of \_\_\_\_\_  
Initial Volume / ml  
Volume collected / ml

Impinger

Final weight 653.00 gm of SILICA GEL  
Initial weight 625.70 gm  
Weight collected 27.3 gm

Total Volume Collected 28.3 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-118</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. Lewis on 11/11/77

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2205

Run No. 3 Date 11/12/77

$V_m$ - volume of gas metered	<u>198.7</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.15</u> in Hg
$\Delta H$ - average orifice pressure	<u>1.10</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>526</u> °R
$V_{LC}$ - volume of water collected	<u>28.8</u> ml
$CO_2$ - concentration of $CO_2$	<u>0.0</u> %
$O_2$ - concentration of $O_2$	<u>20.5</u> %
$CO$ - concentration of $CO$	<u>0.0</u> %
<small>- CONCENTRATION OF</small> $C_p$ - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.48</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>555</u> °R
$P_s$ - average stack pressure	<u>28.15</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
$A_n$ - area of the nozzle	<u>00.00136</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>1162</u> mg g/m <sup>3</sup>
<del>H</del> - energy input	<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULATE FIELD DATA

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

Ambient Temp °F 60  
 Bar. Press. "Hg 28.15  
 Assumed Moisture % 5  
 Probe Tip Dia. In. 500  
 Pitot Tube No. 3-2  
 Probe Length/type 257-JS  
 Filter No. 00-119

Plant Produce  
 Run No. 3  
 Location 2205  
 Date 11/12/77  
 Operator S.M. NEMER  
 Sample Box No. AK60  
 Meter Box No. AS60  
 Meter Δ H .072  
 C/Factor .79

LEAK PRE CHECK .03 <sup>cfm</sup> @ 18 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
W 3	4	6580.0	5.5	1.27	1.25	14		6	N/A	N/A	N/A	94
7	8	6605.0	5.6	1.3	1.3	15		6				95
6	12	6618.3	5.6	1.3	1.3	15		6				95
5	16	6631.4	5.4	1.25	1.25	17		6				95
4	20	6644.3	4.4	1.02	1.05	18		5				95
3	24	6656.4	4.1	.96	.96	18		5				95
2	28	6668.4	3.5	.82	.82	19		5				95
1	32	6679.0	3.3	.76	.76	19		4				96
N 8	4	6679.0	5.2	1.2	1.2	19		6				95
7	8	6691.6	4.9	1.15	1.15	19		6				95
6	12	6703.5	5.0	1.16	1.15	20		6				95
5	16	6716.1	4.8	1.12	1.10	20		5				95
4	20	6728.3	4.9	1.15	1.15	20		6				96
3	24	6741.4	5.0	1.16	1.15	21		6				96
2	28	6754.1	4.7	1.10	1.1	22		5				97
1	32	6766.0	4.2	.98	.98	22		5				98
Comments:		6774.7										

LEAK POST CHECK .03 cfm @ 21 in. Hg for 1 min

PARTICULATE FIELD DATA

VERY IMPORTANT - FILL IN ALL BLANKS

Plant Marine J

Ambient Temp °F 75

Run No. #2 2207

Read and record at the start of each test point.

Bar. Press. "Hg 08.13

Location Bussan J

Assumed Moisture % 3

Date 10/10/77

Time: Start Time 1600

Probe Tip Dia. In. .500

Operator S.M. NEMEC

End Time 1710

Pitot Tube No. 3-2

Sample Box No. AP10

Probe Length/type 2FT-55

Meter Box No. HP10

Filter No. 00-114

Meter Δ H .077

C Factor .79

LEAK PRE CHECK .04 @ 23 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
N8	4	5240.0	1.4	3.2	3.2	27		10	N/A	N/A	N/A	116.5
7	8	5279.9	1.4	3.2	3.2	28		10	N/A	N/A	N/A	115
6	12	5301.3	1.4	3.2	3.2	29		10	N/A	N/A	N/A	114
5	16	5321.3	1.3	3.0	3.0	30		9	N/A	N/A	N/A	113
4	20	5341.1	1.3	3.0	3.0	31		9	N/A	N/A	N/A	113
3	24	5361.6	1.4	3.2	3.2	32		10	N/A	N/A	N/A	112
2	28	5382.1	1.4	3.2	3.2	32		10	N/A	N/A	N/A	111
1	32	5402.0	1.5	3.4	2.9	33		9	N/A	N/A	N/A	111
N8	4	5402.0	1.2	2.8	2.8	32		9	N/A	N/A	N/A	113.5
7	8	5420.6	1.2	2.8	2.8	32		9	N/A	N/A	N/A	112
6	12	5439.8	1.2	2.8	2.8	32		9	N/A	N/A	N/A	111
5	16	5459.3	1.3	3.0	3.0	32		9	N/A	N/A	N/A	110.5
4	20	5479.3	1.5	3.47	3.5	33		10	N/A	N/A	N/A	110
3	24	5500.4	1.4	3.2	3.2	33		10	N/A	N/A	N/A	110
2	28	5521.2	1.4	3.2	3.2	33		10	N/A	N/A	N/A	109
1	32	5541.4	1.5	3.4	2.9	32		10	N/A	N/A	N/A	109

LEAK POST CHECK .07 @ 24 in. Hg for 1 min.

Comments

SAMPLE CLEANUP SHEET

Plant: Madison Station Date: 11/10/77  
Address: Madison Ave Operators: \_\_\_\_\_  
Station No.: 2207  
Run No.: #5 Ambient Temperature: 75  
Barometric Pressure: \_\_\_\_\_ Sample Box Number: AELP

Impinger 1

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 603.7 gm of SILICA GEL  
Initial weight 573.6 gm  
Weight collected 30.1 gm

Total Volume Collected 30.1 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-114</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul deRivis on 10/10/77

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2207

Run No. 3 Date 11/11/77

$V_m$ - volume of gas metered	<u>305.7</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.17</u> in Hg
$\Delta H$ - average orifice pressure	<u>2.82</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>529</u> °R
$V_{LC}$ - volume of water collected	<u>56.1</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<del>CONCENTRATION OF</del> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>1.22</u> in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>564</u> °R
P <sub>s</sub> - average stack pressure	<u>28.17</u> in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
A <sub>n</sub> - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>512.4</u> mg g/m <sup>3</sup>
<del>H</del> - energy input	<u>105</u> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULAR FIELD DATA

Plant Proctor Lin Ambient Temp °F 60  
 Run No. 33 2207 Bar. Press. "Hg 28.17  
 Location Proctor Lin Assumed Moisture % 3  
 Date 11/17 Time: Start Time 0832  
 Operator S.M. NEMES End Time \_\_\_\_\_  
 Sample Box No. None Pitot Tube No. 3-2  
 Meter Box No. A660 Probe Length/type 2FT-SS  
 Meter Δ H .072 Filter No. 00-115  
 C/Factor .77

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.

LEAK PRE CHECK .04 @ 23 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
W8	4	5510.0	1.3	3.0	3.0	13		9	N/A	N/A	N/A	104.5
	7	5588.1	1.3	3.0	3.0	15		9				105
	6	5607.1	1.2	2.8	2.8	16		9				105
	5	5645.7	1.2	2.8	2.8	17		9				104
	4	5665.2	1.3	3.0	3.0	18		9				103.5
	3	5683.4	1.3	3.0	3.0	19		9				101.5
	2	5703.1	1.2	2.8	2.8	19		9				101
	1	5721.9	1.2	2.8	2.8	21		8				101
N8	4	5721.9	1.2	2.8	2.8	21		9				102
	7	5737.2	1.2	2.8	2.8	21		9				101
	6	5759.1	1.2	2.8	2.8	22		9				105
	5	5777.9	1.2	2.8	2.8	23		9				105
	4	5795.1	1.3	3.0	3.0	24		9				105
	3	5816.6	1.3	3.0	3.0	25		9				107
	2	5835.6	1.3	3.0	3.0	26		9				108
	1	5856.2	1.2	2.3	2.3	27		8				109

LEAK POST CHECK .02 @ 24 in. Hg 1 min.

Comments:

SAMPLE CLEANUP SHEET

Plant: Moran, Ar Date: 11/11/77  
Address: Moran, Ar Operators: \_\_\_\_\_  
Station No.: 2307  
Run No.: #3 Ambient Temperature: 60°F  
Barometric Pressure: 28.17 Sample Box Number: AER

Impinger 1

Final Volume 6.6 ml of empty  
Initial Volume 0 ml  
Volume collected 6.6 ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 691.0 gm of silica gel  
Initial weight 641.5 gm  
Weight collected 49.5 gm

Total Volume Collected 56.1 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>20-115</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paula Perin on 11/11/77

Plant MARANA GIN  
Unit 2207

Location MARANA, ARIZONA  
Run No. 4 Date 11/11/77

$V_m$ - volume of gas metered	<u>311.3</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.18</u>	in Hg
$\Delta H$ - average orifice pressure	<u>2.91</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>549</u>	°R
$V_{Lc}$ - volume of water collected	<u>50.37</u>	ml
$CO_2$ - concentration of $CO_2$	<u>0.0</u>	%
$O_2$ - concentration of $O_2$	<u>20.5</u>	%
$CO$ - concentration of $CO$	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> $C_p$ - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>1.28</u>	in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>575</u>	°R
$P_s$ - average stack pressure	<u>28.18</u>	in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>64</u>	min.
$A_n$ - area of the nozzle	<u>0.00136</u>	Ft <sup>2</sup>
ms - weight collected	<u>404.1</u>	mg gm
<del>H</del> - energy input		<del>105</del> BTU <sup>5</sup>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULATE FIELD DATA

Plant MARANA GIN

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F 68

Run No. 2207 #4

Read and record at the start of each test point.

Bar. Press. "Hg 28.15

Location MARANA, ARIZ.

Assumed Moisture % 3

Date 11/11/77

Time: Start Time \_\_\_\_\_

Probe Tip Dia. In. 500

Operator \_\_\_\_\_

End Time \_\_\_\_\_

Pitot Tube No. 3-2

Sample Box No. AERO

Probe Length/type 2" SS

Meter Box No. AERO

Filter No. 116

Meter Δ H 0.72

C Factor .79

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Stack Temp. °F	Stack Temp. °F (2-24100)
				Desired	Actual	Outlet	Inlet					
W 8	4	5880.0	1.3	3.0	3.0	27		9				111
7	8	5999.5	1.5	3.5	3.5	28		9				118
6	12	5940.3	1.4	3.2	3.2	29		10				116
5	16	5961.3	1.3	3.0	3.0	31		9				117
4	20	5981.5	1.4	3.2	3.2	32		10				116
3	24	6000.3	1.3	3.0	3.0	33		9				114
2	28	6020.1	1.3	3.0	3.0	34		9				113
1	32	6039.4	1.0	2.3	2.3	34		9				114
W 8	4	6039.4	1.1	2.5	2.5	33		8				113
7	8	6056.9	1.3	3.0	3.0	33		8				113
6	12	6075.2	1.3	3.0	3.0	33		9				114
5	16	6094.1	1.4	3.2	3.2	33		10				124
4	20	6114.1	1.3	3.0	3.0	33		10				118
3	24	6130.1	1.1	2.5	2.5	32		8				115
2	28	6152.0	1.3	3.0	3.0	32		9				114
1	32	6170.0	1.1	2.3	2.3	32		10				113

LEAK PRE CHECK .04 @ 23 in Hg for 1 min  
 LEAK POST CHECK .06 @ 23 in. Hg for 1 min

COMMENTS

SAMPLE CLEANUP SHEET

Plant: Morgan Hill Date: 11/11/77  
Address: Morgan Hill, Ca. Operators: \_\_\_\_\_  
Station No.: 2207  
Run No.: 44 Ambient Temperature: 65  
Barometric Pressure: 28.18 Sample Box Number: 4000

Impinger 1

Final Volume 4 ml of up  
Initial Volume 0 ml  
Volume collected 4 ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 645.00 gm of Silica Gel  
Initial weight 598.63 gm  
Weight collected 46.37 gm

Total Volume Collected 50.37 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-116</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by J. Hardy on \_\_\_\_\_

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2208

Run No. 1 Date 11/9/77

$V_m$ - volume of gas metered	<u>145.1</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.16</u>	in Hg
$\Delta H$ - average orifice pressure	<u>0.51</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>524</u>	°R
$V_{Lc}$ - volume of water collected	<u>20.4</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>1.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>0.36</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>533</u>	°R
P <sub>s</sub> - average stack pressure	<u>28.16</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>64</u>	min.
A <sub>n</sub> - area of the nozzle	<u>0.00104</u>	Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>120.6</u>	mg g/m <sup>3</sup>
<del>H</del> - energy input		<del>10<sup>6</sup> BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULATE FIELD DATA

VERY IMPORTANT - FILL IN ALL BLANKS

Plant Brookline  
 Run No. 81  
 Location 2208  
 Date 11/9/77  
 Operator S.H. NEMEC  
 Sample Box No. 1460  
 Meter Box No. 4000  
 Meter Δ H .08  
 Cp Factor .79

Ambient Temp °F 50  
 Bar. Press. "Hg 28.16  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .436  
 Pitot Tube No. 3-2  
 Probe Length/type 217-11  
 Filter No. 00-109

Read and record at the start of each test point.

Time: Start Time 0845  
 End Time 0953

LEAK PRECHECK 11 @ 18 in Hg for 1 min.

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
WS	4	4020.5							N/A	N/A	N/A	71.0
7	8	4029.3	.45	.65	.65	12	7					70.5
6	12	4038.1	.46	.66	.66	12	7					71.0
5	16	4049.8	.47	.68	.68	13	7					72.0
4	20	4057.7	.44	.64	.64	15	7					72.0
3	24	4068.2	.39	.56	.56	16	6					72.0
2	28	4077.3	.35	.51	.51	17	6					72.0
1	32	4086.1	.30	.43	.43	18	6					72.0
NS	4	4094.7	.26	.37	.37	18	5					72.0
7	8	4094.7	.32	.45	.45	19	6					72.0
6	12	4103.6	.36	.52	.52	19	6					73.0
5	16	4111.5	.35	.51	.51	19	6					74.0
4	20	4120.7	.35	.51	.51	20	6					75.0
3	24	4129.6	.37	.53	.53	20	6					75.5
2	28	4142.5	.35	.51	.51	21	6					76.5
1	32	4148.3	.24	.35	.35	21	6					77.0
Comments:		4157.7	.22	.31	.31	22	6					75.0

LEAK AFTER CHECK 17 @ 18 in Hg for 1 min

SAMPLE CLEANUP SHEET

Plant: MARANA GIN, MARANA ARIZ Date: 11/8/77  
Address: MARANA, ARIZONA Operators: P. DEPERCINI, S. NEMEC  
Station No.: 2208 : B. RABASC  
Run No.: 1 Ambient Temperature: 55  
Barometric Pressure: 28.16 Sample Box Number: AERO

Impinger 1

Final Volume 0 ml of EMPTY  
Initial Volume 0.0 ml  
Volume collected \_\_\_\_\_ ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 626.9 gm of silica gel  
Initial weight 606.5 gm  
Weight collected 20.4 gm

Total Volume Collected 20.4 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00108</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul Depercin on 11/9/77

Molecular Weight Determination

Station Number 2208

Method of Analysis: Fryrite X

Orsat \_\_\_\_\_

Sample Type: Grab X

Integrated \_\_\_\_\_

Run No.	Time		CO <sub>2</sub>	O <sub>2</sub>	CO
	Collected	Analyzed			
1	10:00 Am		0	21	—
2			0	21	—
3			0	21	—

Leak Check: Yes

O<sub>2</sub> Check 21 % against AIR

CO<sub>2</sub> Check \_\_\_\_\_ % against \_\_\_\_\_

Signature: Paul R. Beren Date: 11/17/77

Remarks:

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2208

Run No. 2 Date 11/9/77

$V_m$ - volume of gas metered	<u>154.5</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.16</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.54</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>547</u> °R
$V_{LC}$ - volume of water collected	<u>22.7</u> ml
$CO_2$ - concentration of CO <sub>2</sub>	<u>0.0</u> %
$O_2$ - concentration of O <sub>2</sub>	<u>20.5</u> %
$CO$ - concentration of CO <small>- CONCENTRATION OF</small>	<u>0.0</u> %
$C_p$ - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.21</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>546</u> °R
$P_s$ - average stack pressure	<u>28.16</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
$A_n$ - area of the nozzle	<u>.00137</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>131.6</u> mg g/m <sup>3</sup>
<del>H</del> - energy input	<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

FIELD DATA

Plant Prochem, Ltd. Ambient Temp °F 60  
 Run No. 42 Bar. Press. "Hg 28.16  
 Location 2208 Assumed Moisture % 3  
 Date 11/9/77 Probe Tip Dia. In. .501  
 Operator S.M. NEMER Pitot Tube No. 3-0  
 Sample Box No. APCO Probe Length/type 2F7-55  
 Meter Box No. APCO Filter No. 00-109  
 Meter Δ H .08

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1045  
 End Time \_\_\_\_\_

C Factor .79  
 LEAK CHECK .12 @ 17 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Stack Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
8	4	4166.0	.15	.38	.38	28	28	14	N/A	N/A		86
7	8	4182.3	.15	.38	.38	28	28	14	N/A	N/A		86
6	12	4190.7	.17	.43	.43	29	29	4	N/A	N/A		86.0
5	14	4202.7	.33	.83	.83	29	29	5	N/A	N/A		85.5
4	20	4219.6	.27	.68	.68	29	29	5	N/A	N/A		86
3	24	4222.8	.24	.60	.60	30	30	5	N/A	N/A		84.5
2	28	4232.7	.20	.50	.50	30	30	4	N/A	N/A		84.0
1	32	4240.7	.10	.25	.25	31	31	4	N/A	N/A		85.0
8	4	4240.7	.25	.63	.63	31	31	4	N/A	N/A		84
7	8	4250.7	.25	.63	.63	31	31	4	N/A	N/A		85.5
6	12	4261.0	.25	.63	.63	31	31	4	N/A	N/A		84.0
5	16	4271.2	.23	.58	.58	31	31	4	N/A	N/A		86.5
4	20	4282.5	.20	.50	.50	32	32	4	N/A	N/A		88.0
3	24	4291.2	.15	.38	.38	32	32	4	N/A	N/A		88.0
2	28	4300.1	.27	.68	.68	32	32	4	N/A	N/A		89.0
1	32	4310.4	.21	.53	.53	33	33	4	N/A	N/A		87.5

TYPICAL LEAK CHECK .17 @ 14 in. Hg for 1 min

SAMPLE CLEANUP SHEET

Plant: Mason Gin Date: 11/9/77  
 Address: Mason, A Operators: \_\_\_\_\_  
 Station No.: 2208  
 Run No.: #2 Ambient Temperature: 55  
 Barometric Pressure: \_\_\_\_\_ Sample Box Number: None

Impinger 1

Final Volume 0 ml of empty  
 Initial Volume 0 ml  
 Volume collected 0 ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final weight 634.7 gm of silica gel  
 Initial weight 612.0 gm  
 Weight collected 22.7 gm

Total Volume Collected 22.7 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>0010 9</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. Blevins on 11/9/77

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2208

Run No. 3 Date 11/9/77

$V_m$ - volume of gas metered	<u>184.1</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.12</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.96</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>544</u> °R
$V_{Lc}$ - volume of water collected	<u>19.3</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>79</u> %
$\Delta P$ - average velocity pressure	<u>0.42</u> in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>552</u> °R
P <sub>s</sub> - average stack pressure	<u>28.12</u> in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>69</u> min.
A <sub>n</sub> - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>179.0</u> mg <small>g/m</small>
<del>H</del> - energy input	<u>                    </u> 10 <sup>5</sup> - BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

Rev. 018

PARTICULAR FIELD DATA

Plant MARANNA GIN  
 Run No. 3  
 Location MARANNA PHIZ  
 Date 11/9/77  
 Operator S.M. NEMEC  
 Sample Box No. AGRO  
 Meter Box No. AEED  
 Meter Δ H , 072  
 C Factor .78

Ambient Temp °F 75  
 Bar. Press. "Hg 28.12  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 2" SS  
 Filter No. 110

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1355  
 End Time 1500

LEAK PRE CHECK .11 @ 18 in Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Impinger Temp. °F	Oven Temp. °F	Probe Stack Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet				
68	4	4338.2	.43	1.0	1.0	30		N/A	N/A	N/A	91
7	8	4361.0	.48	1.1	1.1	29					91
6	12	4373.4	.48	1.1	1.1	29					91
5	16	4386.3	.49	1.15	1.15	29					91
4	20	4398.7	.44	1.05	1.05	29					91
3	24	4410.0	.40	.93	.93	29					91
2	28	4420.4	.38	.79	.79	29					91
1	32	4430.5	.27	.62	.62	29					92
N 8	4	4430.5	.24	.56	.56	28					94
7	8	4439.7	.30	.74	.74	28					95
6	12	4449.7	.46	1.05	1.05	28					98
5	16	4461.4	.48	1.1	1.1	28					92
4	20	4473.5	.50	1.17	1.15	29					92
3	24	4486.1	.49	1.15	1.15	29					91.5
2	28	4498.6	.44	1.05	1.05	29					91.5
1	32	4510.9	.30	.90	.90	29					91.5

LEAK POST CHECK .18 @ 6 in Hg for 1 min

SAMPLE CLEANUP SHEET

Plant: Manure Pile Date: 11/8/77  
Address: Manure Pile Operators: \_\_\_\_\_  
Station No.: 2208  
Run No.: 3 Ambient Temperature: 75°F  
Barometric Pressure: 28.12 Sample Box Number: None

Impinger 1

Final Volume 0 ml of None  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 2

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 623.3 gm of silica gel  
Initial weight 604.0 gm  
Weight collected 19.3 gm

Total Volume Collected 19.3 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-140</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul L. deBorja on 11/9/77

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2208

Run No. 4 Date 11/9/77

$V_m$ - volume of gas metered	<u>173.8</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.11</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.91</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>536</u> °R
$V_{LC}$ - volume of water collected	<u>25.6</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.39</u> in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>550</u> °R
P <sub>s</sub> - average stack pressure	<u>28.11</u> in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
A <sub>n</sub> - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>152.6</u> <del>mg</del> gm
<del>H</del> - energy input	<u>                    </u> <del>105</del> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULATE FIELD DATA

Plant MARINA GIN  
 Run No. 4  
 Location 2208  
 Date 11/9/77  
 Operator S.M. NEMEC  
 Sample Box No. AERO  
 Meter Box No. AERO  
 Meter A H .072  
 C Factor .79

Ambient Temp °F 75  
 Bar. Press. "Hg 28.11  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 2" SS  
 Filter No. 111

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1540  
 End Time 1650

LEAK PRECHECK .15 @ 17 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Stack Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
W 8	4	4537.8	.21	.49		24		4	N/A	N/A		93
7	8	4550.2	.51	1.2		24		5				93
6	12	4562.4	.47	1.1		24		5				91
5	16	4574.4	.46	1.07		24		5				91
4	20	4585.8	.41	.95		25		5				91
3	24	4596.0	.32	.74		25		4				90
2	28	4605.7	.27	.65		25		4				90
1	32	4614.6	.23	.54		24		4				90
8	4	4614.6	.23	.54		24		4				89
7	8	4623.1	.25	.58		24		4				90
6	12	4631.9	.46	1.06		24		5				90
5	16	4643.3	.48	1.15		24		5				89
4	20	4655.6	.51	1.17		24		5				88
3	24	4668.0	.51	1.17		24		5				88
2	28	4681.3	.47	1.1		24		5				87.5
1	32	4692.8	.41	.95		24		5				87.

LEAK POST CHECK .11 @ 18 in Hg for 1 min

Comments  
 11/9/77

SAMPLE CLEANUP SHEET

Plant: Michigan Sil Date: 11/9/77  
Address: Marion, Ar Operators: \_\_\_\_\_  
Station No.: 2208  
Run No.: # 4 Ambient Temperature: 65  
Barometric Pressure: 28.12 Sample Box Number: AP80

Impinger 1

Final Volume 0 ml of supp  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 646.6 gm of silica gel  
Initial weight 621.0 gm  
Weight collected 25.6 gm

Total Volume Collected 25.6 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>0011</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. ... on 11/9/77

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2208

Run No. 5 Date 11/10/77

$V_m$ - volume of gas metered	<u>182.9</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.15</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.98</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>531</u> °R
$V_{Lc}$ - volume of water collected	<u>20.5</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small>	<u>          </u> %
$C_p$ - Pitot tube coefficient	<u>.79</u>
$\Delta P$ - average velocity pressure	<u>0.42</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>540</u> °R
$P_s$ - average stack pressure	<u>28.15</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
$A_n$ - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
ms - weight collected	<u>186.7</u> mg gm.
<del>H</del> - energy input	<u>          </u> <del>105 BTU</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg

PARTICULATE FIELD DATA

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

Plant Western 2nd  
 Run No. 25 2208  
 Location Burroughs  
 Date 11/10/77  
 Operator S.H. NEMER  
 Sample Box No. 1120  
 Meter Box No. 1120  
 Meter Δ H 0.022  
 C Factor .79

Ambient Temp °F 60  
 Bar. Press. "Hg 29.5  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 217-55  
 Filter No. 00-112

LEAK PRE CHECK .08 @ 19 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
W8	4	4721.3	.50	1.15	1.15	15		5	N/A	N/A	N/A	75
7	8	4733.3	.52	1.2	1.2	16		5				76.5
6	12	4745.4	.51	1.17	1.15	17		5				77
5	16	4757.8	.53	1.23	1.25	19		5				78
4	20	4769.8	.45	1.05	1.05	20		5				78
3	24	4781.2	.42	.98	.98	22		5				79
2	28	4792.1	.39	.91	.91	22		5				80
N1	32	4802.6	.35	.82	.82	23		5				80.5
8	4	4802.6	.35	.82	.82	23		5				81
7	8	4812.3	.38	.88	.88	23		5				81
6	12	4823.3	.39	.90	.90	24		5				81
5	16	4834.7	.39	.90	.90	24		6				81
4	20	4847.3	.41	.95	.95	25		5				82
3	24	4858.9	.42	.98	.98	25		5				82
2	28	4870.8	.40	.92	.92	25		6				83
	32	4882.4	.35	.82	.82	25		5				83.5

LEAK POST CHECK .11 @ 18 in. Hg for 1 min

COMMENTS:

SAMPLE CLEANUP SHEET

Plant: Marian Ln Date: 11/10/77  
Address: Marian Ln Operators: \_\_\_\_\_  
Station No.: 2208 \_\_\_\_\_  
Run No.: 85 Ambient Temperature: 60  
Barometric Pressure: 28.15 Sample Box Number: APR

Impinger 1

Final Volume 5860 ml of silica gel  
Initial Volume 565.6 ml  
Volume collected 20.4 ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight \_\_\_\_\_ gm of \_\_\_\_\_  
Initial weight \_\_\_\_\_ gm  
Weight collected \_\_\_\_\_ gm

Total Volume Collected 20.5 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-112</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. DePue on 11/9/77

Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2209

Run No. 1 Date 11/10/71

$V_m$ - volume of gas metered	<u>190.9</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.87</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.98</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>536</u> °R
$V_{Lc}$ - volume of water collected	<u>26.7</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.67</u> in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>543</u> °R
P <sub>s</sub> - average stack pressure	<u>27.87</u> in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
A <sub>n</sub> - area of the nozzle	<u>0.00104</u> Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>435.8</u> mg gmm
<del>H</del> - energy input	<u>105</u> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

PARTICULAR FIELD DATA

Plant Thames Ambient Temp °F 60  
 Run No. 81 Bar. Press. "Hg 27.87  
 Location 2209 Assumed Moisture % 3  
 Date November 7, 1949 Probe Tip Dia. In. .436  
 Operator L. G. Larson Pitot Tube No. 3-2  
 Sample Box No. APC Probe Length/type 2'-55  
 Meter Box No. 1420 Filter No. 105  
 Meter & H .08

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1100  
 End Time 1210

C Factor 179  
 Leak Check 07 Collected 15 in H<sub>2</sub> for 1 min.

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
S 8	4	3472.4	.64	.93	.98	22	22	10	N/A	N/A	N/A	87.0
7	8	3484.0	.74	1.08	1.10	23	23	11	N/A	N/A	N/A	86.5
6	12	3496.9	.66	.96	.96	23	23	11	N/A	N/A	N/A	88.0
5	16	3509.1	.72	1.05	1.05	24	24	11	N/A	N/A	N/A	88.0
4	20	3520.8	.68	.93	.93	25	25	11	N/A	N/A	N/A	87.5
3	24	3532.5	.63	.91	.91	25	25	10	N/A	N/A	N/A	89
2	28	3544.7	.74	1.08	1.10	25	25	11	N/A	N/A	N/A	89
1	32	3556.4	.58	.82	.82	26	26	10	N/A	N/A	N/A	87.0
E 8	4	3556.4	.69	1.0	1.0	25	25	6	N/A	N/A	N/A	87.0
7	8	3568.2	.72	1.05	1.05	25	25	6	N/A	N/A	N/A	89.0
6	12	3580.1	.76	1.1	1.1	25	25	6	N/A	N/A	N/A	89.0
5	16	3591.9	.67	.97	.97	25	25	6	N/A	N/A	N/A	87.0
4	20	3604.4	.66	.96	.96	26	26	6	N/A	N/A	N/A	90.0
3	24	3617.6	.67	.97	.97	27	27	6	N/A	N/A	N/A	87.0
2	28	3628.5	.63	.91	.91	25	25	6	N/A	N/A	N/A	89.0
1	32	3639.1	.63	.91	.91	24	24	6	N/A	N/A	N/A	91.0

FINAL LEAK CHECK, 05 @ 15 in H<sub>2</sub> for 1 min.



SAMPLE CLEANUP SHEET

Plant: MARANA GIN MILL Date: 11/6/77  
Address: MARANA, ARIZONA Operators: B. BAGASE, S. NEMEC, P. DEPEK  
Station No.: 2209  
Run No.: 1 Ambient Temperature: 65  
Barometric Pressure: 27.79 Sample Box Number: AELP

Impinger 1

Final Volume 610.0 ml of \_\_\_\_\_  
Initial Volume 585.7 ml  
Volume collected 24.3 ml

Impinger 2

Final Volume 606.7 ml of \_\_\_\_\_  
Initial Volume 604.3 ml  
Volume collected 2.4 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume 5 ml  
Volume collected \_\_\_\_\_ ml

Impinger

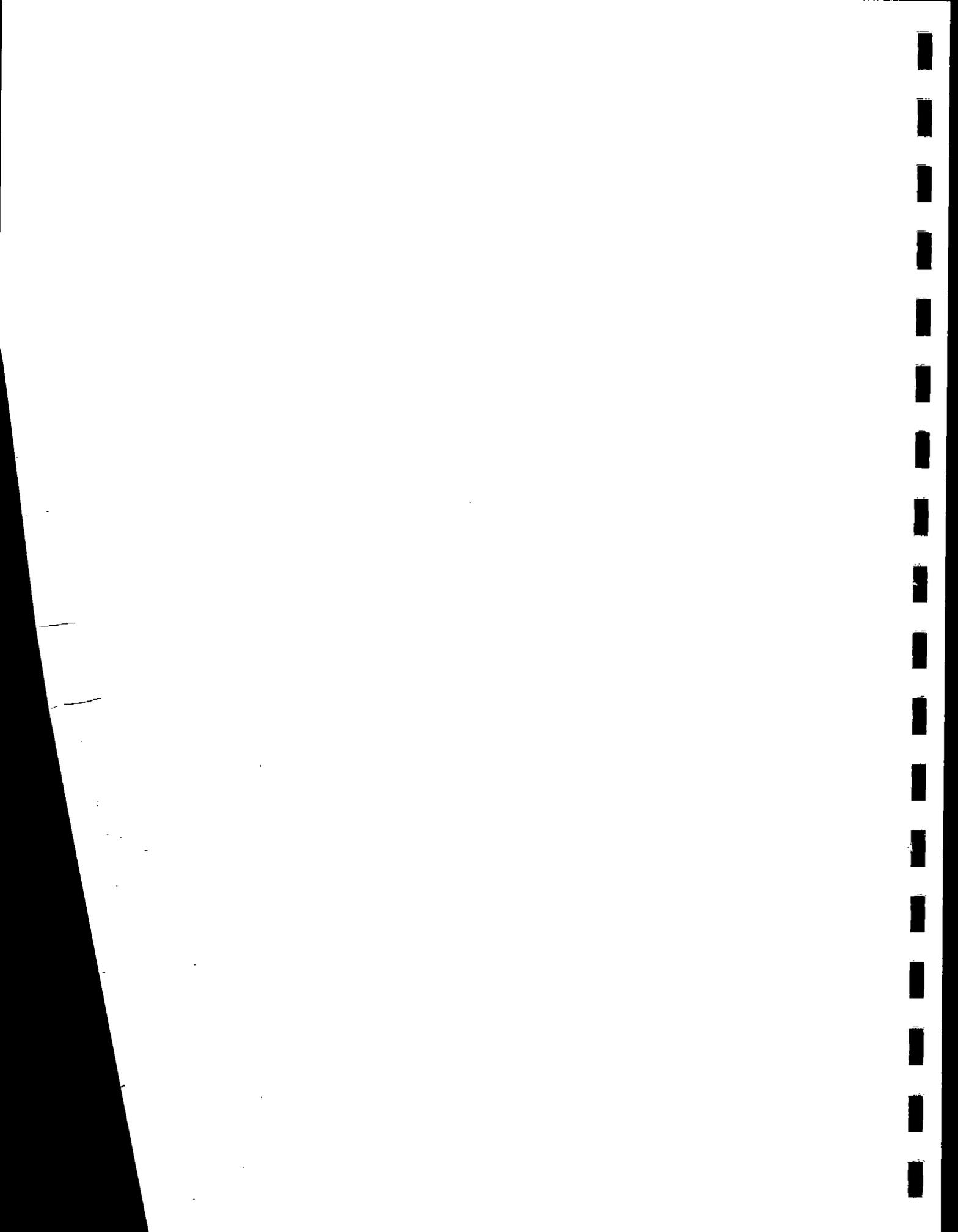
Final weight \_\_\_\_\_ gm of \_\_\_\_\_  
Initial weight \_\_\_\_\_ gm  
Weight collected \_\_\_\_\_ gm

Total Volume Collected 26.7 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00/05</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Steven M. Lopez on 11/7/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2209

Run No. 2 Date 11/7/77

$V_m$ - volume of gas metered	<u>177</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.84</u>	in Hg
$\Delta H$ - average orifice pressure	<u>0.95</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>531</u>	°R
$V_{LC}$ - volume of water collected	<u>14.7</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>0.66</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>547</u>	°R
P <sub>s</sub> - average stack pressure	<u>27.84</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>64</u>	min.
A <sub>n</sub> - area of the nozzle	<u>0.00104</u>	Ft <sup>2</sup>
ms - weight collected	<u>732.7</u>	mg gm
<del>H</del> - energy input		<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg



PARTICULAR FIELD DATA

Ambient Temp °F 70  
 Bar. Press. "Hg 27.74  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .476  
 Pitot Tube No. 3-2  
 Probe Length/type 2PT-SS  
 Filter No. 00-106

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.

Time: Start Time 1340  
 End Time 1458

Plant Thames  
 Run No. 82  
 Location 2209  
 Date 11/3/77  
 Operator S.M. NEMEC  
 Sample Box No. ACCOITERA  
 Meter Box No. AAA  
 Meter A H 107  
 C Factor .79

LEAK PRECHECK 10 @ 18 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot In. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
E 8	4	3660.0	.73	1.04	1.05	24	24	6	N/A	N/A	N/A	90.0
7	8	3681.5	.73	1.04	1.05	24	24	6	N/A	N/A	N/A	88.0
6	12	3692.6	.69	.99	.99	23	23	6	N/A	N/A	N/A	87.0
5	16	3704.0	.67	.96	.96	22	22	6	N/A	N/A	N/A	88.0
4	20	3715.3	.66	.94	.94	22	22	5	N/A	N/A	N/A	87.0
3	24	3726.5	.63	.90	.90	22	22	5	N/A	N/A	N/A	87.0
2	28	3737.6	.63	.90	.90	22	22	5	N/A	N/A	N/A	87.0
1	32	3749.0	.64	.92	.92	20	20	5	N/A	N/A	N/A	87.0
S 8	4	3749.0	.68	.98	.98	21	21	5	N/A	N/A	N/A	85.0
7	8	3759.3	.66	.94	.94	21	21	5	N/A	N/A	N/A	85.0
6	12	3770.2	.67	.96	.96	21	21	5	N/A	N/A	N/A	86.0
5	16	3782.0	.64	.92	.92	21	21	5	N/A	N/A	N/A	86.0
4	20	3793.1	.63	.90	.90	20	20	5	N/A	N/A	N/A	86.0
3	24	3804.2	.64	.92	.92	20	20	5	N/A	N/A	N/A	86.0
2	28	3814.9	.65	.93	.93	20	20	5	N/A	N/A	N/A	85.0
1	32	3826.5	.63	.92	.92	20	20	5	N/A	N/A	N/A	86.0

FINAL LEAK CHECK .09 @ 19 in. Hg for 1 min.

Comments



SAMPLE CLEANUP SHEET

Plant: Thomas King Date: 11/7/77  
Address: Thomas, Cal. Operators: C. P. Garcia  
Station No.: 2209 : NEMEC  
Run No.: 82 Ambient Temperature: 65  
Barometric Pressure: 27.84 Sample Box Number: ACH

Impinger 1

Final Volume 613.5 ml of silica gel  
Initial Volume 600.0 ml  
Volume collected 13.5 ml

Impinger 2

Final Volume 649.5 ml of silica gel  
Initial Volume 648.3 ml  
Volume collected 1.2 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight \_\_\_\_\_ gm of \_\_\_\_\_  
Initial weight \_\_\_\_\_ gm  
Weight collected \_\_\_\_\_ gm

Total Volume Collected 14.7 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-106</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul dePena on 11/7/77



Plant MARANA GIN Location MARANA, ARIZONA  
 Unit 2209 Run No. 3 Date 11/7/77

$V_m$ - volume of gas metered	<u>179.9</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.84</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.94</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>524</u> °R
$V_{Lc}$ - volume of water collected	<u>33</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
$C_p$ - <del>CONCENTRATION OF</del> Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.66</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>545</u> °R
$P_s$ - average stack pressure	<u>27.84</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>64</u> min.
$A_n$ - area of the nozzle	<u>0.00104</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>525.9</u> mg
<del>H</del> - energy input	<u>105-B</u>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
 OR 68°F AND 29.92 in Hg



PARTICULAR FIELD DATA

Ambient Temp °F 65  
 Bar. Press. "Hg 27.84  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .436  
 Pitot Tube No. 3-2  
 Probe Length/type 2" SS  
 Filter No. 107

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1550  
 End Time 1700

Plant MARANA GILL  
 Run No. 3 2309  
 Location MARANA ARIZ  
 Date 11/7/77  
 Operator S.M. NEMEC  
 Sample Box No. AEROTHERM  
 Meter Box No. AERO  
 Meter Δ H .0805  
 C Factor .79

LEAK PRE CHECK .09 @ 18 in Hg for 1 min.

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
S 8	4	3840.2	.62	.89	.89	16	5	N/A	N/A	N/A	N/A	85.0
7	8	3850.6	.66	.95	.95	16	5					87.0
6	12	3873.1	.69	.99	.99	16	5					87.0
5	16	3884.4	.63	.91	.91	17	5					86.0
4	20	3895.2	.63	.91	.91	17	5					87.0
3	24	3906.1	.67	.96	.96	18	5					87.0
2	28	3916.7	.66	.95	.95	18	5					87.0
1	32	3927.6	.64	.92	.92	18	5					85.0
E 8	4	3927.6	.67	.96	.96	18	5					83.0
7	8	3938.4	.66	.95	.95	18	5					85.0
6	12	3950.9	.68	.97	.97	18	5					84.0
5	16	3963.5	.65	.93	.93	19	5					85.0
4	20	3974.9	.68	.97	.97	19	5					84
3	24	3987.2	.64	.94	.94	19	5					84.0
2	28	3998.0	.65	.93	.93	19	5					85.0
1	32	4009.3	.66	.93	.93	19	5					84.0

FINAL LEAK CHECK .10 @ 19 in Hg for 1 min

COMMENTS



SAMPLE CLEANUP SHEET

Plant: Truman Air Date: 11/7/07  
 Address: Truman, Mo Operators: \_\_\_\_\_  
 Station No.: 2209 \_\_\_\_\_  
 Run No.: 43 Ambient Temperature: 65  
 Barometric Pressure: 29.83 Sample Box Number: AC60

Impinger 1

Final Volume 0 ml of silica gel  
 Initial Volume 0 ml  
 Volume collected 0 ml

Impinger 2

Final Volume 658.9 ml of silica gel  
 Initial Volume 625.9 ml  
 Volume collected 33.0 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final weight \_\_\_\_\_ gm of \_\_\_\_\_  
 Initial weight \_\_\_\_\_ gm  
 Weight collected \_\_\_\_\_ gm

Total Volume Collected 33 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-107</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by \_\_\_\_\_ on \_\_\_\_\_



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2211

Run No. 1 Date 11/4/77

$V_m$ - volume of gas metered	<u>292.1</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.98</u> in Hg
$\Delta H$ - average orifice pressure	<u>3.11</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>550</u> °R
$V_{Lc}$ - volume of water collected	<u>13</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>1.0</u> %
<small>- CONCENTRATION OF</small>	<u>77</u> %
$C_p$ - Pitot tube coefficient	<u>77</u> %
$\Delta P$ - average velocity pressure	<u>0.62</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>557</u> °R
$P_s$ - average stack pressure	<u>27.98</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
$A_n$ - area of the nozzle	<u>0.00104</u> Ft <sup>2</sup>
ms - weight collected	<u>3357.8</u> mg
<del>H</del> - energy input	<u>106</u> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Ambient Temp °F 80  
 Bar. Press. "Hg 29.98  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .485  
 Pitot Tube No. 302  
 Probe Length/type 2FT-SS  
 Filter No. 101  
 .set point = 365

VERY IMPORTANT - FILL IN ALL BLANKS  
 Road and record at the start of each test point.  
 Time: Start Time 1500  
 End Time 1530

Plant Dubuque, Ia  
 Run No. #1  
 Location 2211  
 Date 11/4/77  
 Operator S.M. NEMEC  
 Sample Box No. APRO  
 Meter Box No. APRO  
 Meter A H .102  
 C Factor .79

LEAK CHECK @ .180 | min.

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe/Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet					
N 10	5	256.68	.74	3.75	3.75	30°		10	N/A	N/A		95.5
5	10	258.50	.76	3.85	3.85	31°		10				
4	15	261.51	.75	3.79	3.80	32°		10				
3	20	264.05	.63	3.15	3.15	33°		9				97.0
2	25	266.71	.63	3.15	3.15	33°		9				97.0
1	30	269.35	.58	1.95	1.95	34°		6.2				98.1
END		271.46										
W 6		271.48	.72	3.61	3.60	32°		9.5				98.0
5		273.88	.67	3.39	3.40	32°		8.5				97.0
4		276.44	.64	3.25	3.25	32.0		8				97.0
3		278.97	.64	3.25	3.25	32.0		8				96.0
2		281.48	.57	2.80	2.7	33.0		7.5				97.0
1		283.64	.29	1.47	1.50	33.0		6				97.0
END		285.9										96.0

FINAL LEAK CHECK @ .130 | min

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SAMPLE CLEANUP SHEET

Plant: Marana Dam Date: Nov 3, 1997  
Address: Marana Dam Operators: JOPELIZ  
Station No.: 2211 : VENEC/RAGASC  
Run No.: #1 Ambient Temperature: 75  
Barometric Pressure: 27.98 Sample Box Number: zero

Impinger 1

Final Volume 0 ml of empty  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 639.1 gm of silica gel  
Initial weight 626.1 gm  
Weight collected 13.0 gm

Total Volume Collected 13 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-101</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Rue de la Cruz on 11/9/97



Plant MARANA

Location MARANA, ARIZONA

Unit 2211

Run No. 2 Date 11/5/77

$V_m$ - volume of gas metered	<u>176.0</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.99</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.97</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>550</u> °R
$V_{Lc}$ - volume of water collected	<u>29.2</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>1.0</u> %
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.63</u> in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>556</u> °R
P <sub>s</sub> - average stack pressure	<u>27.99</u> in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
A <sub>n</sub> - area of the nozzle	<u>.00104</u> Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>1572.5</u> mg
<del>H</del> - energy input	<del>105</del> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULAR FIELD DATA

Plant Manawa, Ill. Ambient Temp °F 80  
 Run No. #2 Bar. Press. "Hg 29.99  
 Location 22211 Assumed Moisture % 3  
 Date 11/5/77 Probe Tip Dia. In. .436  
 Operator S.M. NEMEC Pitot Tube No. 3-2  
 Sample Box No. 1110 Probe Length/type 217-51  
 Meter Box No. 1110 Filter No. 007102  
 Meter Δ H 0.0805

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1040  
 End Time 1145

LEAK CHECK .0805 @ 1 min 16 in Hg

C Factor .79

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
6	5	2900.0	.75	1.14	1.15	30	30	6	N/A	N/A	N/A	94
5	10	2917.4	.75	1.14	1.15	30	30	6				94
4	15	2931.9	.71	1.08	1.10	31	31	6				94
3	20	2948.1	.64	.97	.97	32	32	5				95
2	25	2963.7	.56	.85	.85	32	32	5				96
1	30	2977.6	.34	.52	.52	32	32	4				96
END		2989.1										
6	5	2989.1	.75	1.14	1.15	33	33	6				96.5
5	10	3004.1	.70	1.18	1.2	33	33	6				96.5
4	15	3019.6	.75	1.14	1.15	33	33	6				96
3	20	3035.6	.63	.95	.95	33	33	5				97
2	25	3050.3	.61	.93	.93	34	34	5				97
1	30	3064.6	.34	.52	.52	34	34	4				97
END		3076.0										

Comments: LEAK CHECK @ 1 min / 16 in Hg



SAMPLE CLEANUP SHEET

Plant: Innovative Systems Date: 11/5/77  
 Address: 2211 Operators: \_\_\_\_\_  
 Station No.: 2211  
 Run No.: #2 Ambient Temperature: 60  
 Barometric Pressure: 27.99 Sample Box Number: ACRO

Impinger 1

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 1

Final Volume 647.3 <sup>weight</sup> gm of silica gel  
 Initial Volume 634.3 gm  
 Volume collected 13.0 gm

Impinger 2

Final weight 674.4 gm of silica gel  
 Initial weight 658.2 gm  
 Weight collected 16.2 gm

Total Volume Collected 29.2 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>60-102</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul dePelleis on 11/5/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2211

Run No. 03 Date 11/5/77

$V_m$ - volume of gas metered	<u>182.1</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.99</u> in Hg
$\Delta H$ - average orifice pressure	<u>1.0</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>551</u> °R
$V_{Lc}$ - volume of water collected	<u>22.0</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small>	<u>7.7</u> %
$C_p$ - Pitot tube coefficient	
$\Delta P$ - average velocity pressure	<u>0.67</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>561</u> °R
$P_s$ - average stack pressure	<u>27.99</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>6.0</u> min.
$A_n$ - area of the nozzle	<u>0.0104</u> Ft <sup>2</sup>
ms - weight collected	<u>2482.8</u> mg gm
<del>H</del> - energy input	<del>105 BTU'S</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg

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PARTICULAR FIELD DATA

Plant MARANA CAN Ambient Temp °F 85  
 Run No. 03 2211 Bar. Press. "Hg. 27.99  
 Location MADONA ARIZ Assumed Moisture % 3  
 Date 11/5/77 Time: Start Time 1345 Probe Tip Dia. In. .436  
 Operator SM NEMEC End Time 1450 Pitot Tube No. 3-2  
 Sample Box No. 11 Probe Length/type 2" SS.  
 Meter Box No. 11 Filter No. 103  
 Meter Δ H .0805

PRE LEAK CHECK .01 @ 17 in Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
N 6	5	3081.0	.76	1.13	1.15	34		6	N/A	N/A	N/A	101
5	10	3097.8	.79	1.18	1.20	33		6				101
4	15	3113.0	.76	1.13	1.15	33		6				101
3	20	3129.2	.69	1.02	1.00	33		5				106.5
2	25	3145.6	.63	.94	.94	33		5				101
1	30	3159.5	.42	.61	.61	33		4				100.5
END		3172.4										
W 6	5	3172.4	.76	1.13	1.15	32		6				100
5	10	3188.4	.76	1.13	1.15	32		6				100.5
4	15	3204.4	.73	1.08	1.10	32		6				101.5
3	20	3221.2	.70	1.06	1.05	32		5				101
2	25	3236.0	.56	.83	.83	32		5				100.5
1	30	3249.1	.46	.66	.66	32		4				101
END		3263.1										

Comments: LEAK CHECK .05 @ 17 in Hg for 1 min



SAMPLE CLEANUP SHEET

Plant: Mann Gen Date: 11/5/77  
 Address: Mann Gen Operators: \_\_\_\_\_  
 Station No.: 221  
 Run No.: 3 Ambient Temperature: 85  
 Barometric Pressure: \_\_\_\_\_ Sample Box Number: 1090

Impinger 1

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume 633.9 ml of SILICA SOL  
 Initial Volume 620.8 ml  
 Volume collected 13.6 ml

Impinger

Final weight 620.0 gm of SILICA GEL  
 Initial weight 611.6 gm  
 Weight collected 8.4 gm

Total Volume Collected 22.0 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-103</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. deLima on 11/5/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2211

Run No. 04 Date 11/5/77

$V_m$ - volume of gas metered	<u>179.3</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.89</u> in Hg
$\Delta H$ - average orifice pressure	<u>1.00</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>544</u> °R
$V_{Lc}$ - volume of water collected	<u>27.3</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.71</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>559</u> °R
$P_s$ - average stack pressure	<u>27.89</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
$A_n$ - area of the nozzle	<u>0.00103</u> Ft <sup>2</sup>
ms - weight collected	<u>26.087</u> mg gm
<del>W</del> - energy input	<u>105</u> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULARS FIELD DATA

Plant MARAJAN GIN Ambient Temp °F 85  
 Run No. 04 Bar. Press. "Hg 29.89  
 Location 2211 MARAJAN Assumed Moisture % 3  
 Date 11/5/77 Time: Start Time 5:34 Probe Tip Dia. In. .435  
 Operator S.M. NEMEC End Time 10:45 Pitot Tube No. 3-2  
 Sample Box No. AEROTHERM Probe Length/type 2" SS  
 Meter Box No. " " Filter No. 104  
 Meter Δ H .0805

PRE-LEAK CHECK @ 17 in. Hg. for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
N 6	5	3270.0	.84	1.2	1.2	29		6	N/A	N/A	N/A	100.5
5	10	2285.9	.84	1.2	1.2	29		6	N/A	N/A	N/A	100
4	15	3302.0	.79	1.13	1.15	29		6	N/A	N/A	N/A	100
3	20	3317.7	.75	1.07	1.05	29		5	N/A	N/A	N/A	99.5
2	25	3333.0	.52	1.74	.77	30		4.5	N/A	N/A	N/A	99.5
1	30	3346.4	.44	1.63	1.03	30		4	N/A	N/A	N/A	99.5
END		3356.9										
N 6	5	3358.9	.82	1.16	1.15	29		6				98.5
5	10	3374.6	.82	1.16	1.15	29		6				98.5
4	15	3389.5	.80	1.13	1.15	29		6				98.0
3	20	3405.2	.72	1.02	1.0	29		5				98.0
2	25	3420.7	.65	.92	.92	29		5				98.0
1	30	3435.3	.48	.68	.65	29		4				97.5
END		3449.3										

Comments: LEAK CHECK .18 @ 15 in. Hg. for 1 min.



SAMPLE CLEANUP SHEET

Plant: William J. ... Date: 4/5/97  
 Address: Marion, Ala. Operators: \_\_\_\_\_  
 Station No.: 2211  
 Run No.: 84 Ambient Temperature: 85  
 Barometric Pressure: 27.87 Sample Box Number: ACRO

Impinger 1

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 2

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume <sup>weight</sup> 1042.0 <sup>gm</sup> ml of SILICA GEL  
 Initial Volume 629.6 ml  
 Volume collected 12.4 ml

Impinger

Final weight 612.9 gm of SILICA GEL  
 Initial weight 598.0 gm  
 Weight collected 14.9 gm

Total Volume Collected 27.3 ml

Filters

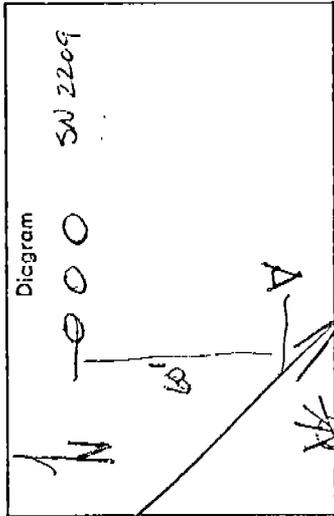
No.	Final Weight	Tare Weight	Weight Collected
<u>00-104</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by \_\_\_\_\_ on \_\_\_\_\_



# RECORD OF VISUAL DETERMINATION OF OPACITY

COMPANY Producers Cotton  
 LOCATION Marana, Ariz  
 TEST NUMBER 1  
 DATE 11-9-77  
 TYPE FACILITY Cotton gin  
 CONTROL DEVICE Cyclones



HOURS OF OBSERVATION 1400+  
 OBSERVER C. Young  
 OBSERVER CERTIFICATION DATE 10/4/77  
 POINT OF EMISSIONS cyclone top  
 HEIGHT OF DISCHARGE POINT 20'

Initial		Final
1417		1417
60'	→	
South	→	
20'	→	
Sky	→	
NW	→	
3-5	→	
75°F	→	
0°	→	
Clean	→	
white	→	
2'	→	

Set Number	Time		Sum	Average	Opacity
	Start	End			
1			0	0	0

Readings ranged from 0 to 0 % opacity  
 SIGNATURE [Signature]  
 Environmental Protection Agency  
 National Enforcement Investigations Center—Denver

REMARKS:











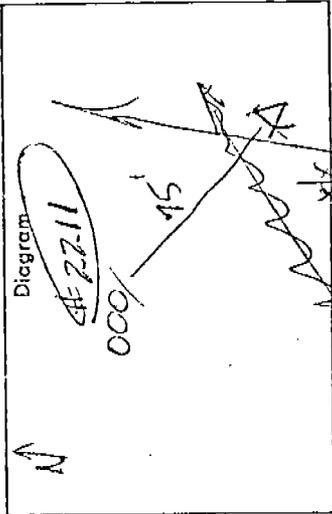
# OBSERVATION RECORD

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
	0							
	1							
09	02	10	10	10	10	✓		
09	03	10	10	10	10			
09	04	10	10	10	10			
09	05	10	10	10	10			
09	06	10	10	10	10			
09	07	10	10	10	10			
09	08	10	10	10	10			
09	09	10	10	10	10			
09	10	10	10	10	10			
09	11	10	10	10	10			
09	12	10	10	10	10			
09	13	10	10	10	10			
09	14	10	10	10	10			
09	15	10	10	10	10			
09	16	10	10	10	10			
09	17	10	10	10	10			
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# RECORD OF VISUAL DETERMINATION OF OPACITY

COMPANY Producers Cotton  
 LOCATION Marana, Ariz  
 TEST NUMBER 6  
 DATE 11-10-77  
 TYPE FACILITY ~~staple~~ Cotton gin  
 CONTROL DEVICE cyclones



HOURS OF OBSERVATION 0900-1000  
 OBSERVER Cary D. Young  
 OBSERVER CERTIFICATION DATE 10-9-77  
 POINT OF EMISSIONS cyclone top  
 HEIGHT OF DISCHARGE POINT 40 ft

Initial	Final
0930	0936
75'	
East	
40'	
Sky	
South	
~2 mph	
60°F	
< 1%	
Clear	
White	
10'	

Set Number	Time		Opacity	
	Start	End	Sum	Average
6	0930	0936	245	10

Readings ranged from 0 to 70 % opacity

SIGNATURE

Environmental Protection Agency  
 National Enforcement Investigations Center—Denver

**CLOCK TIME**  
**OBSERVER LOCATION**  
 Distance to Discharge  
 Direction from Discharge  
 Height of Observation Point  
**BACKGROUND DESCRIPTION**  
**WEATHER CONDITIONS**  
 Wind Direction  
 Wind Speed  
 Ambient Temperature  
 Humidity  
**SKY CONDITIONS** (clear, overcast, % clouds, etc.)  
**PLUME DESCRIPTION**  
 Color  
 Distance Visible

REMARKS:



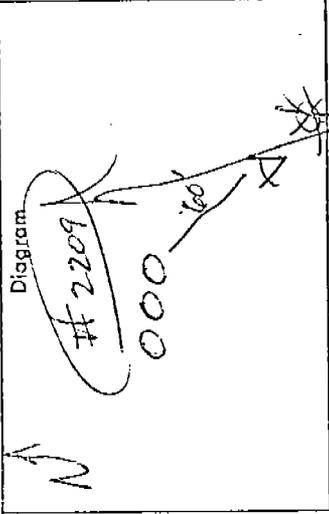
# OBSERVATION RECORD

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
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	35	5	5	10	15			
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# RECORD OF VISUAL DETERMINATION OF OPACITY

COMPANY Producers Cotton  
 LOCATION Marana, Ariz  
 TEST NUMBER 7  
 DATE 11-10-77  
 TYPE FACILITY Cotton gin  
 CONTROL DEVICE Cyclones



HOURS OF OBSERVATION 0900-1000  
 OBSERVER Gary D. Young  
 OBSERVER CERTIFICATION DATE 10-1-77  
 POINT OF EMISSIONS Cyclone Top  
 HEIGHT OF DISCHARGE POINT \_\_\_\_\_

**CLOCK TIME**  
**OBSERVER LOCATION**  
 Distance to Discharge \_\_\_\_\_  
 Direction from Discharge \_\_\_\_\_  
 Height of Observation Point \_\_\_\_\_

**BACKGROUND DESCRIPTION**  
**WEATHER CONDITIONS**  
 Wind Direction \_\_\_\_\_  
 Wind Speed \_\_\_\_\_  
 Ambient Temperature \_\_\_\_\_  
 Humidity \_\_\_\_\_

**SKY CONDITIONS** (clear, overcast, % clouds, etc.) \_\_\_\_\_  
**PLUME DESCRIPTION**  
 Color \_\_\_\_\_  
 Distance Visible \_\_\_\_\_

**REMARKS:**

## SUMMARY OF AVERAGE OPACITY

Set Number	Time		Sum	Average
	Start—	End		
7	0945	0957	45	2

Readings ranged from 0 to 5 % opacity

**SIGNATURE**

Environmental Protection Agency  
 National Enforcement Investigations Center—Denver



PARTEC FIELD DATA

Plant BURBANK GIL Ambient Temp °F \_\_\_\_\_  
 Run No. \_\_\_\_\_ Bar. Press. "Hg \_\_\_\_\_  
 Location MANHATTAN AREA 3 Assumed Moisture % \_\_\_\_\_  
 Date 11/6/77 Probe Tip Dia. In. \_\_\_\_\_  
 Operator H. Smith Pitot Tube No. \_\_\_\_\_  
 Sample Box No. CADET A2000-C Probe Length/type \_\_\_\_\_  
 Meter Box No. \_\_\_\_\_ Filter No. \_\_\_\_\_

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.

Time: Start Time 1002  
 End Time \_\_\_\_\_

Pre-Test check - O

Point	Clock	Meter, CF	Pitot in. H <sub>2</sub> O AP	Sampling RATE (CFM)		Gas Temp. °F		Temp. °F	Stack Temp. °F	Stack Temp. °F (+460)
				Desired	Actual	Outlet	Inlet			
1	1002			30	30	60°	60°			
2	1006			30	30	60°	60°			
3	1010			30	30	60°	60°			
4	1014			30	30	60°	60°			
5	1018			30	30	60°	60°			
6	1022			30	30	60°	60°			
7	1026			30	30	60°	60°			
8	1030			30	30	60°	60°			
9	1034			30	30	60°	60°			
10	1038			30	30	60°	60°			
11	1045			30	30	62°	62°			
12	1049			30	30	62°	62°			
13	1053			30	30	62°	62°			
14	1057			30	30	63°	63°			
15	1101			30	30	63°	63°			
16	1105			30	30	63°	63°			

Down to move -

Comments: Sampling Quarter points @ 4 min point  
 Leak check



2301

PARTICULAR FIELD DATA

Plant NEWBUND GIVE

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. 2

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location NEWBUND HRIZ.

Assumed Moisture % \_\_\_\_\_

Date 11/12/77

Time: Start Time 1416

Probe Tip Dia. In. \_\_\_\_\_

Operator H. J. Jody

End Time 1532

Pilot Tube No. \_\_\_\_\_

Sample Box No. Feder A 2000-C

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter

Filter # 1040426

\*DOWN TO CHANGE POINTS.

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (+460)
				Desired	Actual	Outlet	Inlet				
1	1416				30		90				
2	1426				30		89				
4	1424				30		89				
3	1428				30		89				
5	1432				30		89				
6	1436				30		89				
8	1446				30		90				
7	1444				30		90				
9	1452				30		90				
10	1454				30		90				
12	1458				30		90				
11	1502				30		90				
13	1506				30		90				
14	1510				30		91				
16	1514				30		91				
15	1518				30		91				

Cont: 1500

11/12/77 2-501

PARTICULAR FIELD DATA

Plant MAYNA GIN

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. 3

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MAYNA ARIE

Assumed Moisture % \_\_\_\_\_

Date 11/12/77

Time: Start Time 1540

Probe Tip Dia. In. \_\_\_\_\_

Operator Hardy

End Time 1646

Pilot Tube No. \_\_\_\_\_

Sample Box No. Rader A2000-C

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter 1

Filter 12410427

Shot down to move  
Burr

Point	Clock	Meter, CF	Pitot In. H <sub>2</sub> O AP	Sampling RATE (CFM)		Outlier	Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (T+460)
				Desired	Actual		Inlet	Tip				
1	1540				30		88	88				
2	1544				30		89	89				
3	1552				30		90	90				
4	1548				30		91	91				
5	1556				30		90	90				
6	1600				30		91	91				
7	1608				30		91	91				
8	1607				30		91	91				
9	1614				30		91	91				
10	1618				30		91	91				
11	1620				30		91	91				
12	1626				30		91	91				
13	1630				30		91	91				
14	1634				30		92	92				
15	1638				30		92	92				
15	1642											

Comments: 1646 End of test and check 0°

579-2302

PARTICULAR FIELD DATA

Plant MAYANA QM

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. 1

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MAYANA AVIZ.

Time: Start Time 0824

Assumed Moisture % \_\_\_\_\_

Date 11/13/77

End Time 1008

Probe Tip Dia. In. 3.5"

Operator Hardy

Sample Box No. Radon 192000-C

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Filter # 1041428

Pre-Test Check - O

DO NOT OPEN FROM 0830 TO 0900  
DO NOT OPEN METAL RUNNER

\* DO NOT TO MOVE

Point	Clock	Meter, CF	Pitot In. H <sub>2</sub> O AP	Sampling Rate (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet %				
1	0834			30			61°				
2	0906			30			67°				
4	0916			30			68°				
3	0914			30			68°				
5	0918			30			69°				
6	0922			30			69°				
8	0926			30			68°				
7	0930			30			66°				
9	0936			30			68°				
10	0946			30			68°				
12	0944			30			69°				
11	0948			30			71°				
13	0952			30			71°				
14	0956			30			72°				
16	1000			30			73°				
15	1004			30							

LOGS CHECK - O

Run # 100

PARTICULATE FIELD DATA

Plant MEYERS GIL

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. 2

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MEYERS AVE

Time: Start Time 1024

Assumed Moisture % \_\_\_\_\_

Date 11/13/77

End Time 1130

Probe Tip Dia. In. 3.5"

Operator W. Rudy

Filter Tube No. \_\_\_\_\_

Probe Length/type \_\_\_\_\_

Sample Box No. Ryder Broomer

Filter No. \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Meter \_\_\_\_\_

Filter 10410430

Pre-Leak check -

shut down  
remove 2 min

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling Rate (CFM)		Outlet °F	Inlet °F	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (+460)
				Desired	Actual						
1	1024				30		75°				
2	1028				30		75°				
4	1032				30		75°				
3	1036				30		76°				
5	1040				30		77°				
6	1044				30		75°				
8	1048				30		76°				
7	1052				30		76°				
9	1058				30		75°				
10	1102				30		76°				
12	1106				30		78°				
11	1110				30		80°				
13	1114				30		82°				
14	1118				30		83°				
16	1122				30		82°				
15	1126				30		82°				

Leak Check -

Comments: 1125 and no - 11.0

Run # 10  
Run # 2

\* Down for  
point change  
2 min.

PARTICULAR FIELD DATA

Plant MAZING CINC.

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. # 3

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MAZING AVE

Time: Start Time 1328

Assumed Moisture % \_\_\_\_\_

Date 11/13/77

End Time 1434

Probe Tip Dia. In. \_\_\_\_\_

Operator Hardy

Sample Box No. Folder A-2000-C

Pilot Tube No. 3.5"

Meter Box No. \_\_\_\_\_

Probe Length/type \_\_\_\_\_

Meter \_\_\_\_\_

Filter No. \_\_\_\_\_

1040431

Pre Leak Check - 0.

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling RATE (CFM)		Outlet °F	Gas Temp. Inlet	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (*F+460)
				Desired	Actual						
1	1328			30	30		98°				
2	1332			30	30		91°				
4	1336			30	30		92°				
3	1344			30	30		93°				
5	1344			30	30		94°				
6	1344			30	30		94°				
8	1352			30	30		93°				
7	1356			30	30		93°				
*9	1402			30	30		93°				
10	1406			30	30		93°				
12	1410			30	30		95°				
11	1414			30	30		96°				
13	1418			30	30		94°				
14	1422			30	30		93°				
16	1426			30	30		95°				
15	1430						95°				

LEAK CHECK - 0.

Cont:

Run # 3303

Down to change  
points, 3 min

Filter 10110432

Plant Michals Cim  
Run No. #1  
Location Maryland Ave  
Date 11/3/77  
Operator Harvey  
Sample Box No. Rader # A3000-c  
Meter Box No. \_\_\_\_\_  
Meter \_\_\_\_\_

VERY IMPORTANT - FILL IN ALL BLANKS  
Read and record at the start of each test point.  
Time: Start Time 1416  
End Time 1548  
Ambient Temp °F \_\_\_\_\_  
Bar. Press. "Hg \_\_\_\_\_  
Assumed Moisture % \_\_\_\_\_  
Probe Tip Dia. In. 3.5"  
Pitot Tube No. \_\_\_\_\_  
Probe length/type \_\_\_\_\_  
Filter No. \_\_\_\_\_

Point	Clock	Meter, CF	Pitot In. H <sub>2</sub> O AP	Sampling Rate (CFM)		Outlet Gas Temp. °F	Temp. °F	Temp. °F	Temp. °F	Temp. °F (°F+460)
				Desired	Actual					
1	1414				30	92				
2	1415				30	92				
3	1416				30	93				
4	1417				30	93				
5	1453				30	94				
6	1457				30	94				
7	1501				30	94				
8	1505				30	94				
9	1509				30	94				
10	1516				30	93				
11	1520				30	93				
12	1524				30	92				
13	1528				30	92				
14	1532				30	92				
15	1536				30	92				
16	1540				30	92				
17	1544				30	92				

Comments: \_\_\_\_\_

check check - 0

2305

PARTICULAR FIELD DATA

Plane MARATHA BIRD

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. # 9

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MARATHA AVIZ

Time: Start Time 1558

Assumed Moisture % \_\_\_\_\_

Date 11/13/77

End Time \_\_\_\_\_

Probe Tip Dia. In. 3.5"

Operator Harvey

Sample Box No. Rader A9000c

Pilot Tube No. \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Probe Length/type \_\_\_\_\_

Meter \_\_\_\_\_

Filter No. \_\_\_\_\_

Filter 10410433

\* Down to change points 2min

Pre-Loam check - 0-

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling RATE (Cfm)		Gas Temp. °F		Temp. °F	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet					
1	1658			30	30	93	93					
2	1602			30	30	95	95					
4	1606			30	30	98	98					
3	1610			30	30	93	93					
5	1614			30	30	92	92					
6	1618			30	30	91	91					
8	1622			30	30	89	89					
7	1624			30	30	88	88					
9	1630			30	30	88	88					
10	1634			30	30	88	88					
12	1638			30	30	88	88					
11	1642			30	30	88	88					
13	1646			30	30	88	88					
14	1650			30	30	85	85					
16	1654			30	30							
15	1658											

LEAK CHECK - 0-

Cont

3  
330  
RUN # 3

SHUT DOWN TO  
MOVE - 2. min.

PANICUL FIELD DATA

Plant MARANA RIN

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. # 3

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MARANA FINZ.

Assumed Moisture % \_\_\_\_\_

Date 11/14/77

Time: Start Time 0820

Probe Tip Dia. In. 3.5"

Operator Harvey

End Time 0926

Probe Tube No. \_\_\_\_\_

Sample Box No. Rader A9000-C

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter \_\_\_\_\_

Filter # 10110434

*One leak check - 8-*

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet				
1	0820				30		68°				
2	0824				30		78°				
4	0828				30		68°				
3	0832				30		65°				
5	0836				30		65°				
6	0840				30		67°				
8	0844				30		66°				
7	0848				30		65°				
9	0852				30		65°				
10	0858				30		65°				
12	0902				30		66°				
11	0906				30		67°				
13	0910				30		68°				
14	0914				30		69°				
16	0918				30		70°				
15	0922				30						

LEAK CHECK - 0

Comments: MARANA FINZ. 11/14/77

ST# 2304

RUN# 1 2304

PARTICULAR FIELD DATA

Plant Meyana Bin

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. 1

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MAYNA Bin

Time: Start Time 0940

Assumed Moisture % \_\_\_\_\_

Date 11/17/77

End Time 1046

Probe Tip Dia. In. 3.5"

Operator Hardy

Pilot Tube No. \_\_\_\_\_

Probe length/type \_\_\_\_\_

Sample Box No. Pader A2000-c

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter \_\_\_\_\_

Filter # 10240435

are leak checks

Par  
Point change  
2 min

Point	Clock	Meter, CF	Pitot In. H <sub>2</sub> O AP	Sampling Rate (CFM)		Gas Temp. °F	Inlet	Outlet	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (T+460)
				Desired	Actual							
1	0940				30.0	71.0	119.0					
2	0944				30	72.0						
3	0952				30	72.0						
4	0948				30	73.0						
5	0956				30	73.0						
6	1000				30	73.0						
7	1008				30	72.0						
8	1004				30	72.0						
9	1014				30	72.0						
10	1018				30	73.0						
11	1022				30	73.0						
12	1022				30	74.0						
13	1030				30	75.0						
14	1034				30	75.0						
15	1042				30	76.0						

Low BR section of screen blocked approx 6"

Run # 104

PARTICULATE FIELD DATA

Plant Mesa Mesa Mill

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. # 2

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location Mesa Mesa Mill

Assumed Moisture % \_\_\_\_\_

Date 11/14/77

Time: Start Time 1246

Probe Tip Dia. In. 3.5"

Operator H. Fordy

End Time 1352

Pilot Tube No. \_\_\_\_\_

Sample Box No. Rader A2000

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter \_\_\_\_\_

Filter 1040436

Pie bear check - 0

\* Shut down  
Tockana points  
9/min.

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling RATE (CFM)		Outlet °F	Inlet Inlet	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual						
1	1246				30.0		85°				
2	1250				30		87°				
3	1258				30		87°				
4	1254				30		86°				
5	1302				30		85°				
6	1306				30		85°				
8	1316				30		85°				
7	1314				30		87°				
9	1320				30		86°				
10	1324				30		84°				
12	1328				30		83°				
11	1332				30		83°				
13	1336				30		86°				
14	1340				30		88°				
16	1344				30		90°				
15	1348				30		91°				

Comments: 1352 End of Test

PARTICULAR FIELD DATA

Plant MARYANN QID

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. # 3

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MARYANN AVIZ.

Assumed Moisture % \_\_\_\_\_

Date 11/14/77

Time: Start Time 1410

Probe Tip Dia. In. 3.5"

Operator Hardy

End Time 1518

Pitot Tube No. \_\_\_\_\_

Sample Box No. Ryder A2000C

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter

1240438

*Pie Leak check - 0*

\* Down for point change 2 min.

Point	Clock	Meter, CF	Pitot In. H <sub>2</sub> O AP	Sampling Rate (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet					
1	1410			30	30		88					
2	1414			30	30		91					
4	1418			30	30		94					
3	1422			30	30		91					
5	1426			30	30		90					
6	1430			30	30		90					
8	1434			30	30		96					
7	1438			30	30		89					
9	1444			30	30		87					
10	1448			30	30		87					
12	1452			30	30		88					
11	1456			30	30		96					
13	1502			30	30		89					
14	1506			30	30		89					
16	1518			30	30		90					
15	1514			30	30		92					

1518 - End of Test

Com

Plant MARSH GAS

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. #1

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MARSH & A112

Time: Start Time 1534

Assumed Moisture % \_\_\_\_\_

Date 11/14/77

End Time 1638

Probe Tip Dia. In. 3.5

Operator Fordy

Probe Length/type \_\_\_\_\_

Pilot Tube No. \_\_\_\_\_

Sample Box No. Order A3000-

Filter No. \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Meter \_\_\_\_\_

Filter # 10110439

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling RATE (CFM)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet				
1	1534				30		92				
2	1536				30		96				
4	1538				30		96				
3	1540				30		92				
5	1542				30		91				
6	1544				30		92				
8	1548				30		92				
9	1548				30		92				
10	1550				30		92				
10	1552				30		92				
12	1554				30		92				
14	1556				30		90				
13	1558				30		90				
14	1600				30		90				
16	1604				30		90				
15	1606				30		90				

Comments: DO NOT SAMPLE BACK TWO POINTS BECAUSE OF WIND.

*Handwritten:* Run #1



Plant MEYERH GIN

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. # 2

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location MEYERH Av 12

Time: Start Time 0908

Assumed Moisture % \_\_\_\_\_

Date 11/15/77

End Time \_\_\_\_\_

Probe Tip Dia. In. 3.5"

Operator Hewidy

Sample Box No. Ryder A 20000-c

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter \_\_\_\_\_

Fiber A 1040440

Pre Leak Check - 0

Point	Clock	Meter, CF	Pilot In. H <sub>2</sub> O AP	Sampling RATE (cfm)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (Pt-460)
				Desired	Actual	Outlet	Inlet				
1	0908			30	30		65°				
2	0910			30	30		66°				
4	0912			30	30		66°				
3	0914			30	30		66°				
5	0916			30	30		66°				
6	0918			30	30		66°				
8	0920			30	30		67°				
7	0922			30	30		67°				
9	0924			30	30		67°				
10	0926			30	30		67°				
12	0928			30	30		67°				
11	0930			30	30		67°				
13	0932			30	30		68°				
14	0934			30	30		68°				
16	0940			30	30		68°				
15	0942			30	30		69°				

Comments:

Leak Check - 0

Small amount of water in stack

\* Down to change points 4 min.

STA 2305

RUN # 2

Sheet 2 of 2

Point	Clock	Gas Meter, CF	Pitot In. H <sub>2</sub> O AP	Sampling RATE (cfm)		Gas Temp. °F		Temp. °F	Temp. °F	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (+460)
				Desired	Actual	Outlet	Inlet						
17	0944				30		69°						
18	0946				30		69°						
20	0948				30		69°						
19	0950				30		69°						
21	0952				30		69°						
22	0954				30		69°						
24	0956				30		69°						
23	0958				30		76°						
25	1000				30		70°						
26	1002				30		78°						
	1004	End of Test											

Comments:

3/16/77

Plant NEWBUR CLIC

VERY IMPORTANT - FILL IN ALL BLANKS

Ambient Temp °F \_\_\_\_\_

Run No. # 3

Read and record at the start of each test point.

Bar. Press. "Hg \_\_\_\_\_

Location NEWBUR A1112

Assumed Moisture % \_\_\_\_\_

Date 11/15/77

Time: Start Time 1034

Probe Tip Dia. In. 3.5"

Operator Harvey

End Time 1128

Pilot Tube No. \_\_\_\_\_

Sample Box No. Order #2000-c

Probe Length/type \_\_\_\_\_

Meter Box No. \_\_\_\_\_

Filter No. \_\_\_\_\_

Meter \_\_\_\_\_

Filter # 1040441

*Pre leak check*

Point	Clock	Meter, CR	Pilot In. H <sub>2</sub> O AP	Sampling RATE (Cfm)		Gas Temp. °F		Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet				
1	1034				30		75°				
2	1036				30		76°				
3	1038				30		77°				
4	1040				30		78°				
5	1042				30		78°				
6	1044				30		78°				
7	1046				30		78°				
8	1048				30		79°				
9	1050				30		79°				
10	1052				30		79°				
11	1054				30		78°				
12	1056				30		78°				
13	1058				30		78°				
14	1100				30		78°				
15	1104				30		78°				

Comments: \_\_\_\_\_

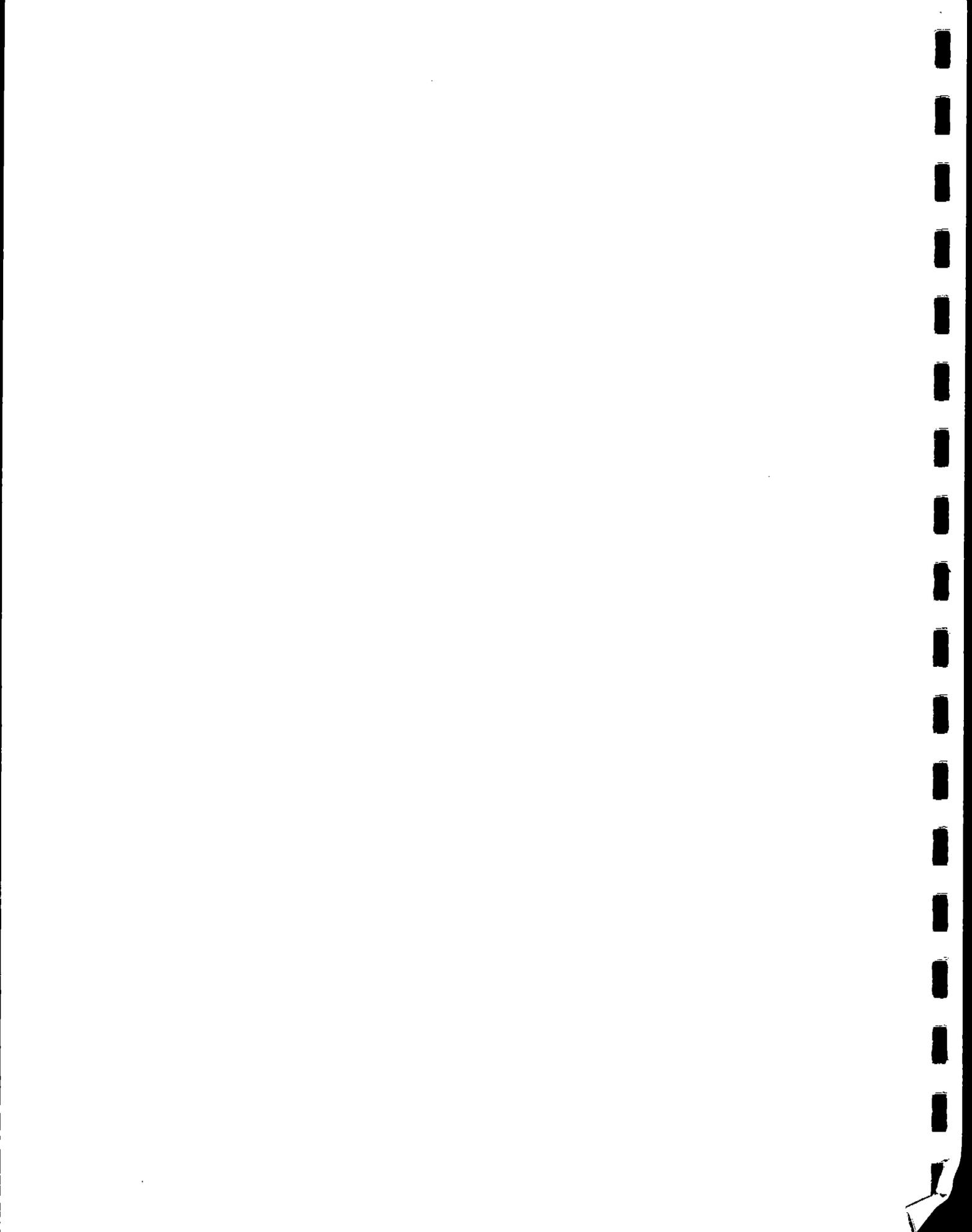
*to move  
2 min*

RUN # 3  
3774-2305

Point	Clock	Gas Meter, CF	Pitot In. H <sub>2</sub> O AP	Sampling RATE (cfm)		Gas Temp. °F		Temp. °F	Temp. °F	Temp. °F	Temp. °F	Stack Temp. °F	Stack Temp. °F (+460)
				Desired	Actual	Outlet	Inlet						
17	1108				30		78°						
18	1118				30		77°						
20	1112				30		77						
19	1114				30		78°						
21	1116				30		79°						
22	1118				30		80°						
24	1120				30		81°						
23	1122				30		82°						
25	1124				30		83°						
26	1126				30		83°						
	1128			End of Test									
				Lead Check O									

Comments:

3/16/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2306

Run No. 1 Date 4/17/77

$V_m$ - volume of gas metered	<u>288</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.05</u>	in Hg
$\Delta H$ - average orifice pressure	<u>2.71</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>531</u>	°R
$V_{Lc}$ - volume of water collected	<u>26.4</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>1.0</u>	%
<small>-- CONCENTRATION OF</small>		%
$C_p$ - Pitot tube coefficient	<u>.79</u>	
$\Delta P$ - average velocity pressure	<u>1.30</u>	in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>547</u>	°R
$P_s$ - average stack pressure	<u>28.05</u>	in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
$A_n$ - area of the nozzle	<u>.00136</u>	Ft <sup>2</sup>
$m_s$ - weight collected	<u>145.0</u>	mg g/m
<del>W - energy input</del>		<del>106 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant Industries Ltd  
 Run No. 41  
 Location 2306  
 Date 11/17/77  
 Operator S.M. NEMEC  
 Sample Box No. Ae6e  
 Meter Box No. Ae6e  
 Meter Δ H .072  
 C Factor .79

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 0845  
 End Time \_\_\_\_\_

Ambient Temp °F 60°  
 Bar. Press. "Hg 28.05  
 Assumed Moisture % 5  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 3F7-5F  
 Filter No. 00-134

PRE LEAK CHECK .03 cfm @ 16 in. Hg for 1 min.

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Stack Temp. °F	Stack Temp. °F (Average)
				Desired	Actual	Outlet	Inlet					
W6	5	9733.8	1.4	2.92	2.9	14		11				82
5	10	9759.0	1.6	3.35	3.35	16		12				83
4	15	9785.7	1.5	3.15	3.15	18		11				84
3	20	9811.1	1.5	3.15	3.15	20		11				85
2	25	9834.1	1.3	2.7	2.7	22		10				86
1	30	9855.5	7.88	1.65	1.65	23		8				87
		9855.5										
S6	5	9879.5	1.3	2.7	2.7	23		10				88
5	10	9904.9	1.5	3.15	3.15	23		11				88
4	15	9930.4	1.5	3.15	3.15	24		11				89
3	20	9954.6	1.3	2.7	2.7	25		10				90
2	25	9978.5	1.1	2.30	2.30	25		9				90
1	30	9998.0	.77	1.62	1.6	25		8				90

POST LEAK CHECK .04 cfm @ 15 in. Hg for 1 min.

Comments:



SAMPLE CLEANUP SHEET

Plant: Musson Air Date: 11/17/77  
Address: Musson A4 Operators: \_\_\_\_\_  
Station No.: 2306  
Run No.: 21 Ambient Temperature: 60  
Barometric Pressure: 28.05 Sample Box Number: APRE

Impinger 1

Final Volume 2 ml of eggs  
Initial Volume 0 ml  
Volume collected 2 ml

Impinger 2

Final Volume 0 ml of eggs  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 732.0 gm of silica gel  
Initial weight 712.8 gm  
Weight collected 24.2 gm

Total Volume Collected 26.4 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-134</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul Davis on 11/17/77



Molecular Weight Determination

Station Number 2306

Method of Analysis: Fryrite X

Orsat \_\_\_\_\_

Sample Type: Grab X

Integrated \_\_\_\_\_

Run No.	Time		CO <sub>2</sub>	O <sub>2</sub>	CO
	Collected	Analyzed			
1	9:10 Am		0	20.8	
2			0	20.9	
3			0	20.7	

Leak Check: yes

O<sub>2</sub> Check 20.9 % against AIR

CO<sub>2</sub> Check \_\_\_\_\_ % against \_\_\_\_\_

Signature: Paul A. Perini Date: 11/17/07

Remarks:



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2306

Run No. #2 Date 11/17/77

$V_m$ - volume of gas metered	<u>229.8</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.05</u>	in Hg
$\Delta H$ - average orifice pressure	<u>1.72</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>542</u>	°R
$V_{LC}$ - volume of water collected	<u>19.8</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>0.79</u>	%
$\Delta P$ - average velocity pressure	<u>1.40</u>	in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>558</u>	°R
$P_s$ - average stack pressure	<u>28.05</u>	in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
$A_n$ - area of the nozzle	<u>.00103</u>	Ft <sup>2</sup>
$m_s$ - weight collected	<u>160.2</u>	gms
<del>H</del> - energy input		<del>105 BTU'S</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
 OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant Magma Lin Ambient Temp °F 70  
 Run No. 82 Bar. Press. "Hg 28.05  
 Location 2306 Assumed Moisture % 5  
 Date 11/17/97 Probe Tip Dia. In. .435  
 Operator BRIAN RAUBASE Pitot Tube No. 3-2  
 Sample Box No. APR Probe Length/type 2 FT-55  
 Meter Box No. APR Filter No. 00-13  
 Meter Δ H .072

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

Time: Start Time 1025 End Time 1130

Qp Factor .79  
 PRE LEAK CHECK .08 CFM @ 15 IN Hg FOR 1 MIN

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
		10000.2										
6	5	10018.5	1.5	1.85	1.85	24	6					95
5	10	10037.8	1.6	1.97	1.97	25	7					95
4	15	10059.8	1.6	1.97	1.97	26	7					96
3	20	10079.9	1.5	1.85	1.85	26	7					97
2	25	10098.9	1.4	1.73	1.73	27	7					98
1	30	10116.8	1.3	1.60	1.60	28	6					98
		10116.8										
6	5	10134.9	1.3	1.60	1.60	28	6					98
5	10	10152.6	1.6	1.97	1.97	29	8					98
4	15	10172.2	1.6	1.97	1.97	29	7					99
3	20	10199.0	1.4	1.73	1.73	30	7					100
2	25	10212.4	1.9	1.98	1.98	31	6					100
1	30	10230.0	1.8	1.96	1.96	31	5					101

Comments:



SAMPLE CLEANUP SHEET

Plant: Mason Dr Date: 11/7/77  
 Address: Lawrence, CA Operators: \_\_\_\_\_  
 Station No.: 2308  
 Run No.: 42 Ambient Temperature: 70  
 Barometric Pressure: 28.05 Sample Box Number: APK0

Impinger 1

Final Volume 1 ml of exp  
 Initial Volume 0 ml  
 Volume collected 1 ml

Impinger 2

Final Volume 0 ml of exp  
 Initial Volume 0 ml  
 Volume collected 0 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final weight 6333 gm of SILICA gel  
 Initial weight 6145 gm  
 Weight collected 18.8 gm

Total Volume Collected 19.8 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-135</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paulo de Perce on 11/7/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2306

Run No. 3 Date 11/17/77

$V_m$ - volume of gas metered	<u>234.0</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.02</u>	in Hg
$\Delta H$ - average orifice pressure	<u>1.66</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>55.5</u>	°R
$V_{Lc}$ - volume of water collected	<u>24.2</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>1.37</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>56.5</u>	°R
P <sub>s</sub> - average stack pressure	<u>28.02</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
A <sub>n</sub> - area of the nozzle	<u>.00103</u>	Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>93.6</u>	g
<del>H</del> - energy input		<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant Moham  
 Run No. #3  
 Location 2306  
 Date 11/17/77  
 Operator S.M. NEMEC  
 Sample Box No. AP10  
 Meter Box No. A620  
 Meter A H 1072  
 C Factor 79

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.  
 Time: Start Time 1250 End Time 1355  
 Ambient Temp °F 85  
 Bar. Press. "Hg 28.02  
 Assumed Moisture % 5  
 Probe Tip Dia. In. 0.435  
 Pitot Tube No. 3-2  
 Probe Length/type 2 FT-55  
 Filter No. 005-136

PRE LEAK TEST .11 @ 18 in. Hg for 1min.

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
W.P.		10250.0							N/A	N/A	N/A	(24460)
5	5	10270.7	1.5	1.85	32		8					102
4	10	10290.9	1.5	1.85	33		8					104
3	15	10311.2	1.5	1.85	34		8					105
2	20	10330.5	1.5	1.85	34		8					105
1	25	10350.2	1.4	1.73	35		8					105
	30	10367.6	1.3	1.65	35		6					105
		10367.6										
56	5	10387.0	1.4	1.73	35		8					106
5	10	10408.4	1.7	2.10	35		8					105
4	15	10428.6	1.6	1.98	35		8					106
3	20	10449.9	1.4	1.73	36		8					107
2	25	10468.4	1.3	1.60	36		7					107
1	30	10484.0	1.1	1.46	38		5					107

POST LEAK CHECK = 0.7 CFM @ 16 in Hg for 1min

Comments:



SAMPLE CLEANUP SHEET

Plant: Marathon Oil Date: 11/17/77  
Address: Midway, Okla. Operators: \_\_\_\_\_  
Station No.: 2306  
Run No.: 3 Ambient Temperature: 85  
Barometric Pressure: 28.02 Sample Box Number: NR00

Impinger 1

Final Volume 1 ml of empty  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 2

Final Volume 0 ml of empty  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 664.8 gm of silica gel  
Initial weight 641.6 gm  
Weight collected 23.2 gm

Total Volume Collected 24.2 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-136</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. dePlessin on 11/17/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2307

Run No. 1 Date 11/16/77

$V_m$ - volume of gas metered	<u>219.4</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.05</u>	in Hg
$\Delta H$ - average orifice pressure	<u>1.53</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>52.6</u>	°R
$V_{Lc}$ - volume of water collected	<u>25.6</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>0.72</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>58.1</u>	°R
P <sub>s</sub> - average stack pressure	<u>28.05</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>.00103</u>	Ft <sup>2</sup>
Theta - sample time	<u>6<sup>0</sup></u>	min.
A <sub>n</sub> - area of the nozzle	<u>0.00136</u>	Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>101.8</u>	mg g/m
<del>W - energy input</del>		<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Ambient Temp °F 60  
 Bar. Press. "Hg 28.05  
 Assumed Moisture % 2  
 Probe Tip Dia. In. 5.00  
 Pitot Tube No. 3-2  
 Probe Length/type 2FI-55  
 Filter No. 00-131

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 0840  
 End Time 0945

Plant Proctor  
 Run No. 41  
 Location 2307  
 Date 11/16/77  
 Operator S.M. NEMER  
 Sample Box No. AP60  
 Meter Box No. AP60  
 Meter Δ H .072  
 C<sub>p</sub> Factor .79

PRE LEAK CHECK .02 cfm @ 16 in Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
6	5	9062.0	.75	1.6	1.6	14		7				122
5	10	9081.5	.80	1.7	1.7	15		7				123
4	15	9100.3	.80	1.7	1.7	16		7				110
3	20	9119.0	.87	1.85	1.85	18		7				104
2	25	9137.5	.74	1.57	1.55	19		7				114
1	30	9154.5	.51	1.08	1.08	19		6				119
		9154.5										
6	5	9173.2	.78	1.66	1.65	19		7				122
5	10	9191.0	.76	1.62	1.60	20		7				124
4	15	9209.8	.78	1.66	1.65	20		7				127
3	20	9228.9	.75	1.6	1.6	21		7				128
2	25	9247.7	.65	1.38	1.4	22		6				130
1	30	9266.4	.48	.96	.96	22		5				130

POST LEAK CHECK .03 cfm @ 18 in Hg for 1 min.



SAMPLE CLEANUP SHEET

Plant: Marathon Refining Date: 11/6/77  
Address: Marathon, TX Operators: \_\_\_\_\_  
Station No.: 2807 \_\_\_\_\_  
Run No.: 41 Ambient Temperature: 60  
Barometric Pressure: 28.05 Sample Box Number: AER0

Impinger 1

Final Volume 3 ml of empty  
Initial Volume 0 ml  
Volume collected 3 ml

Impinger 2

Final Volume 0 ml of empty  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 646.1 gm of SILICASEL  
Initial weight 623.5 gm  
Weight collected 22.6 gm

Total Volume Collected 25.6 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-131</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paula R. Perini on 11/6/77



Molecular Weight Determination

Station Number 2307

Method of Analysis: Fryrite X

Orsat \_\_\_\_\_

Sample Type: Grab X

Integrated \_\_\_\_\_

Run No.	Time		CO <sub>2</sub>	O <sub>2</sub>	CO
	Collected	Analyzed			
1	9:50 am		0	20.5	—
2			0	20.5	—
3			0	20.5	—

Leak Check: YES

O<sub>2</sub> Check 20.5 % against AIR

CO<sub>2</sub> Check \_\_\_\_\_ % against \_\_\_\_\_

Signature: Paul R. Brown Date: 11/17/77

Remarks:



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2317

Run No. 2 Date 11/16/77

$V_m$ - volume of gas metered	<u>214.1</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.05</u>	in Hg
$\Delta H$ - average orifice pressure	<u>1.42</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>544</u>	°R
$V_{Lc}$ - volume of water collected	<u>40.8</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>0.72</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>602</u>	°R
P <sub>s</sub> - average stack pressure	<u>28.05</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
A <sub>n</sub> - area of the nozzle	<u>0.0136</u>	Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>145.9</u>	mg gm
<del>W</del> - energy input		<del>106 BTU'S</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PANICUT YIELD DATA

Plant Zabala, Inc. Ambient Temp °F 115  
 Run No. #12 Bar. Press. "Hg. 28.05  
 Location 2307 Assumed Moisture % 22%  
 Date 11/16/77 Probe Tip Dia. In. .500  
 Operator BRIAN RAGASE Pitot Tube No. 3-2  
 Sample Box No. AERO Probe Length/type DFT-X  
 Meter Box No. AERO Filter No. 005, 132  
 Meter Δ H .072

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1026 End Time \_\_\_\_\_

Operator 179 PAE LEAK CHECK 04 CFM AT 20 IN H<sub>2</sub>O F 17 IN

Point	Clock	Dry Gas Meter, CF	Pitot In. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F	Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual						
6	5	9287.7	.72	1.42	1.42	24	6				135
5	10	9305.4	.73	1.45	1.45	25	6				138
4	15	9322.7	.76	1.50	1.50	26	7				138
3	20	9341.2	.78	1.56	1.56	27	7				141
2	25	9360.5	.74	1.45	1.45	28	6				140
1	30	9378.4	.60	1.18	1.18	29	6				141
		9378.4									
6	5	9396.4	.76	1.50	1.50	30	7				143
5	10	9413.0	.79	1.56	1.56	30	7				144
4	15	9433.8	.79	1.56	1.56	31	7				144
3	20	9451.4	.78	1.53	1.53	32	7				144
2	25	9470.4	.68	1.34	1.34	33	6				146
1	30	9485.1	.49	.97	.97	33	6				146

POST LEAK CHECK 05 CFM @ 20 IN H<sub>2</sub>O F 17 IN

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Comments:



SAMPLE CLEANUP SHEET

Plant: Moham, Albin Date: 11/16/77  
 Address: Moham, Al. Operators: \_\_\_\_\_  
 Station No.: 2307  
 Run No.: 42 Ambient Temperature: 65  
 Barometric Pressure: 28.05 Sample Box Number: APRO

Impinger 1

Final Volume 2.0 ml of empt  
 Initial Volume 0 ml  
 Volume collected 2 ml

Impinger 2

Final Volume 0 ml of empt  
 Initial Volume 0 ml  
 Volume collected 0 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final weight 724.3 gm of SILICA GEL  
 Initial weight 685.5 gm  
 Weight collected 38.8 gm

Total Volume Collected 40.8 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-132</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. DePera on 11/16/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2307

Run No. 3 Date 11/16/77

$V_m$ - volume of gas metered	<u>218.7</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>28.04</u> in Hg
$\Delta H$ - average orifice pressure	<u>1.42</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>556</u> °R
$V_{Lc}$ - volume of water collected	<u>41.8</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.76</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>608</u> °R
$P_s$ - average stack pressure	<u>28.04</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
$A_n$ - area of the nozzle	<u>.00136</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>139.9</u> mg
<del>H - energy input</del>	<del>105 BTU</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant Prosser Bldg Ambient Temp °F 75  
 Run No. 283 Bar. Press. "Hg 28.04  
 Location 2307 Assumed Moisture % 2  
 Date 11/16/77 Probe Tip Dia. In. 1.500  
 Operator S.M. NEMEC Pitot Tube No. 3-2  
 Sample Box No. AP10 Probe Length/type 2FT-SS  
 Meter Box No. AP10 Filter No. 00-13  
 Meter Δ H 0.072  
 C/Factor 1.27

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

Time: Start Time 1308  
 End Time 1413

PRE LEAK CHECK .02 cfm @ 20 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum in. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
6	5	9507.7	.75	1.48	1.50	36		6	N/A	N/A	N/A	145
5	10	9526.1	.79	1.56	1.55	36		6	N/A	N/A	N/A	147
4	15	9545.9	.81	1.60	1.60	35		7	N/A	N/A	N/A	148
3	20	9564.8	.83	1.62	1.60	36		7	N/A	N/A	N/A	149
2	25	9582.4	.79	1.56	1.55	36		6	N/A	N/A	N/A	150
1	30	9599.5	.63	1.24	1.25	36		6	N/A	N/A	N/A	151
		9599.5										
6	5	9618.4	.82	1.62	1.60	35		7				148
5	10	9637.7	.86	1.70	1.70	35		7				144
4	15	9656.8	.87	1.72	1.70	35		7				146
3	20	9675.7	.80	1.58	1.6	35		7				149
2	25	9693.4	.71	1.4	1.4	35		6				149
1	30	9708.7	.57	1.02	1.0	35		5				151

POST LEAK CHECK .03 cfm @ 17 in. Hg for 1 min

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SAMPLE CLEANUP SHEET

Plant: Marathon Oil Date: 11/16/77  
Address: Marathon, Ok. Operators: \_\_\_\_\_  
Station No.: 2307 : \_\_\_\_\_  
Run No.: 7 Ambient Temperature: 85°F  
Barometric Pressure: 28.04 Sample Box Number: 1900

Impinger 1

Final Volume 2 ml of appt  
Initial Volume 0 ml  
Volume collected 2 ml

Impinger 2

Final Volume 0 ml of appt  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 762.2 gm of silver gel  
Initial weight 720.4 gm  
Weight collected 41.8 gm

Total Volume Collected \_\_\_\_\_ ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-133</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. Levi on 11/16/77

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Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2308

Run No. 1 Date 11/18/77

$V_m$ - volume of gas metered	<u>73.9</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.90</u>	in Hg
$\Delta H$ - average orifice pressure	<u>.119</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>538</u>	°R
$V_{Lc}$ - volume of water collected	<u>10.5</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.77</u>	%
$\Delta P$ - average velocity pressure	<u>.095</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>558</u>	°R
P <sub>s</sub> - average stack pressure	<u>27.90</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
A <sub>n</sub> - area of the nozzle	<u>.00136</u>	Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>326.1</u>	g <sub>m</sub>
<del>H</del> - energy input		<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg

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PARTICULATE FIELD DATA

Plant Process Unit Ambient Temp °F 80  
 Run No. 21 Bar. Press. "Hg. 29.96  
 Location 2308 Assumed Moisture % 5  
 Date 11/18/77 Probe Tip Dia. In. 500  
 Operator S.M. NEMEC Pitot Tube No. 3-2  
 Sample Box No. ACC Probe Length/type 2.5T-55  
 Meter Box No. ACT Filter No. 00-137  
 Meter Δ H 0.72

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1310  
 End Time 1434

PRE LEAK CHECK .03 cfm @ 15 in Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice AH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
E 6	5	10490.0	.10	.123	.125	85		3	N/A	N/A	N/A	98
5	10	10502.6	.10	.123	.125	25		3				100
4	15	10509.8	.10	.123	.125	25		3				96
3	20	10517.9	.10	.123	.125	25		3				98
2	25	10522.1	.08	.10	.10	26		3				99
1	30	10527.0	.08	.10	.10	26		3				100
N 6	5	10532.4	.10	.123	.125	26		3				96
5	10	10539.8	.10	.123	.125	26		3				96
4	15	10546.1	.095	1.15	1.15	26		3				96
3	20	10552.7	.10	.123	.125	26		3				99
2	25	10558.8	.10	.123	.125	27		3				101
1	30	10563.9	.09	1.1	1.1	26		3				99

POST LEAK CHECK .05 cfm @ 18 in Hg for 1 min

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SAMPLE CLEANUP SHEET

Plant: Tracor Jim Date: 11/18/77  
 Address: Tracor Co. Operators: \_\_\_\_\_  
 Station No.: 2368  
 Run No.: 41 Ambient Temperature: 65  
 Barometric Pressure: 27.88 Sample Box Number: 1010

Impinger 1

Final Volume 0 ml of eggs  
 Initial Volume 0 ml  
 Volume collected 0 ml

Impinger 2

Final Volume 0 ml of eggs  
 Initial Volume 0 ml  
 Volume collected 0 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final weight 691.1 gm of carbon gel  
 Initial weight 680.6 gm  
 Weight collected 10.5 gm

Total Volume Collected 10.5 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-137</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. dePena on 11/18/77

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Molecular Weight Determination

Station Number 2308

Method of Analysis: Fryrite X

Orsat \_\_\_\_\_

Sample Type: Grab X

Integrated \_\_\_\_\_

Run No.	Time		CO <sub>2</sub>	O <sub>2</sub>	CO
	Collected	Analyzed			
1	10:10 Am		0	21	-
2			0	21	-
3			0	21	-

Leak Check: YES

O<sub>2</sub> Check 21 % against AIR

CO<sub>2</sub> Check \_\_\_\_\_ % against \_\_\_\_\_

Signature: Paul R. dePina Date: 11/12/77

Remarks:



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2308

Run No. 2 Date 4/18/77

$V_m$ - volume of gas metered	<u>83.7</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.88</u>	in. Hg
$\Delta H$ - average orifice pressure	<u>.156</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>5.36</u>	°R
$V_{LC}$ - volume of water collected	<u>11.9</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>0.7</u>	%
$\Delta P$ - average velocity pressure	<u>0.13</u>	<sup>← .126</sup> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>0.556</u>	°R
$P_s$ - average stack pressure	<u>27.88</u>	in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
$A_n$ - area of the nozzle	<u>0.00136</u>	Ft <sup>2</sup>
ms - weight collected	<u>486.5</u>	mg
<del>H</del> - energy input		<del>105 BTU'S</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant Manom Lin  
 Run No. #2  
 Location 2308  
 Date 11/18/77  
 Operator S.M. NEMER  
 Sample Box No. AC120  
 Meter Box No. AC120  
 Meter A H 1072  
 C Factor 79

Ambient Temp °F 80  
 Bar. Press. "Hg 22.88  
 Assumed Moisture % 5  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 2FT55  
 Filter No. 007138

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1530  
 End Time \_\_\_\_\_

PRE LEAK CHECK, 19 cfm @ 16 in Hg for 1 min.

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O AP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum in. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
6	5	10576.7	.15	.185	.185	25	4	N/A	N/A	N/A	N/A	99
5	10	10583.3	.16	.195	.195	25	4	N/A	N/A	N/A	N/A	98
4	15	10590.4	.14	.175	.175	25	4	N/A	N/A	N/A	N/A	98
3	20	10596.5	.13	.16	.16	25	3	N/A	N/A	N/A	N/A	97
2	25	10604.4	.13	.16	.16	25	3	N/A	N/A	N/A	N/A	99
1	30	10610.0	.10	.125	.125	25	3	N/A	N/A	N/A	N/A	95
6	5	10617.9	.12	.148	.150	24	3					94
5	10	10625.8	.13	.16	.16	24	3					92
4	15	10631.9	.13	.16	.16	24	3					94
3	20	10638.8	.12	.148	.150	24	3					95
2	25	10645.9	.10	.123	.125	24	3					95
1	30	10652.1	.10	.123	.125	23	3					95

POST LEAK CHECK, 17 cfm @ 13 in Hg for 1 min.

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SAMPLE CLEANUP SHEET

Plant: Marathon Date: 11/18/77  
Address: Marathon, Okla Operators: \_\_\_\_\_  
Station No.: 2308  
Run No.: 42 Ambient Temperature: 75  
Barometric Pressure: 27.88 Sample Box Number: ACPO

Impinger 1

Final Volume 1.0 ml of eggs  
Initial Volume 0 ml  
Volume collected 1 ml

Impinger 2

Final Volume 0 ml of eggs  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 682.0 gm of silver gel  
Initial weight 671.1 gm  
Weight collected 10.9 gm

Total Volume Collected 11.9 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-138</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Brian L. Rayse on 11/18/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2308

Run No. 3 Date 11/19/77

$V_m$ - volume of gas metered	<u>79.3</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.85</u> in Hg
$\Delta H$ - average orifice pressure	<u>.146</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>52.0</u> °R
$V_{LC}$ - volume of water collected	<u>15.5</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<del>CONCENTRATION OF</del>	<u>0.79</u> %
$C_p$ - Pitot tube coefficient	
$\Delta P$ - average velocity pressure	<u>0.12</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>544</u> °R
$P_s$ - average stack pressure	<u>27.85</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
$A_n$ - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
ms - weight collected	<u>193.1</u> mg <del>g/m</del>
<del>H - energy input</del>	<u>106 BTU'S</u>

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

VERY IMPORTANT - FILL IN ALL BLANKS

Plant Johnson  
 Run No. 3  
 Location 2308  
 Date 11/19/77  
 Operator S.M. NEMEC  
 Sample Box No. APRO  
 Meter Box No. APRO  
 Meter Δ H .072  
 C Factor 79

Read and record at the start of each test point.

Time: Start Time 1821  
 End Time \_\_\_\_\_

Ambient Temp °F 60  
 Bar. Press. "Hg 27.55  
 Assumed Moisture % 5  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 2FT-11  
 Filter No. 20-139

PRE LEAK CHECK .09 cfm @ 15 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
6	5	10658.8	.13	.165	.165	14		3	N/A	N/A		82
5	10	10665.8	.14	.178	.180	14		3	N/A	N/A		82
4	15	10672.1	.13	.165	.165	14		3	N/A	N/A		82
3	20	10678.4	.12	.152	.150	14		3	N/A	N/A		82
2	25	10684.6	.11	.140	.140	15		3	N/A	N/A		82
1	30	10690.4	.082	.107	.105	15		3	N/A	N/A		81
		10690.4										
6	5	10696.7	.11	.140	.140	15		3				83
5	10	10702.5	.12	.152	.150	15		3				84
4	15	10710.4	.13	.165	.165	16		3				83
3	20	10716.9	.11	.140	.140	17		3				85
2	25	10723.2	.11	.140	.140	18		3				85
1	30	10729.4	.09	.115	.115	19		3				88

POST LEAK CHECK .10 cfm @ 15 in Hg for 1 min

Comments:



SAMPLE CLEANUP SHEET

Plant: Marathon Oil Date: 11/19/77  
Address: Marathon, TX Operators: \_\_\_\_\_  
Station No.: 2308  
Run No.: #3 Ambient Temperature: 60  
Barometric Pressure: 27.85 Sample Box Number: 10900

Impinger 1

Final Volume 1 ml of empty  
Initial Volume 0 ml  
Volume collected 1 ml

Impinger 2

Final Volume 0 ml of empty  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight ~~636.7~~ 651.2 gm of silica gel  
Initial weight 636.7 gm  
Weight collected 14.5 gm

Total Volume Collected 15.5 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-139</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul A. Perini on 11/19/77



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2309

Run No. 1 Date 4/15/77

$V_m$ - volume of gas metered	<u>111.3</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.98</u>	in Hg
$\Delta H$ - average orifice pressure	<u>0.30</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>525</u>	°R
$V_{LC}$ - volume of water collected	<u>33.6</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>0.27</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>624</u>	°R
P <sub>s</sub> - average stack pressure	<u>27.98</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
A <sub>n</sub> - area of the nozzle	<u>0.00103</u>	Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>318.7</u>	mg
<del>H</del> - energy input		<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Ambient Temp °F 60  
 Bar. Press. "Hg 27.98  
 Assumed Moisture % 5  
 Probe Tip Dia. In. .435  
 Pitot Tube No. 3-2  
 Probe Length/type 2FT-55  
 Filter No. 20-127

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 0908  
 End Time 1011

Plant Proton  
 Run No. 41  
 Location 2109  
 Date 11/15/77  
 Operator S.M. NEMEK  
 Sample Box No. 1480  
 Meter Box No. Ae20  
 Meter Δ H 0.72  
 C/Factor 2.79

PRE LEAK CHECK - .06 cfm @ 20 in Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
		84747							N/A	N/A	N/A	(°F+60)
6	5	84849	.30	.34	.34	16		4				164
5	10	8493.9	.26	.30	.30	16		4				166
4	15	8502.4	.30	.34	.34	17		4				165
3	20	8512.8	.30	.34	.34	17		4				162
2	25	8521.8	.25	.29	.29	18		4				164
1	30	8529.6	.15	.173	.175	18		4				164
		8529.6										<del>164</del>
6	5	8534.2	.30	.34	.34	19		4				164
5	10	8549.0	.31	.35	.35	20		4				165
4	15	8558.6	.30	.34	.34	20		4				165
3	20	8568.2	.28	.32	.32	20		4				164
2	25	8577.5	.25	.29	.29	21		4				164
1	30	8586.0	.20	.23	.23	21		4				165

POST LEAK CHECK - .05 cfm @ 21 in Hg for 1 min

Comments:



SAMPLE CLEANUP SHEET

Plant: Intercon Alu Date: 11/15/77  
Address: Intercon, Ala. Operators: \_\_\_\_\_  
Station No.: 2309 : \_\_\_\_\_  
Run No.: #1 Ambient Temperature: 60  
Barometric Pressure: 27.98 Sample Box Number: APCO

Impinger 1

Final Volume 2 ml of apc  
Initial Volume 0 ml  
Volume collected 2 ml

Impinger 2

Final Volume 1 ml of apc  
Initial Volume 0 ml  
Volume collected 1 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 725.9 gm of silica gel  
Initial weight 695.3 gm  
Weight collected 30.6 gm

Total Volume Collected 33.6 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-127</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. de Perren on 11/15/77



Molecular Weight Determination

Station Number 2309

Method of Analysis: Fryrite X

Orsat \_\_\_\_\_

Sample Type: Grab X

Integrated \_\_\_\_\_

Run No.	Time		CO <sub>2</sub>	O <sub>2</sub>	CO
	Collected	Analyzed			
1	11:00 pm		0	21	—
2			0	21	—
3			0	21	—

Leak Check: yes

O<sub>2</sub> Check 21 % against AIR

CO<sub>2</sub> Check \_\_\_\_\_ % against \_\_\_\_\_

Signature: Pure K. de R. de R. Date: 11/17/77

Remarks:



Plant MARANA GIN

Location MARANA, ARIZONA

Unit 2309

Run No. 2 Date 11/15/77

$V_m$ - volume of gas metered	<u>142.6</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.99</u>	in Hg
$\Delta H$ - average orifice pressure	<u>0.58</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>543</u>	°R
$V_{Lc}$ - volume of water collected	<u>42.1</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>— CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>0.79</u>	%
$\Delta P$ - average velocity pressure	<u>0.26</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>640</u>	°R
P <sub>s</sub> - average stack pressure	<u>27.99</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
A <sub>n</sub> - area of the nozzle	<u>0.00136</u>	Ft <sup>2</sup>
m <sub>s</sub> - weight collected	<u>521.6</u>	g
<del>H - energy input</del>		<del>105 BTU's</del>

STANDARD CONDITIONS — 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant MARANA GIN

Run No. 2 2309

Location MARANA ANIZ

Date 11/15/77

Operator BRIAN RAGASE

Sample Box No. AERO

Meter Box No. AERO

Meter Δ H .072

C Factor .79

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

Time: Start Time 1100

End Time \_\_\_\_\_

Ambient Temp °F 72

Bar. Press. "Hg 27.97

Assumed Moisture % 5

Probe Tip Dia. In. 1.500

Pitot Tube No. 3-2

Probe Length/type 2 FT / STAINLESS

Filter No. 00, 128

PRE LEAK CHECK .04 cfm @ 21" Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
		8590.1										
4	5	8601.1	.28	.58	.58	24	14					174
5	10	8612.2	.30	.62	.62	25	15					174
4	15	8626.5	.32	.66	.66	26	4					174
3	20	8637.7	.32	.66	.66	27	4					178
2	25	8650.8	.28	.58	.58	27	4					180
1	30	8662.1	.19	.39	.39	28	4					180
		8662.1										
5	5	8673.9	.28	.58	.58	29	4					180
5	10	8686.5	.32	.66	.66	29	4					181
4	15	8699.1	.32	.66	.66	30	4					182
3	20	8710.3	.28	.58	.58	31	4					184
2	25	8722.3	.28	.58	.58	31	4					185
1	30	8732.7	.19	.39	.39	32	4					187

PRE LEAK CHECK .03 CFM @ 25" Hg for 1 min

Comments:



SAMPLE CLEANUP SHEET

Plant: Marathon Oil Date: 11/15/77  
Address: Marathon, TX Operators: \_\_\_\_\_  
Station No.: 2309  
Run No.: #2 Ambient Temperature: 72  
Barometric Pressure: 27.99" Sample Box Number: APCC

Impinger 1

Final Volume 3 ml of apt  
Initial Volume 0 ml  
Volume collected 3 ml

Impinger 2

Final Volume 2 ml of apt  
Initial Volume 0 ml  
Volume collected 2 ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml

Impinger

Final weight 767.8 gm of silica gel  
Initial weight 730.7 gm  
Weight collected 37.1 gm

Total Volume Collected 42.1 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>no-128</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. Roberts on 11/15/77



Plant 1

Location MARANA, ARIZONA

Unit 2309

Run No. 3 Date 11/18/77

$V_m$ - volume of gas metered	<u>145.4</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.94</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.60</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>556</u> °R
$V_{LC}$ - volume of water collected	<u>40.1</u> ml
$CO_2$ - concentration of $CO_2$	<u>0.0</u> %
$O_2$ - concentration of $O_2$	<u>20.5</u> %
$CO$ - concentration of $CO$	<u>0.0</u> %
<small>- CONCENTRATION OF</small> $C_p$ - Pitot tube coefficient	<u>.79</u> %
$\Delta P$ - average velocity pressure	<u>0.30</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>647</u> °R
$P_s$ - average stack pressure	<u>27.94</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
$A_n$ - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>367.8</u> mg <del>gm</del>
<del>Energy input</del>	<u>105 BTU</u>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant Monsanto Inc  
 Run No. #3  
 Location 2309  
 Date 11/15/67  
 Operator S.M. NEMETZ  
 Sample Box No. APRO  
 Meter Box No. APRO  
 Meter Δ H 0.072  
 Q factor 179

Ambient Temp °F 85  
 Bar. Press. "Hg 27.94  
 Assumed Moisture % 3  
 Probe Tip Dia. In. .500  
 Pitot Tube No. 3-2  
 Probe Length/type 21FT SS  
 Filter No. 00-12

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1330  
 End Time \_\_\_\_\_

PRE LEAK CHECK .06 cfm @ 22 in. of Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
6	5	8740.0	.31	.63	.63	35	4	N/A	N/A	N/A	N/A	186
5	10	8763.5	.31	.63	.63	35	4	N/A	N/A	N/A	N/A	187
4	15	8775.9	.31	.63	.63	35	4	N/A	N/A	N/A	N/A	187
3	20	8788.7	.33	.66	.66	35	4	N/A	N/A	N/A	N/A	186
2	25	8800.5	.28	.56	.56	35	4	N/A	N/A	N/A	N/A	186
1	30	8810.3	.20	.405	.405	36	4	N/A	N/A	N/A	N/A	187
		8811.3										
6	5	8823.7	.31	.63	.63	36	4					184
5	10	8835.8	.33	.66	.66	36	4					186
4	15	8850.0	.35	.71	.71	36	4					186
3	20	8862.6	.33	.66	.66	36	4					186
2	25	8874.3	.28	.54	.54	36	4					189
1	30	8885.4	.24	.47	.47	36	4					189

POST LEAK CHECK .07 cfm @ 19 in Hg for 1 min.



Plant MARANA GIN Location MARANA, ARIZONA  
Unit 2309 Run No. 4 Date 1/15/77

$V_m$ - volume of gas metered	<u>142.6</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.93</u> in Hg
$\Delta H$ - average orifice pressure	<u>0.61</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>552</u> °R
$V_{LC}$ - volume of water collected	<u>37.85</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<small>— CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>0.77</u> %
$\Delta P$ - average velocity pressure	<u>31</u> in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>647</u> °R
P <sub>s</sub> - average stack pressure	<u>27.93</u> in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
A <sub>n</sub> - area of the nozzle	<u>0.00136</u> Ft <sup>2</sup>
ms - weight collected	<u>316.1</u> <del>mg</del> gm
<del>H - energy input</del>	<del>705-BTU'S</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant HARANA SIN Ambient Temp °F 80  
 Run No. 4 Bar. Press. "Hg 27.93  
 Location HP 2309 Assumed Moisture % 2  
 Date 11/15/77 Probe Tip Dia. In. .500  
 Operator ERIAN BAGASE Pitot Tube No. 3-2  
 Sample Box No. AER0 Probe Length/type 2 FT/SS  
 Meter Box No. AER0 Filter No. 00129

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1505 End Time \_\_\_\_\_

Meter Δ H .072  
 C Factor .79

**PRE BEAK CHECK .01 CFM @ 15 in Hg FOR 1 MIN**

Point	Clock	Dry Gas Meter, CF	Pitot, in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
		8896.1										
11	5	8800.4	.28	.54	.54	34		4				190
5	10	8911.4	.30	.58	.58	33		4				190
4	15	8923.5	.32	.62	.62	33		4				189
3	20	8936.5	.32	.62	.62	33		4				189
2	25	8948.7	.31	.60	.60	33		4				188
1	30	8959.7	.24	.465	.465	33		4				187
5	5	8971.2	.34	.66	.66	33		4				183
5	10	8985.0	.37	.72	.72	33		4				184
4	15	8999.2	.37	.72	.72	33		4				186
3	20	9009.8	.35	.68	.68	33		4				187
2	25	9028.0	.33	.62	.62	33		4				187
1	30	9032.1	.23	.445	.445	33		4				188

Comments:



SAMPLE CLEANUP SHEET

Plant: Marathon Date: 11/15/77  
Address: Marathon, Ok Operators: \_\_\_\_\_  
Station No.: 2309  
Run No.: 4 Ambient Temperature: 80  
Barometric Pressure: 27.92 Sample Box Number: AERO

Impinger 1

Final Volume 2.2 ml of empty  
Initial Volume 0 ml  
Volume collected 2.2 ml

Impinger 2

Final Volume 0 ml of empty  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 742.85 gm of Silica gel  
Initial weight 707.20 gm  
Weight collected 35.65 gm

Total Volume Collected 37.85 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-130</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by BRIAN RAGASE on 11/15/77



Plant MARANA GIN Location MARANA, ARIZONA

Unit 231 Run No. 1 Date 11/11/77

$V_m$ - volume of gas metered	<u>196.3</u> Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.94</u> in Hg
$\Delta H$ - average orifice pressure	<u>1.10</u> in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>565</u> °R
$V_{Lc}$ - volume of water collected	<u>52.0</u> ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u> %
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u> %
CO - concentration of CO	<u>0.0</u> %
<del>CONCENTRATION OF</del>	<u>0.0</u> %
$C_p$ - Pitot tube coefficient	<u>0.79</u>
$\Delta P$ - average velocity pressure	<u>1.00</u> in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>650</u> °R
$P_s$ - average stack pressure	<u>27.94</u> in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u> Ft <sup>2</sup>
Theta - sample time	<u>60</u> min.
$A_n$ - area of the nozzle	<u>0.00103</u> Ft <sup>2</sup>
$m_s$ - weight collected	<u>186.1</u> mg gm
<del>Energy input</del>	<u>105</u> BTU's

STANDARD CONDITIONS - 20°C AND 76 cm Hg

OR 68°F AND 29.92 in Hg



PARTICULATE FIELD DATA

Plant Monsieur 241

Ambient Temp °F 85

Run No. 7-1

VERY IMPORTANT - FILL IN ALL BLANKS

Bar. Press. "Hg 29.94

Location 2300

Assumed Moisture % 5

Date 11/14/67

Read and record at the start of each test point.

Time: Start Time 1248

Operator S.M. NEMEC

End Time 1352

Pitot Tube No. 3-2

Sample Box No. AP60

Probe Length/type 2FT-55

Meter Box No. AP60

Filter No. 00-124

Meter Δ H .070

C/Factor 1.79

LEAK PRECHECK .03 cfm @ 22 in of Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F
				Desired	Actual	Outlet	Inlet					
		7890.0							N/A	N/A	N/A	(77+60)
W6	5	7907.4	1.05	1.15	1.15	37		5	N/A			188
	10	7924.4	1.05	1.15	1.15	38		5				188
	15	7940.9	1.05	1.15	1.15	36		5				189
	20	7958.1	1.2	1.32	1.30	40		6				197
	25	7974.4	.99	1.08	1.10	41		6				188
	30	7988.8	.76	.84	.84	41		5				188
		7988.8										
56	5	8005.6	1.1	1.2	1.12	41		6				188
	10	8022.5	1.1	1.2	1.2	42		6				188
	15	8039.7	1.15	1.25	1.25	42		6				189
	20	8056.2	1.05	1.15	1.15	42		6				196
	25	8071.6	.87	.95	.95	42		5				192
	30	8086.3	.67	.74	.74	43		5				192

LEAK POST CHECK .03 cfm @ 15 in Hg for 1 min.



SAMPLE CLEANUP SHEET

Plant: Moham Elm Date: 11/13/77  
 Address: Moham. / Cor. Operators: \_\_\_\_\_  
 Station No.: 2310 \_\_\_\_\_  
 Run No.: #1 Ambient Temperature: 85  
 Barometric Pressure: 27.94 Sample Box Number: 1920

Impinger 1

Final Volume 2 ml of empty  
 Initial Volume 0 ml  
 Volume collected 2 ml

Impinger 2

Final Volume 0 ml of empty  
 Initial Volume 0 ml  
 Volume collected 0 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 766.7 gm of silica gel  
 Initial weight 766.7 gm  
 Weight collected 60.0 gm

Total Volume Collected 52.0 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-124</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. Dupuis on 11/14/77



Molecular Weight Determination

Station Number 2310

Method of Analysis: Fryrite X

Orsat \_\_\_\_\_

Sample Type: Grab X

Integrated \_\_\_\_\_

Run No.	Time		CO <sub>2</sub>	O <sub>2</sub>	CO
	Collected	Analyzed			
1	2:00 pm		0	21	-
2			0	21	-
3			0	21	-

Leak Check: YES

O<sub>2</sub> Check 21 % against AIR

CO<sub>2</sub> Check \_\_\_\_\_ % against \_\_\_\_\_

Signature: Paul R. ... Date: 11/17/77

Remarks:



Plant MARANA GIN Location MARANA, ARIZONA  
 Unit 231 Run No. 2 Date 11/14/77

$V_m$ - volume of gas metered	<u>192.1</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.90</u>	in Hg
$\Delta H$ - average orifice pressure	<u>1.15</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>565</u>	°R
$V_{LC}$ - volume of water collected	<u>48.9</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>.79</u>	%
$\Delta P$ - average velocity pressure	<u>1.06</u>	in H <sub>2</sub> O
$T_s$ - average stack temperature	<u>649</u>	°R
$P_s$ - average stack pressure	<u>27.90</u>	in H <sub>2</sub> O
$A_s$ - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
$A_n$ - area of the nozzle	<u>0.00103</u>	Ft <sup>2</sup>
$m_s$ - weight collected	<u>219.1</u>	mg
<del>H - energy input</del>		<del>105 BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
 OR 68°F AND 29.92 in Hg



PARTICULATE YIELD DATA

Plant Proton Lin  
 Run No. 2310  
 Location 2310  
 Date 11/17/57  
 Operator B. RAGASE  
 Sample Box No. 2000  
 Meter Box No. AC100  
 Meter Δ H 1.072  
 Factor 29

Ambient Temp °F 85  
 Bar. Press. "Hg 29.90  
 Assumed Moisture % 5  
 Probe Tip Dia. In. 4.35  
 Pitot Tube No. 3-2  
 Probe Length/type DFT-55  
 Filter No. CO-128

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1448  
 End Time \_\_\_\_\_

LEAK PRECHECK .06 @ 16 in. Hg for 1 min

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °F		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Stack Temp. °F	Stack Temp. °F (°F+460)
				Desired	Actual	Outlet	Inlet					
116	5	8126.2	1.0	1.1	1.1	30		5				190
5	10	8126.1	1.1	1.3	1.3	40		6				170
4	15	8138.3	1.2	1.3	1.3	41		6				189
3	20	8155.2	1.2	1.3	1.3	41		6				158
2	25	8171.4	1.1	1.2	1.2	41		5				189
1	30	8186.7	1.55	1.4	1.4	41		5				188
		8186.7										
5	5	8202.7	1.1	1.2	1.2	41		5				186
5	10	8219.3	1.2	1.3	1.3	40		6				187
4	15	8236.5	1.2	1.3	1.3	40		6				190
3	20	8254.1	1.1	1.2	1.2	40		6				190
2	25	8269.8	1.0	1.1	1.1	40		5				189
1	30	8282.1	1.61	1.68	1.68	40		5				191
Final												

POST LEAK CHECK .07 CFM @ 16 in. Hg for 1 min

Comments:



SAMPLE CLEANUP SHEET

Plant: Mason Lin Date: 11/14/77  
Address: Mason Lin Operators: \_\_\_\_\_  
Station No.: 2310  
Run No.: 2 Ambient Temperature: 75  
Barometric Pressure: 27.90 Sample Box Number: APRO

Impinger 1

Final Volume 0 ml of empty  
Initial Volume 0 ml  
Volume collected 0 ml

Impinger 2

Final Volume 2 ml of empty  
Initial Volume 0 ml  
Volume collected 2 ml

Impinger 3

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

~~Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
Initial Volume \_\_\_\_\_ ml  
Volume collected \_\_\_\_\_ ml~~

Impinger

Final weight 747.6 gm of silica gel  
Initial weight 701.7 gm  
Weight collected 46.9 gm

Total Volume Collected 4.9 ml

Filters

No.	Final Weight	Tare Weight	Weight Collected
<u>00-125</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Paul R. deLoraine on 11/14/77



Plant MARANA GIN Location MARANA, ARIZONA

Unit 2310 Run No. 3 Date 11/14/77

$V_m$ - volume of gas metered	<u>190.1</u>	Ft <sup>3</sup>
$P_b$ - barometric pressure	<u>27.88</u>	in Hg
$\Delta H$ - average orifice pressure	<u>1.08</u>	in H <sub>2</sub> O
$T_m$ - average meter temperature	<u>557</u>	°R
$V_{LC}$ - volume of water collected	<u>55.55</u>	ml
CO <sub>2</sub> - concentration of CO <sub>2</sub>	<u>0.0</u>	%
O <sub>2</sub> - concentration of O <sub>2</sub>	<u>20.5</u>	%
CO - concentration of CO	<u>0.0</u>	%
<small>- CONCENTRATION OF</small> C <sub>p</sub> - Pitot tube coefficient	<u>0.79</u>	%
$\Delta P$ - average velocity pressure	<u>0.86</u>	in H <sub>2</sub> O
T <sub>s</sub> - average stack temperature	<u>646</u>	°R
P <sub>s</sub> - average stack pressure	<u>27.88</u>	in H <sub>2</sub> O
A <sub>s</sub> - area of the stack	<u>2.18</u>	Ft <sup>2</sup>
Theta - sample time	<u>60</u>	min.
A <sub>n</sub> - area of the nozzle	<u>0.00103</u>	Ft <sup>2</sup>
ms - weight collected	<u>234.4</u>	mg
<del>H - energy input</del>		<del>105-BTU's</del>

STANDARD CONDITIONS - 20°C AND 76 cm Hg  
OR 68°F AND 29.92 in Hg



Plant MARANA 6/M  
 Run No. 3  
 Location 2310  
 Date 11/14/77  
 Operator S.M. NEMEC  
 Sample Box No. AERO  
 Meter Box No. AERO  
 Meter Δ H 0.72  
 C Factor .79

Ambient Temp °F 80  
 Bar. Press. "Hg 27.85  
 Assumed Moisture % 5  
 Probe Tip Dia. In. .435  
 Pitot Tube No. 3-2  
 Probe Length/type 2" SS  
 Filter No. 00 126

VERY IMPORTANT - FILL IN ALL BLANKS  
 Read and record at the start of each test point.  
 Time: Start Time 1632  
 End Time 1737

**PRE LEAK CHECK .02 SFM @ 16 in. H<sub>2</sub>O for 1 min**

Point	Clock	Dry Gas Meter, CF	Pitot in. H <sub>2</sub> O ΔP	Orifice ΔH in H <sub>2</sub> O		Dry Gas Temp. °C		Pump Vacuum In. Hg	Impinger Temp. °F	Oven Temp. °F	Probe Temp. °F	Stack Temp. °F (SP-450)
				Desired	Actual	Outlet	Inlet					
106	5	8284.0	1.92	1.0	1.0	38		5				192
5	10	8315.6	1.0	1.1	1.1	37		6				189
4	15	8331.4	1.05	1.15	1.15	37		6				188
3	20	8348.0	1.1	1.2	1.2	37		6				187
2	25	8363.5	.94	1.02	1.0	37		5				188
1	30	8378.4	.72	.78	.78	37		4				186
		8378.4										
56	5	8393.9	1.1	1.2	1.2	36		6				183
5	10	8410.6	1.1	1.2	1.2	36		6				186
4	15	8427.7	1.15	1.25	1.25	35		6				184
3	20	8444.2	1.1	1.2	1.2	35		6				183
2	25	8460.0	.97	1.05	1.05	35		5				182
1	30	8474.1	.74	.80	.80	34		4				183

POST LEAK CHECK .04 CFM @ 17 in. Hg for 1 min



SAMPLE CLEANUP SHEET

Plant: Marathon Gas Date: 11/14/77  
 Address: Marathon, Tex. Operators: \_\_\_\_\_  
 Station No.: 2310 \_\_\_\_\_  
 Run No.: #3 Ambient Temperature: 70  
 Barometric Pressure: 29.88 Sample Box Number: 1060

Impinger 1

Final Volume 2.0 ml of empty  
 Initial Volume 0 ml  
 Volume collected \_\_\_\_\_ ml

Impinger 2

Final Volume 1.0 ml of empty  
 Initial Volume 0 ml  
 Volume collected \_\_\_\_\_ ml

Impinger 3

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final Volume \_\_\_\_\_ ml of \_\_\_\_\_  
 Initial Volume \_\_\_\_\_ ml  
 Volume collected \_\_\_\_\_ ml

Impinger

Final weight 778.95 gm of silica gel  
 Initial weight 726.30 gm  
 Weight collected 52.65 gm

Total Volume Collected 55.65 ml

Filters

<u>No.</u>	<u>Final Weight</u>	<u>Tare Weight</u>	<u>Weight Collected</u>
<u>00-126</u>	_____ gm	_____ gm	_____ gm
_____	_____ gm	_____ gm	_____ gm

Cleanup performed by Q13/Hrbly on 11/14/77