AP-42 Section Number: 9.9.1

Reference Number: 31

Title: Written Communcation From Paul Luther, Purina Mills, Inc., To Greg LaFlam, Pacific Environmental Service March 11 and August 28, 1987

Purina Mills, Inc.

Paul A. Luther, P.E.
Manager, Environmental Services

800 Chouteau • St. Louis, MO 63164 • 314 982-2175

March 11, 1987

Mr. Greg La Flam
Environmental Engineer
Pacific Environmental Services, Inc.
1905 Chapel Hill Road
Durham, NC 27707

Dear Mr. La Flam:

I have enclosed for your use stack test data from four Purina Mills, Inc. feed mills. The pellet coolers at all four mills were tested for TSP emissions. A cracker, flaking unit and hammermill were also tested at three of the mills.

I have removed the location and test dates from this material. This was done for confidentiality, however you will note that in all instances test data were below allowable emissions. I can also inform you that all tests took places between 1972 and 1980. Two sites were tested in 1972, one in 1976 and one in 1980.

I have also enclosed excerpts from a textbook, Feed Manufacturing Technology III, published by the AFIA in 1985. Chapter 53 concerns air pollution control in the feed industry. Table 13-2 displays emissions data from high efficiency collectors.

Two other potential sources of information that you may want to pursue are first, equipment manufacturers, particularly Sprout Waldron in Muncy, Pennsylvania and California Pellet Mill in San Francisco, California. Another source would be cyclone manufacturers such as Carter Day, MAC and Kice.

Please call me if you have any questions.

Sincerely,

Paul A. Luther

Paul A. Luther, P.E.
Manager, Environmental Services

PAL/da

800 Chouteau Avenue
St. Louis, Missouri 63164

PELLET MILL/COOLER STACK TEST SUMMARY

Plant	Feed	Collector	Processed Feed Rate lb/hr	Air Flow SCFM	Emission Rate lb/hr	
No. 1	Steer	Longhorn Cyclone	24,000	10,100	6.6	
	Steer	Carter Day Cyclone	24,000	10,850	3.4	
	Poultry	Cyclones	24,00	10,450	11.0	
	Poultry	Cyclones	24,000	14,325	3.9	
No. 2	Mixed	Cyclone	20,000	16,735	0.44	
	Mixed	Cyclone	36,000	25,580	1.85	
No. 3	Poultry	Cyclone	27,900	25,240	7.2	
	Poultry	Cyclone	28,700	25,350	4.0	
	Steer	Cyclone	25,200	21,850	3.9	
	Steer	Cyclone	29,500	30,430	7.3	
No. 4	Dairy	Single Cyclone	19,300	16,130	3.2	} Uses total catch
	Turkey	Single Cyclone	21,600	16,060	2.4	

CRACKER STACK TEST SUMMARY

No. 2	Corn	Cyclone	8,000	3,130	0.097

HAMMERMILL STACK TEST SUMMARY

No. 4	Corn	Dual Cyclone	16,000	5,760	1.3	Uses total catch

FLAKING STACK TEST SUMMMARY

No. 1	Corn/Barley	Single Cyclone	12,000	3,910	0.93

Purina Mills, Inc.

August 28, 1987

Mr. Greg LaFlam
Pacific Environmental Services, Inc.
1905 Chapel Hill Road
Durham, North Carolina 27702

Dear Mr. LaFlam:

Per your request I have enclosed additional information from the five sites where air emission studies have been conducted. The mill Number, as shown on each section, corresponds to the numbers on the information previously submitted. Please let me know if this satisfies your needs.

Sincerely,

Paul A. Luther

Paul A. Luther, P.E.
Manager, Environmental Services

PAL/da

P.O. Box 66812
St. Louis, Missouri 63166-6812

MILL 1

SUMMARY OF RESULTS

The principal conclusions are as follows:

Steer Unit

1. The total emissions of particulate matter from the steer unit were equal to 10.0 pounds per hour. This total is the sum of the average of the three tests from the Longhorn cyclone and the average from the three tests from the Carter Day cyclones. The emission rates were calculated using the "front-half" collections from the EPA-type sampling train.

2. The average allowable emission rate as calculated from Table 1 of Regulation 8 of the Clean Air Act Regulations is equal to 21.7 pounds per hour. The actual emissions were 46.1 percent of the allowable emissions.

Poultry Unit

1. The emissions of particulate matter from the poultry unit were equal to the emissions from the one outlet tested multiplied by a factor of two. The fans on each of the two outlets of the poultry unit were balanced before testing to produce the same flow rate. The total emissions were equal to 11.0 pounds per hour, based on averaging the

three tests using the "front-half" collections from the EPA-type sampling train.

2. The average allowable emission rate as calculated from Table 1 of Regulation 8 of the Clean Air Act Regulations is equal to 21.7 pounds per hour. The actual emissions were 50.7 percent of the allowable emissions.

Rolling Unit

1. The emissions of particulate matter from the stack were equal to 0.9 pounds per hour, based on averaging the three tests using the "front-half" collections from the EPA-type sampling train.

2. The average allowable emission rate as calculated from Table 1 of Regulation 8 of the Clean Air Act Regulations is equal to 13.6 pounds per hour. The actual emissions were 6.6 percent of the allowable emissions.

MILL 1

Pellet Mill Cooler

SUMMARY OF RESULTS

Steer Unit - Longhorn Cyclone
Stack

Run Number	1	2	3
Stack Flow Rate - ACFM	11,265	11,113	11,421
Stack Flow Rate - SCFM* AVG 10,100	10,262	10,072	9,966
% Water Vapor - % Vol.	2.9	3.0	3.0
% CO_2 - % Vol.	0.0	0.0	0.0
% O_2 - % Vol.	20.9	20.9	20.9
% Excess Air @ Sampling Point	--	--	--
Particulates			
Probe, Cyclone & Filter Catch grains/SCF*	0.0868	0.1067	0.0365
grains/CF @ Stack Conditions	0.0788	0.0964	0.0317
lbs./hr. 6.6 AVG	7.6	9.2	3.1
Total Catch			
grains/SCF*	--	--	--
grains/CF @ Stack Conditions	--	--	--
lbs./hr.	--	--	--
Total Allowable Emission Rate Reg. 8 lbs/hr	21.7	21.7	21.7
Total Process Feed Rate lbs/hr	24,000	24,000	24,000

• 29.92" Hg., 68°F

MILL 1

Pellet Mill Cooler — Same as 1st Test

SUMMARY OF RESULTS

Steer Unit - Carter Day Cyclones Stack

Run Number	1	2	3
Stack Flow Rate - ACFM	12,939	11,928	12,544
Stack Flow Rate - SCFM* AVG. 10,852	11,321	10,429	10,805
% Water Vapor - % Vol.	2.6	3.3	5.0
% CO_2 - % Vol.	0.0	0.0	0.0
% O_2 - % Vol.	20.9	20.9	20.9
% Excess Air @ Sampling Point	--	--	--
Particulates			
Probe, Cyclone & Filter Catch grains/SCF*	0.0273	0.0299	0.0524
grains/CF @ Stack Conditions	0.0238	0.0261	0.0450
lbs./hr. AVG. 3.4	2.6	2.7	4.9
Total Catch			
grains/SCF*	--	--	--
grains/CF @ Stack Conditions	--	--	--
lbs./hr.	--	--	--
Total Allowable Emission Rate Reg. 8 lbs/hr	21.7	21.7	21.7
Total Process Feed Rate lbs/hr	24,000	24,000	24,000

* 29.92" Hg., 68°F

MILL 1

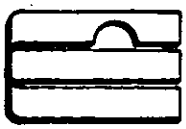
Pellet Mill Cooler - 2 cyclones, 1 tested, emissions doubled

SUMMARY OF RESULTS

Poultry Unit
Stack

Run Number	1	2	3
Stack Flow Rate - ACFM	5,908	6,148	6,191
Stack Flow Rate - SCFM*	5,116	5,341	5,220
% Water Vapor - % Vol.	4.5	4.1	6.9
% CO_2 - % Vol.	0.0	0.0	0.0
% O_2 - % Vol.	20.9	20.9	20.9
% Excess Air @ Sampling Point	--	--	--
Particulates			
Probe, Cyclone & Filter Catch grains/SCF*	0.1540	0.1206	0.0959
grains/CF @ Stack Conditions	0.1329	0.1044	0.0806
lbs./hr.	6.8	5.5	4.3
Total Catch			
grains/SCF*	--	--	--
grains/CF @ Stack Conditions	--	--	--
lbs./hr.	--	--	--
Allowable Emission Rate Reg. 8 lbs/hr	21.7	21.7	21.7
Process Feed Rate lbs/hr	24,000	24,000	24,000

* 29.92" Hg., 68°F



MILL 1

SUMMARY OF RESULTS

Rolling Unit (Flaking Unit) — 1 cyclone only
Stack

Run Number	1	2	3
Stack Flow Rate - ACFM	4,922	4,601	4,477
Stack Flow Rate - SCFM*	4,147	3,876	3,711
% Water Vapor - % Vol.	8.4	8.1	9.6
% CO_2 - % Vol.	0.0	0.0	0.0
% O_2 - % Vol.	20.9	20.9	20.9
% Excess Air @ Sampling Point	--	--	--
Particulates Probe, Cyclone & Filter Catch grains/SCF*	0.0221	0.0291	0.0321
grains/CF @ Stack Conditions	0.0186	0.0244	0.0265
lbs./hr.	0.8	1.0	1.0
Total Catch grains/SCF*	--	--	--
grains/CF @ Stack Conditions	--	--	--
lbs./hr.	--	--	--
Allowable Emission Rate Reg. 8 lbs/hr	13.6	13.6	13.6
Process Reed Rate lbs/hr	12,000	12,000	12,000

• 29.92" Hg., 68°F

DESCRIPTION OF PROCESS OPERATION

Grains and soft materials are used to make pellitized feeds by mixing the materials and making a mash. This mash is mixed with water and molasses and extruded to make pellets of feed. The pellets are cooled by blowing air upward through a screen conveyor. The air entrains some particles from the feed which are largely removed by cyclones before the air is discharged. Both the Steer Unit and the Poultry Unit use this method of processing and cooling the feed.

The Steer Unit flow is split and approximately one-half of the flow is directed through a Longhorn cyclone and the other half is directed through two Carter Day cyclones, giving two discharge points for the unit.

The Poultry Unit air flow is split and has two discharge points. The fans on the unit were balanced and only one side was tested. The test results were doubled to allow for the other fan.

The Rolling Unit crimps grains which are used in mixed feed or feed by itself. The gases are directed through a cyclone and discharged directly from the exit of the cyclone.

All the pellitizers and the rolling unit operated at normal conditions during the particulate testing periods.

DESCRIPTION OF SAMPLING LOCATIONS

Metal ductwork designed by Ecology Audits was used for all the tests. The ductwork was designed to be approximately eight stack diameters downstream and two stack diameters upstream of the sampling ports.

Steer Unit - Longhorn Cyclone

The ductwork was suspended from the exit fan of the cyclone directing the flow downward. The two ports were sampled from the roof approximately 30 feet off the ground.

Steer Unit - Carter Day Cyclones

The ductwork was set up horizontally on the roof approximately 30 feet above the ground and connected to the fan outlet of the cyclones. The ports were sampled using a flexible, heated teflon liner connected to a glass probe.

Poultry Unit

The ductwork was set up horizontally on the roof approximately 30 feet above the ground and connected to one side of the two outlets of the poultry unit. The two ports were sampled using a flexible, heated teflon liner connected to a glass probe.

Rolling Unit

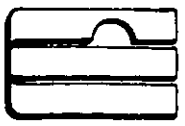
The ductwork was connected to the top of the cyclone and extended to a rooftop approximately 50 feet above the ground and was sampled using a flexible, heated teflon liner connected to a glass probe.

SAMPLING AND ANALYTICAL PROCEDURES

The sampling followed the procedures outlined in the "Appendix to the Code of Federal Regulations, Title 40, Chapter I, Part 60" and the "Source Sampling Procedures and Test Requirements, June 1975, Air Quality Service, Environmental Health Services, Oklahoma State Department of Health".

A preliminary velocity traverse was made at each of the two ports on each of the stacks in order to determine the uniformity and magnitude of the flow prior to testing. On all of the process stacks, the six traverse points were sampled from each of the two ports for a total of 12 traverse points on each stack. Samples of five-minute duration were taken isokinetically at each of the six points on the traverse from each port using a heated, glass-lined probe, which was connected to a flexible, heated teflon liner on all units tested except the Steer Unit's Longhorn cyclone.

On all the tests conducted on the stacks, the sampling trains were leak-checked at 15 inches of mercury vacuum before the test, and leak-checked after each test at the highest vacuum reading recorded during the test. This was performed to predetermine the possibility of a diluted sample.



Also before each test the pitot tube lines were checked for leaks under both a vacuum and pressure. The lines were also checked for clearance and the manometer zeroed before each test.

Particulate emissions were calculated gravimetrically using only the "front-half" collection of the EPA-type sampling train.

APPENDIX A

Location of Sampling Points

The same ductwork was used on all the units tested so the measurements are identical for each unit. The sampling ports were located 198 inches (8.4 stack diameters) downstream from the inlet to the stack and 48 inches (2.0 stack diameters) upstream from the outlet of the stack. The locations of the sampling points were calculated as follows:

Inside Stack Diameter = 23 1/2 inches

Point No.	Percent of Diameter From Wall	Distance From Wall
1	4.4	1 1/16"
2	14.2	3 7/16"
3	29.5	6 15/16"
4	70.5	16 9/16"
5	85.3	20 1/16"
6	95.6	22 7/16"

SUMMARY OF RESULTS

Pellet Cooler Cyclone x2 for comb. reason

Run Number	1	2	3
Stack Flow Rate - ACFM	8,415	8,241	8,219
Stack Flow Rate - DSCFM*	7,190	7,196	7,104
% Water Vapor - % Vol.	4.1	3.8	3.6
% CO_2 - % Vol.	0.0	0.0	0.0
% O_2 - % Vol.	20.9	20.9	20.9
% Excess Air @ Sampling Point	--	--	--
Particulates			
Probe, Cyclone & Filter Catch grains/dscf*	0.0289	0.0252	0.0397
grains/cf @ Stack Conditions	0.0246	0.0219	0.0342
lbs/hr	1.8	1.6	2.4
Total Catch			
grains/dscf*	--	--	--
grains/cf @ Stack Conditions	--	--	--
lbs/hr	--	--	--
Allowable Emission Rate, Oklahoma City Ordinance 12,575 gr/SCF	0.0993	0.0993	0.0997
Process Feed Rate lbs/hr	24,000	24,000	24,000

* 29.92 "Hg, 68°F

DISCUSSION OF RESULTS

The three tests for particulates taken on the stack appeared to be valid representations of the actual emissions during the testing. The indicative parameters calculated from the field data were in close agreement. The moisture percentages were within 7.1 percent of the mean value. The measured flow rates (Q_s) were within 0.8 percent of the mean value. The rates of sampling for the three tests were well within the specified limits of the isokinetic rate, the greatest deviation being 4.2 percent.

The calculated emissions (pounds per hour) of particulates showed a range of -18.9 percent to +26.0 percent variation from the mean value.

To calculate the total emissions (pounds per hour) from the poultry unit cooler, the reported emission rate should be doubled since only one of the two exhausts was sampled. However, the concentration of particulates (grains per standard cubic foot) would remain the same since the value is a concentration and not a mass emission value.

DESCRIPTION OF SAMPLING LOCATION

Metal ductwork designed by Ecology Audits was used for the testing. The ductwork was assembled on the rooftop approximately 30 feet above the ground and connected to one of the two exhaust ducts of the poultry unit cooler.

The sampling ports were located 16 feet 6 inches (8.34 stack diameters) downstream from the rectangular to circular adapter and 4 feet (2.02 stack diameters) upstream from the duct outlet.

SAMPLING AND ANALYTICAL PROCEDURES

The sampling followed the procedures outlined in the "Appendix to the Code of Federal Regulations, Title 40, Chapter I, Part 60" and the "Source Sampling Procedures and Test Requirements, June 1975, Air Quality Service, Environmental Health Services, Oklahoma State Department of Health."

A preliminary velocity traverse was made at each of the two ports on the duct in order to determine the uniformity and magnitude of the flow prior to testing. Six traverse points were sampled from each of the two ports for a total of 12 traverse points on the duct. Samples of five-minute duration were taken isokinetically at each of the six points on the traverse from each port using a heated, glass-lined probe, which was connected to a flexible, heated teflon liner.

On all the tests conducted on the duct, the sampling train was leak-checked at 15 inches of mercury vacuum before the test, and leak-checked after each test at the highest vacuum reading recorded during the test. This was performed to predetermine the possibility of a diluted sample. Also before each test, the pitot tube lines were checked for leaks under both a vacuum and pressure. The lines were also checked for clearance and the manometer zeroed before each test.

Particulate emissions were calculated gravimetrically using only the "front-half" collection of the EPA-type sampling train.

APPENDIX A

Location of Sampling Points

The sampling ports were located 198 inches (8.34 stack diameters) downstream from the inlet to the duct and 48 inches (2.02 stack diameters) upstream from the outlet of the duct. The locations of the sampling points were calculated as follows:

Inside Stack Diameter = 23 1/2 inches

Point No.	Percent of Diameter From Wall	Distance From Wall
1	4.4	1 1/16"
2	14.7	3 7/16"
3	29.5	6 15/16"
4	70.5	16 9/16"
5	85.3	20 1/16"
6	95.6	22 7/16"

EA

SUMMARY OF RESULTS

According to the Statute 17.2-03 for processes other than described in the Statute, the evaluation of test emission is by the criteria of Best Available Control Technology (BACT). The Department Of Environmental Regulation has determined that BACT allows a particulate emission limitation of 3.8 lbs/hr.

It is, therefore, concluded that Ralston Purina Company, with an average actual emission rate of 1.85 lbs/hr., was within the limits of compliance during the tests conducted on

COMPARISON OF TEST RESULTS WITH REGULATIONS MILL 2

Run Number	Process Weight tons/hour	Actual Emissions lbs/hour	Allowable* lbs/hour
1	18.0	1.50	3.80
2	18.0	1.30	3.80
3	18.0	2.74	3.80
AVERAGE	18.0	1.85	3.80

Unknown source!

* BASED ON DER LETTER TO RALSTON PURINA COMPANY OF - COPY INCLUDED.

Process is per

RALSTON PURINA COMPANY

MILL 2

SAMPLE RUN #	STACK AREA (ft^2)	STACK TEMP (°F)	STACK GAS VELOCITY (fps)	ACTUAL CFM	CORR. CFH (DRY GAS)	% MOISTURE	EMISSIONS RESULTS LBS/HR ACTUAL	EMISSIONS RESULTS LBS/HR ALLOWED	% ISOKINETIC
1	8.189	84.7	56.07	27,549	1,575,070	1.6	1.50	3.8	101.9
2	8.189	96.1	55.37	27,205	1,506,253	2.6	1.30	3.8	104.8
3	8.189	91.0	56.55	27.785	1,523,663	4.4	2.74	3.8	105.9
AVG.	8.189	90.6	56.00	27,513	1,534,995	2.9	1.85	3.8	104.2

COMPANY NAME: RALSTON PURINA COMPANY MILL 2

SOURCE IDENTIFICATION: Pellet Mill

SOURCE TEST FOR: Particulates

PROCESS WEIGHT RATE: 10 Tons/hr Mixed Feed

DATE:

RUN	(STACK) OUTLET	SCF	ACFM	SCFM	%H_2O	TEMP, °F	% ISOKINETIC	GRAINS/SCF	EMISSIONS, LBS/HR.
1		28.01	17830.62	16436.65	2.65	100	94.37	.0023	.3240
2		28.35	18,054	16832.07	3.25	90	93.20	.0044	.6281
3		29.13	17971.38	16938.85	2.86	86	95.11	.0025	.3691

AVG. PARTICULATE EMISSIONS: .4404 lbs./hr.

ALLOWABLE EMISSIONS: 14.97 lbs./hr.

STANDARD CONDITIONS: Dry, 70°F., 29.92 in. Hg

ALLOWABLE EMISSIONS BASED ON CHAPTER 17-2.04 of THE STATE OF

COMPANY NAME: RALSTON PURINA COMPANY MILL 2

SOURCE IDENTIFICATION: Corn Cracker

SOURCE TEST FOR: Particulates

PROCESS WEIGHT RATE: 4 Tons/hour Whole Corn

DATE:

RUN	(STACK) OUTLET	SCF	ACFM	SCFM	%H_2O	TEMP, °F	% ISOKINETIC	GRAINS/SCF	EMISSIONS, LBS/HR.	LB/TON
1		46.36	3263.27	3280.80	1.17	61	94.29	.0014	.0384	0.010
2		51.25	3259.87	3215.01	1.19	71	96.49	.0028	.0780	0.020
3		49.81	2935.97	2894.46	1.60	69	93.91	.00703	.1744	0.044
										Avg. 0.024

AVG. PARTICULATE EMISSIONS: .0969 lbs./hr.

ALLOWABLE EMISSIONS: 8.48 lbs./hr.

STANDARD CONDITIONS: Dry, 70°F., 29.92 in. Hg

ALLOWABLE EMISSIONS BASED ON CHAPTER 17-2.04 of THE STATE OF

STACK SAMPLING EQUIPMENT LIST

NOZZLE

Stainless steel (316) with a .1783 and .3650 inch diameter orifice.

PROBE

Six (6) foot stainless steel with a heated stainless steel liner.

THERMOCOUPLE PROBE

Chromel-Alumel "J" type.

PITOT TUBE

"S" type utilized to monitor stack gas velocities

SAMPLE COLLECTION ASSEMBLY

Contains separate hot and cold box modules. The hot box houses the filter holder and cyclone set which maintains a temperature of 240°F. This temperature is verified before each stack test.

The cold box module houses the impinger train and ice bath. Impingers one, three and four are modified Greenburg-Smith and the second is of standard design.

25' HEATED UMBILICAL CORD

A single integrated cable containing all necessary sampling and electrical lines. This cord has a separate heating unit which maintains a 250°F umbilical temperature.

25' UMBILICAL CORD

Connects hot and cold box to control unit.

PM-100 CONTROL UNIT

Contains diaphragm vacuum pump, dry gas meter, stack temperature read out (pyrometer), timer, magnahelic gauges and manometer.

BAROMETER

Weather measure BM-50

WET/DRY BULB THERMOMETER

ASTM °F TAG USA K 753020 (0-580°F fitted with sock for wet bulb).

SAMPLE RECOVERY EQUIPMENT

PROBE BRUSH

WASH BOTTLES

STORAGE CONTAINERS

GRADUATED CYLINDER

GLASS WEIGHING DISH

DESICCATOR

ANALYTICAL BALANCES - METTLER E-1000 and METTLER/H10w SIDE LOADER

SAMPLING REAGENTS

FILTERS

Reeve angel, 900 AF 10 cm glass fiber filters similar to MSA 1106 BH filters.

SILICA GEL

Indicating type 6-16 mesh, dried at 350° for two hours.

ACETONE

Reagent grade

WATER

Distilled water

ICE

LABORATORY PREPARATION

GLASSWARE

Washed and dried prior to each stack test.

FILTERS

Oven dried to constant weight at 221°F and weighed to the nearest .5mg. Placed in desiccator until used in actual stack test.

SELICA GEL

Dried at 350°F for two hours and stored in air tight container.

PM-100 CONTROL UNIT

Check fuses, pyrometer, timer and incline manometer.

UMBILICALS

Leak check each section and clean with acetone.

PROBE

Inspect and clean with acetone.

HOT/COLD BOX

Check temperature with thermometer.

SAMPLE RECOVERY BOTTLES

Washed, dried and scaled.

SAMPLING METHODS AND PROCEDURES

VELOCITY TRAVERSE DATA

DOUBLE KICE SYSTEM

The Double Kice System stack is a 21 3/4" diameter stack with a 6 1/4" long port. The port is located approximately 8 stack diameters down stream and 2 stack diameters upstream of any flow disturbance. Eight sampling points were chosen to obtain particulate samples. Each point was sampled for 5 minutes.

#5 HAMMER MILL

The #5 Hammer Mill stack is a 20 1/4" diameter stack with a 6 1/4" long port. The port is located approximately 8 stack diameters down stream and 2 stack diameters upstream of any flow disturbance. Ten sampling points were chosen to obtain particulate samples. The data obtained during the initial velocity traverse had shown the average ΔP to be less than .01 inches of water. The equipment used was a manometer with a range of 0 - .5 inches of water. Discussions with County Environmental Protection Commission and the State of Florida D.E.R., concerning the low ΔP readings lead to the cancellation of further testing.

PELLET MILL

The Pellet Mill stack is a 20"by42" rectangular stack with four (4) 6 1/4" long sampling ports. The ports are located approximately one (1) equivalent stack diameter down stream and approximately 3 inches from the exit point. In November, County Environmental Protection Commission approved the port locations and the 16 sampling points utilized. During the initial test period, it was found the point nos. 12 and 16 indicated negative ΔP's, therefore sampling point nos. 11 and 15 were sampled 6.66 minutes instead of the normal 3.33 minutes. These negative points were not sampled and therefore not considered in the calculations.

CORN CRACKER

The Corn Cracker stack is a 24 1/8" diameter stack. The port is located approximately 8 stack diameters down stream and 2 stack diameters upstream of any flow disturbance. Twelve (12) sampling points were utilized during the test. The initial pitot tube traverse had shown low ΔP's at sample points 6, 7, and 8. Note that during the test runs negative readings were recorded at these points. To obtain representative samples, the points preceeding the negative sampling points were sampled for a longer period of time. Each point was sampled for 5 minutes unless otherwise indicated on the field sheets.

SAMPLING METHODS AND PROCEDURES
(Continued)

GENERAL SAMPLING METHOD

General Particulate Method A of the D.E.R. Standard Sampling Techinques was followed in conjunction with established EPA methods for the sampling and analysis of particulates at Ralston Purina,

The sampling train for each test was constructed as shown in figure #1. Note a 25' heated umbilical was utilized according to the D.E.R. alternate sampling method. The first and second impingers were filled with 100 ml of deionized water. The third impinger remained empty and used as a dry trap and the fourth impinger was filled with 200g of silica gel to prevent moisture damage to the dry gas meter. Crushed ice was placed around the impingers so that the gas leaving the last impinger was kept at a temperature below 70°F.

Prior to each run the train was leak checked from the probe tip and found to be below .02 CFM.

Prior to each test, the nomograph was initially set at the moisture content determined by the wet-dry bulb method.

At the end of each run the volume of water collected in the first three (3) impingers was measured and the silica gel in the fourth impinger was weighed to the nearest gram to determine the volume of water collected. All impingers were then washed and prepared for the next run.

The filter was removed from the filter holder and placed in a sealed container. All components included in the front half of the sampling train (probe tip, probe, heated umbilical, cyclone set, glass filter holder and related glassware) were rinsed with acetone and the washings were placed in a sealed container. A new filter was inserted in the filter holder and reassembled with the related glassware for the next run.

ANALYSIS PROCEDURE

The filter and any loose particulate matter from the sample container was transferred to a tarred glass weighing dish and oven dried (105°C) to constant weight.

The acetone washings were transferred to a tarred beaker and evaporated to dryness at ambient temperature and pressure. The beaker was then oven dried to constant weight.

SOURCE TESTING NOMENCLATURE AND DIMENSIONS:

ACFM	=	actual ft^3/min.
An	=	probe nozzle tip area, ft^2
As	=	area of stack, ft^2
Bwm	=	water vapor volume in metered gas, ft^3
Bwo	=	proportion of water vapor in gas stream by volume, dimensionless
Cs	=	concentration at standard conditions, grains/SCF
d^2	=	square of probe nozzle tip diameter, in^2
E	=	source emission rate, lbs./hr.
Fs	=	pitot coefficient
$\%H_2O$	=	percent water vapor in stack gas, dimensionless
Mc	=	moisture condensate correction factor for isokinetic meter rate
mg	=	milligrams, amount of contaminant present in test run sample
$\sqrt{\Delta P}$	=	square root of velocity head, in. H_2O
P	=	process weight rate, tons/hr.
Pb	=	barometric pressure, in. Hg
Pm	=	meter pressure, in. Hg
Ps	=	stack pressure, in. Hg
θ	=	sampling time, min.
Qa	=	stack volumetric flow rate under actual conditions, ft^3/min.
Qs	=	stack volumetric flow rate corrected to std. conditions and dry basis, ft^3/min.
Rm	=	meter rate, ft^3/min.
SCFM	=	standard ft^3/min.
Tm	=	meter temperature
Ts	=	stack temperature
Ts'	=	stack temperature during pitot reading
Vm	=	volume of total sample metered under actual conditions, ft^3
Vmd	=	volume of total sample metered on a dry basis, ft^3
SCF	=	dry volume of total sample metered corrected to std. conditions ft^3
Vs	=	gas stream velocity, ft./sec.
Vsc	=	gas stream velocity corrected to std. conditions, ft./sec.
Vw	=	volume of moisture condensate, ml
Vwc	=	water vapor volume of moisture condensate, ft^3
V.P.	=	water vapor pressure at meter temperature

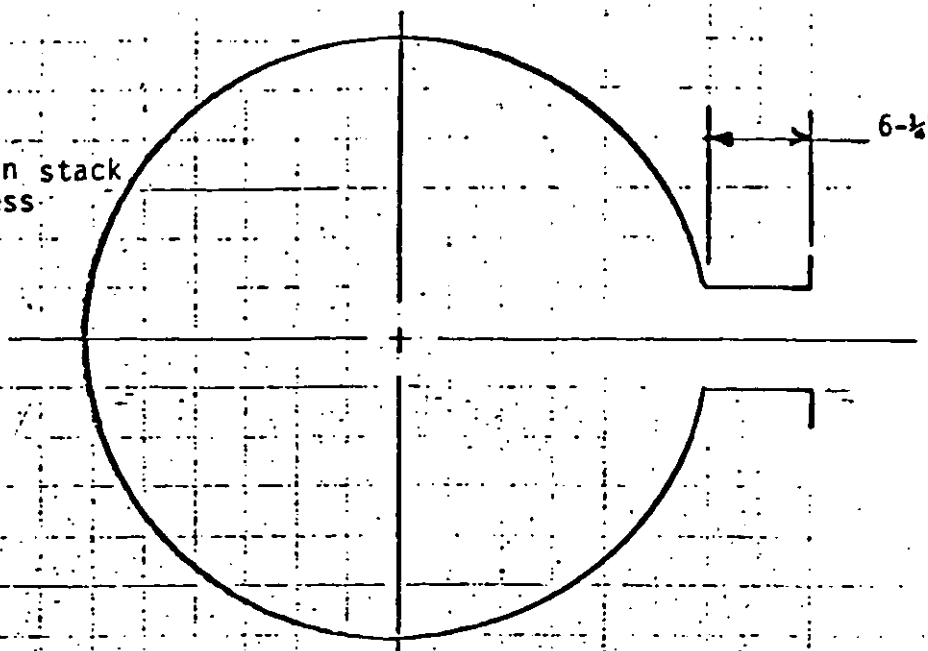
INTERSCIENCE
RESEARCH AND ENGINEERING CORPORATION

JOB NO. E76399 PAGE
PROJECT Double Kice System
CLIENT Ralston Purina
BY BJC/RJB DATE 12/

21.75 in. Stack Dia.

22 gauge Galvanized in stack thickness

.3650 Probe Tip



Point No.	% I.D.	Dist. from Port (in.)	ΔP
1	3.3	7	.13
2	10.5	8-3/4	.13
3	19.4	10-1/2	.14
4	32.3	13-1/4	.14
5	67.7	21-1/4	.14
6	80.6	24	.14
7	89.5	25-3/4	.14
8	96.7	27-1/4	.14
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

137 ΔP

Moisture Data

Wet Bulb	Dry Bu
80	100

2.7 % H_2O

Velocity Traverse Data :

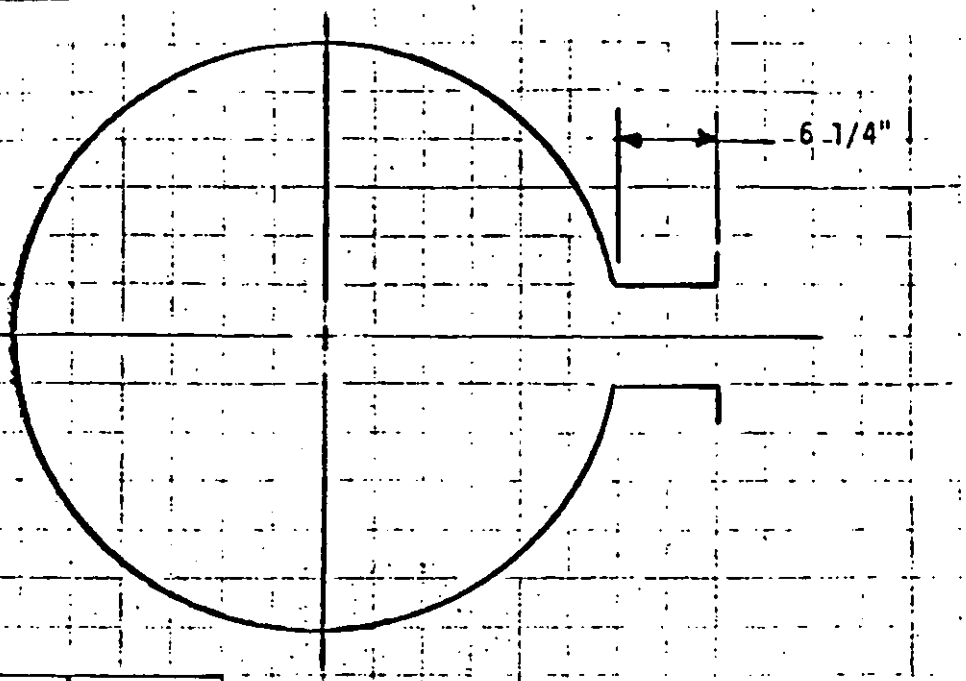
INTERSCIENCE
RESEARCH AND ENGINEERING CORPORATION

JOB NO.	E76399	PAGE	
PROJECT	#5 Hammer Mill		
CLIENT	RALSTON PURINA		
BY	BJC/RJB	DATE	

20 1/4 in Stack Dia.

22 Guage Galvanized in Stack Thickness

Probe Tip



Point No.	% I.D.	Dist. from Port (in.)	ΔP
1	2.5	6 3/4	.01
2	8.2	7 7/8	.01
3	14.6	9 1/8	.01
4	22.6	10 3/4	.005
5	34.2	13 1/16	.005
6	65.8	19 7/16	.005
7	77.4	21 3/4	.01
8	85.4	23 1/4	.005
9	91.8	24 5/8	.005
10	97.5	25 3/4	.005
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

.007 ΔP

MOISTURE DATA

Wet Bulb	Dry Bulb
76	80

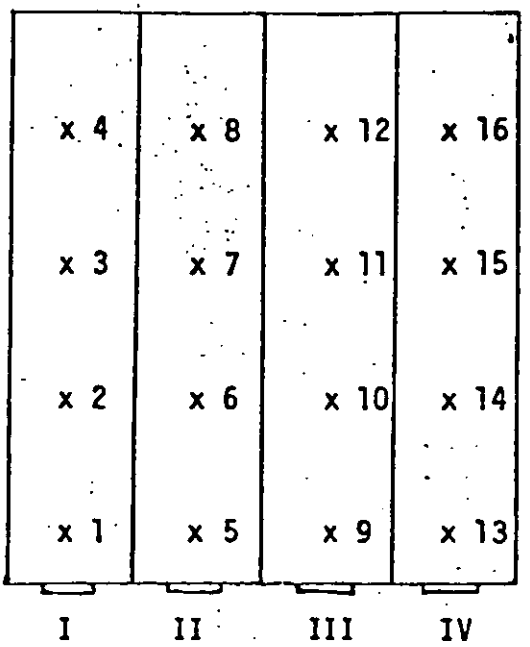
2.8 % H_2O

VELOCITY TRAVERSE DATA

INTERSCIENCE
RESEARCH AND ENGINEERING CORPORATION

JOB NO.	E76399
PROJECT	Pellet Mill
CLIENT	RALSTON PURINA
BY	BJC/RJB
PAGE	
DATE	

.1783 Probe Tip



Powt No.	% I.D.	Dist. from Port (in.)	ΔP
1		5.25	3.0
2		15.75	1.0
3		26.25	1.0
4		36.25	1.2
5		5.25	3.0
6		15.75	1.4
7		26.25	1.0
8		36.25	0.8
9		5.25	3.2
10		15.75	2.5
11		26.25	.5
12		36.25	0
13		5.25	2.8
14		15.75	2.0
15		26.25	3.2
16		36.25	0
17			
18			
19			
20			
21			
22			

1.89 ΔP

MOISTURE DATA

Wet Bulb	Dry Bulb
89	100

14.2 % H_2O

VELOCITY TRAVERSE DATA

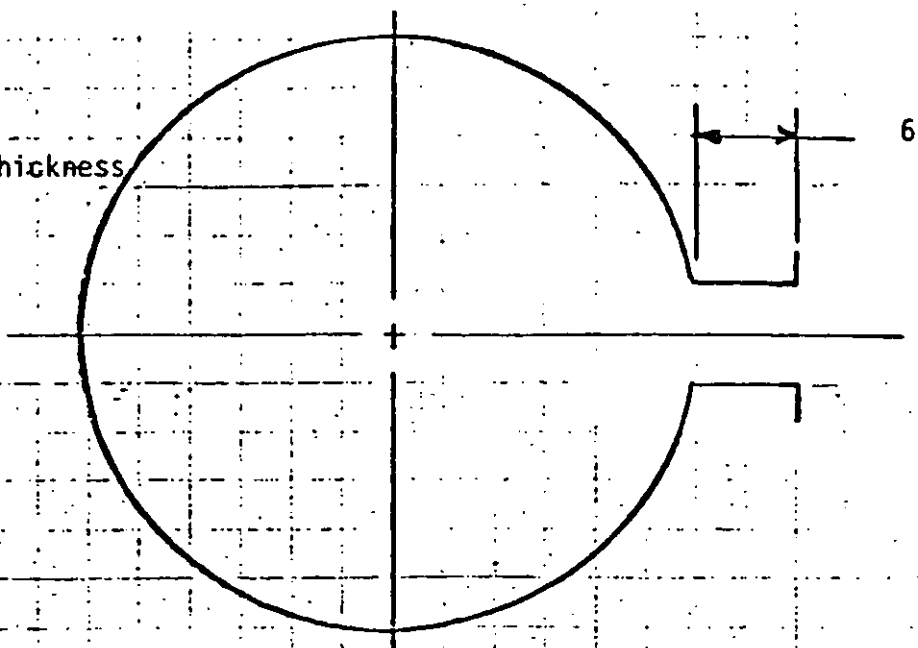
INTERSCIENCE
RESEARCH AND ENGINEERING CORPORATION

JOB NO.	E76399	PAGE	
PROJECT	Corn Cracker		
CLIENT	Ralston Purina		
BY	BJC/RJB	DATE	

24 1/8 in. Stack Dia.

22 guage in Stack Thickness

.3650 Probe Tip



Point No.	% I.D.	Dist. from Port (in.)	ΔP
1	2.1	1/2	.15
2	6.7	1 5/8	.10
3	11.8	2 13/16	.12
4	17.7	4 1/4	.13
5	25.0	6	.12
6	35.5	8 3/4	.06
7	64.5	15 5/8	.02
8	75.0	18 1/4	.05
9	82.3	19 7/8	.11
10	88.2	21 1/2	.15
11	93.3	22 1/2	.18
12	97.9	23 5/8	.18
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

.114 ΔP

MOISTURE DATA

Wet Bulb	Dry Bulb
50	58

1.0 % H_2O

VELOCITY TRAVERSE DATA

SAMPLING PROCEDURES

After selecting the sampling site and the minimum number of sampling points, the stack pressure, temperature, moisture, and velocity head were determined.

Before moving the train to the site, a filter was chosen, labeled and conditioned before being weighed to the nearest 0.5mg. About 200 grams of silica gel was weighed to the nearest 0.1 gram and placed in the fourth impinger. The first and second impingers were charged with 200 ml each of distilled, deionized water and along with the third dry impinger were weighed to the nearest 0.1 gram.

At the site the train was assembled and a leak test was made at 15 inches of mercury vacuum. A stainless steel lined probe was used capable of maintaining a temperature of 250°F. The filter holder assembly was enclosed in a heated box capable of maintaining 250°F. Crushed ice was placed around the impingers and more added during the test to keep the temperature of the gases leaving the last impinger at 70°F.

For each run, data was recorded on the field data sheets. Readings were made at each sampling point and when significant changes in stack conditions necessitated adjustments in the flow rate. Isokinetic conditions were maintained throughout

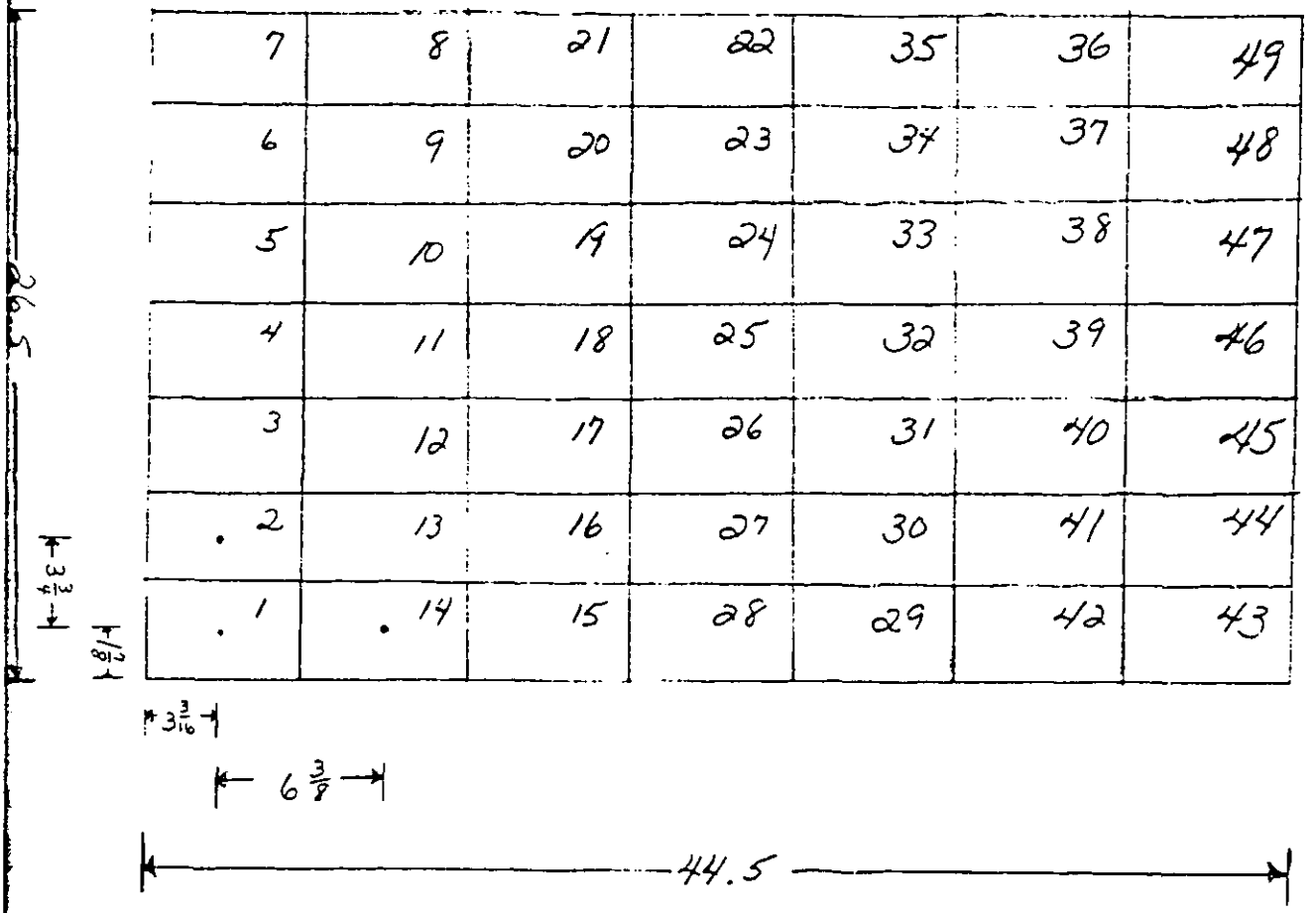
the test with the aid of a nomograph to adjust sampling rates at the various points. The pump was turned off at the end of each run and final meter readings recorded. The probe was removed from the stack and brushed and rinsed with acetone. The filter was removed from the holder and stored in a glass container. The front half of the filter holder, the cyclone and flask were rinsed with acetone and added to the probe washings. A portion of the acetone used in sample recovery was set aside as an analytical blank. The four impingers were reweighed to the nearest 0.1 gram.

ANALYTICAL PROCEDURES

The filters were placed in tared containers and dried to a constant weight and results reported to the nearest 0.5mg. The acetone washings were placed in tared beakers and dried to a constant weight and results reported to the nearest 0.5mg. Appropriate calculations were made for velocity, flowrate and concentrations.

SAMPLING POINT DETERMINATIONS

Stack:	Cyclone/Pellet Mill
Stack Dimensions:	44.5" X 26.5"
Nipple Extension:	3.5"
Stack Area:	8.189 Square Feet



MILL 3

SUMMARY OF RESULTS

The principal conclusions are as follows:

1. Relating emissions to regulations, the railcar emissions represent a more critical problem than the cyclone discharges.

2. Below is a summary of the emissions of the various cyclones on the pellet cooling operation based on averaging three tests from each unit:

Name of Cyclone	Emission Rate lbs. per hour	Pounds per ton of Process Weight
west poultry	7.2	0.50
east poultry	4.0	0.28
high steer*	3.9	0.32
low steer*	7.3	0.49

*Each cyclone had two discharges. The emission rate shown is the sum of the emissions from each port.

MILL 3

SUMMARY OF RESULTS

Pellet Cooler

West Poultry Cooler

Run Number	1	2	3
Date			
Stack Flow Rate - SCFM*	13,156	11,961	12,746
% Water Vapor - % Vol.	4.12	6.49	6.19
% CO_2 - % Vol.	0	0	0
% O_2 - % Vol.	21.0	21.0	21.0
% Excess Air @ Sampling Point	--	--	--
Particulates. Probe, Cyclone & Filter Catch grains/SCF*	.0358	.1004	.0660
grains/CF @ Stack Conditions	.0317	.0862	.0576
lbs./hr.	4.0	10.3	7.2
Total Catch grains/SCF*	.0358	.1004	.0660
grains/CF @ Stack Conditions	.0317	.0862	.0576
lbs./hr.	4.0	10.3	7.2
Process Weight as reported by plant personnel lbs/hr.	24,950	30,000	28,800
Emissions related to process wt. lbs/ton	0.32	0.69	0.50
Type of feed	Hog	Layena chicken	Eggena Etts

$E = 3.12 (P^{0.985})$

MILL 3

SUMMARY OF RESULTS Pellet Cooler

East Poultry Cooler

Run Number	1	2	3
Date			
Stack Flow Rate - SCFM*	12,737	12,629	12,653
% Water Vapor - % Vol.	5.58	5.37	5.35
% CO_2 - % Vol.	0	0	0
% O_2 - % Vol.	21.0	21.0	21.0
% Excess Air @ Sampling Point	--	--	--
Particulates. Probe, Cyclone & Filter Catch grains/SCF*	.0416	.0375	.0301
grains/CF @ Stack Conditions	.0366	.0333	.0266
lbs./hr.	4.5	4.1	3.3
Total Catch grains/SCF*	.0416	.0375	.0301
grains/CF @ Stack Conditions	.0366	.0333	.0266
lbs./hr.	4.5	4.1	3.3
Process Weight as reported by plant personnel lbs/hr.	28,000	28,000	30,000
Emissions related to process wt. lbs/ton	0.32	0.29	0.22
Type of feed	Layena Etts	Layena Etts	Farm Blend

MILL 3

SUMMARY OF RESULTS

High Steer Cooler West Duct

Pellet Cooler - discharge #1

Run Number	1	2	3
Date			
Stack Flow Rate - SCFM*	11,472	12,297	11,663
% Water Vapor - % Vol.	3.19	1.87	2.04
% CO_2 - % Vol.	0	0	0
% O_2 - % Vol.	21.0	21.0	21.0
% Excess Air @ Sampling Point	--	--	--
Particulates. Probe, Cyclone & Filter Catch grains/SCF*	.0250	.0258	.0134
grains/CF @ Stack Conditions	.0228	.0241	.0124
lbs./hr.	2.5	2.7	1.3
Total Catch grains/SCF*	.0250	.0258	.0134
grains/CF @ Stack Conditions	.0228	.0241	.0124
lbs./hr.	2.5	2.7	1.3
Process Weight as reported by plant personnel lbs/hr.	24,000	25,000	27,000
Emissions related to process wt. lbs/ton	0.21	0.22	0.10
Type of feed	unknown	Comp. Crepe	Comp. Crepe

MILL 3

Pellet Cooler - discharge #2

SUMMARY OF RESULTS

High Steer Cooler East Duct

Run Number	1	2	3
Date			
Stack Flow Rate - SCFM*	10,429	10,016	9,668
% Water Vapor - % Vol.	3.49	3.79	4.16
% CO_2 - % Vol.	0	0	0
% O_2 - % Vol.	21.0	21.0	21.0
% Excess Air @ Sampling Point	--	--	--
Particulates. Probe, Cyclone & Filter Catch grains/SCF*	.0232	.0189	.0186
grains/CF @ Stack Conditions	.0213	.0172	.0168
lbs./hr.	2.1	1.6	1.5
Total Catch grains/SCF*	.0232	.0189	.0186
grains/CF @ Stack Conditions	.0213	.0172	.0168
lbs./hr.	2.1	1.6	1.5
Process Weight as reported by plant personnel lbs/hr.	24,000	24,000	27,000
Emissions related to process wt. lbs/ton	0.18	0.13	0.11
Type of feed	Rec. Chow	Rec. Chow	Comp. Crepe

MILL 3

SUMMARY OF RESULTS

Low Steer Cooler East Duct

Pellet cooler - discharge #1

Run Number	1	2	3
Date			
Stack Flow Rate - SCFM*	15,658	15,395	15,563
% Water Vapor - % Vol.	2.30	2.67	2.99
% CO_2 - % Vol.	0	0	0
% O_2 - % Vol.	21.0	21.0	21.0
% Excess Air @ Sampling Point	--	--	--
Particulates. Probe, Cyclone & Filter Catch grains/SCF*	.0314	.0231	.0259
grains/CF @ Stack Conditions	.0296	.0217	.0244
lbs./hr.	4.2	3.0	3.5
Total Catch grains/SCF*	.0314	.0231	.0259
grains/CF @ Stack Conditions	.0296	.0217	.0244
lbs./hr.	4.2	3.0	3.5
Process Weight as reported by plant personnel lbs/hr.	28,000	27,000	30,000
Emissions related to process wt. lbs/ton	0.30	0.22	0.23
Type of feed	unknown	unknown	unknown

MILL 3

SUMMARY OF RESULTS

Low Steer Cooler West Duct

Pellet cooler - discharge #2

Run Number	1	2	3
Date			
Stack Flow Rate - SCFM*	14,971	14,781	14,932
% Water Vapor - % Vol.	3.98	2.87	3.29
% CO_2 - % Vol.	0	0	0
% O_2 - % Vol.	21.0	21.0	21.0
% Excess Air @ Sampling Point	--	--	--
Particulates. Probe, Cyclone & Filter Catch grains/SCF*	.0316	.0264	.0288
grains/CF @ Stack Conditions	.0285	.0239	.0258
lbs./hr.	4.1	3.3	3.7
Total Catch grains/SCF*	.0316	.0264	.0288
grains/CF @ Stack Conditions	.0285	.0239	.0258
lbs./hr.	4.1	3.3	3.7
Process Weight as reported by plant personnel lbs/hr.	30,000	30,000	32,000
Emissions related to process wt. lbs/ton	0.27	0.22	0.23
Type of feed	unknown	unknown	unknown

E

SAMPLING AND ANALYTICAL PROCEDURES

The sampling and analytical procedures used follow the procedures outlined in the "Compliance Sampling Manual - Texas State Department of Health, Air Pollution Control Services, January, 1972."

In the four circular ducts a preliminary velocity traverse was made from ports 90° apart. However, sample collections were made from one port on the circular ducts. All traverse points were sampled in the two rectangular ducts. An analysis was later made comparing the preliminary traverse pitot tube readings to those obtained during sampling to be sure that the sample collection was representative. Table A indicates the number of sampling points and the collection time at each sampling point.

In sampling the west duct of the cyclone unit on the eighth floor, a special stainless steel nozzle was fabricated enabling the sample to be collected from the bottom of the duct with

the conventional glass impinger sampling train. As a result, the sample flowed through an unheated, unlined probe for about the first 30 inches of the collection train. Since there were no significant differences between sample collections in the east and west ducts, it was not judged that this deviation from standard procedure had any effect.

For several random samples, the contents of the first and second impingers were boiled down and weighed for particulate matter. Since no particulate matter was found in the three runs analyzed, the other impingers were not analyzed.

Concentrations of particulates from the grain unloading operation were measured with the following instruments which conform to those described in Title 40, Chapter I, part 50, Appendix B of the Code of Federal Regulations (published in Federal Registrar of November 25, 1971, page 22388) and in "Compliance Sampling Manual, Texas State Department of Health, Air Pollution Control Services, January, 1972."

2 High Volume Air Samplers, General Metal Works, Inc.

2 High Volume Air Samplers, Curtin Scientific Co.

Filter Media consisted of Gelman Glass Fiber Filter Type A, No. G1701, 8" x 10"

Filters were replaced after the unloading of each railway car in an attempt to estimate particulate emissions from each type of grain unloading. Since as many as three railway cars were unloading at one time, it is not possible to always separate the effects of unloading a single car with a specific product.

TABLE A

Sampling Points and Collection Times

Cooler & Duct	Number of Sampling Points	Collection Time of Particulate Sample (min/point)
West Poultry Cooler	10	3
East Poultry Cooler	12	3
Steer Cooler High, West Duct	12	3
Steer Cooler High, East Duct	12	3
Steer Cooler Low, East Duct	16	2
Steer Cooler Low, West Duct	16	2

APPENDIX A

Location of Sampling Points

West Poultry Cooler

The sampling ports are located approximately 16 feet (8 stack diameters) downstream of the reduction and approximately 8 feet (4 stack diameters) upstream of the outlet.

Inside Diameter = 24.5"

Point No.	% From Wall	Distance From Wall
1	6.7	1 5/8"
2	11.8	2 7/8"
3	17.7	4 5/16"
4	25.0	6 1/8"
5	35.5	8 11/16"
6	64.5	15 13/16"
7	75.0	18 3/8"
8	82.3	20 3/16"
9	88.2	21 5/8"
10	93.3	22 7/8"

East Poultry Cooler

The sampling ports are located 12 feet (4.5 stack diameters) downstream of the restriction and 4 feet (1.5 stack diameters) upstream of the outlet.

Inside Diameter = 32.5"

Point No.	% From Wall	Distance From Wall
1	2.1	11/16"
2	6.7	2 3/16"
3	11.8	3 13/16"
4	17.7	5 3/4"
5	25.0	8 1/8"
6	35.5	11 1/2"
7	64.5	21"
8	75.0	24 3/8"
9	82.3	26 3/4"
10	88.2	28 11/16"
11	93.3	30 5/16"
12	97.9	31 13/16"

High Steer Cooler

East & West Ducts

The sampling ports were located 20' downstream (7 stack diameters) of the constriction and 4' (1.5 stack diameters) upstream of the outlet.

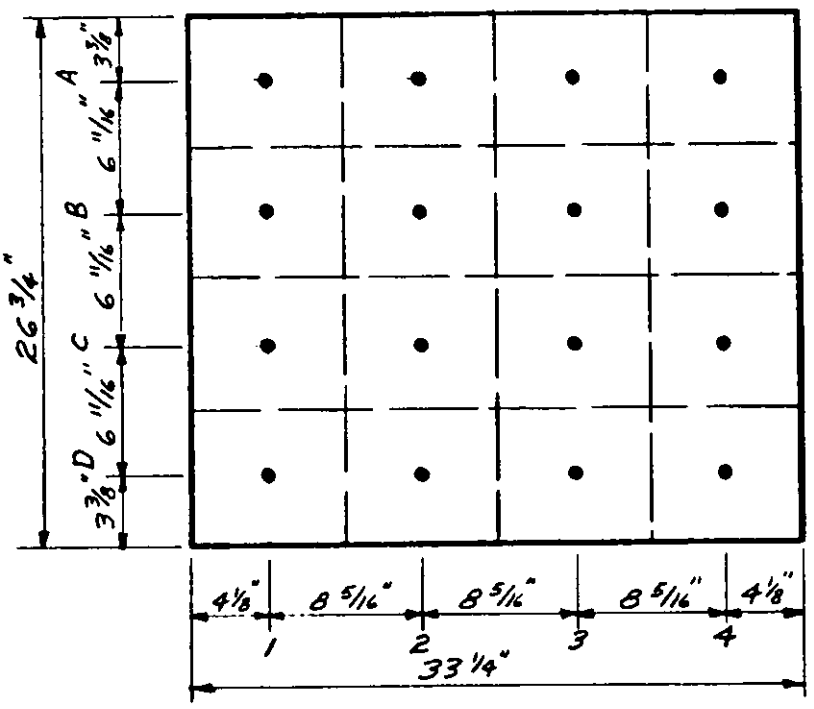
Inside Diameter = 32.5"

Point No.	% From Wall	Distance From Wall
1	2.1	11/16"
2	6.7	2 3/16"
3	11.8	3 13/16"
4	17.7	5 3/4"
5	25.0	8 1/8"
6	35.5	11 1/2"
7	64.5	21"
8	75.0	24 3/8"
9	82.3	26 3/4"
10	88.2	28 11/16"
11	93.3	30 5/16"
12	97.9	31 13/16"

Low Steer Cooler

East & West Ducts

The sampling ports are located approximately 15 feet (6 stack diameters) downstream of the inlet and approximately 5 feet (2 stack diameters) upstream of the outlet.



East Duct Looking South

On the east duct, the ports were on the side. On the west duct, the ports were on the bottom. In both cases the sampling points were the same.

TABLE 2. PELLET COOLER EMISSION DATA SUMMARY

RALSTON PURINA COMPANY, Mill 4

Test No.	Time	Site[a]	Stack Gas Parameters				Particulate Emissions					
			Velocity FPS	Temp. °F.	Moisture %	Volume[b] SCFM	Concentration Grs./SCF		Pounds/Hour		Pounds/Ton	
							Front	Total	Front	Total	Front	Total
1	13:30	Inlet	57.1	94	2.2	15,495	.3616	.3696	48.019	49.075	4.99	5.10
2	to 15:45	Outlet	44.5	90	2.5	16,085	.0159	.0250	2.149	3.445	.223	.358
3	16:20	Inlet	55.9	92	2.0	15,200	.4074	.4161	53.066	54.197	5.51	5.63
4	to 18:30	Outlet	44.7	90	1.9	16,167	.0143	.0213	1.976	2.948	.205	.306
5	19:20	Inlet	53.3	90	2.2	14,538	.5020	.5083	62.546	63.335	5.80	5.87
6	to 21:40	Outlet	44.3	86	2.3	16,057	.0128	.0175	1.765	2.409	.164	.223

(a) Inlet and outlet to cyclone collector

(b) Standard cubic feet per minute, dry basis corrected to 70°F. and 29.92 Hg.

TABLE 3. PELLET COOLER PRODUCTION DATA

Mill 4

Run No.	Test No.	Feed Composition, %	Feed Rate, Pounds/Hour
1	1,2	40% Ground Corn 30% Wheat Middlings 5% Minerals 20% Grain By-Products 5% Molasses	19256
2	3,4		
3	5,6	65% Ground Corn 25%-30% Soybean Meal 5% Minerals 2% Animal By-Products	20575[a] 22550[b]

(a) Rate during first hour of a two-hour test.

(b) Rate during second hour; average rate = 21563

TABLE 4. SUMMARY OF LABORATORY RESULTS AND SAMPLING DATA

RALSTON PURINA COMPANY - PELLET COOLER MILL 4

Test Number	Meter Volume SCFD[a]	Particulate Found, mg		% Isokinetic
		Front	Total	
1	83.246	1950.9	1993.8	107
2	60.883[b]	61.5	98.6	102
3	78.364	2068.9	2113.0	107
4	107.546	99.4	148.3	101
5	78.706	2560.7	2593.0	108
6	110.894	92.2	125.8	104

a) Standard Cubic Feet, Dry Basis Corrected to 70° F and 29.92" Hg.

b) Smaller Sized Sampling Nozzle Used During This Run

TABLE 5. HAMMERMILL EMISSION DATA SUMMARY

RALSTON PURINA COMPANY, Mill 4

Test No.	Time	Stack Gas Parameters [a]				Particulate Emissions					
		Velocity FPS	Temp. °F.	Moisture %	Volume [b] SCFM	Concentration Grs./SCF		Pounds/Hour		Pounds/Ton	
						Front	Total	Front	Total	Front	Total
7	12:30 to 15:30	52.5	72	1.7	5,316	.0253	.0335	1.151	1.525	.144	.191
8	16:20 to 17:00	57.0	78	1.5	5,713	.0192	.0252	.938	1.234	.117	.154
9	18:30 to 19:40	62.1	76	1.7	6,240	.0153	.0212	.817	1.133	.102	.142

(a) Cyclone Outlet

(b) Standard cubic feet per minute, dry basis corrected to 70°F. and 29.92" Hg.

TABLE 6. SUMMARY OF LABORATORY RESULTS AND SAMPLING DATA

RALSTON PURINA COMPANY - HAMMERMILL CYCLONE OUTLET
Mill 4

Test Number	Meter Volume SCFD[a]	Particulate Found, mg		% Isokinetic
		Front	Total	
7	80.471	131.8	174.6	111
8	46.469	57.7	75.9	115
9	50.419	49.9	69.2	114

a) Standard cubic feet per minute, dry basis corrected to 70°F and 29.92 "Hg.

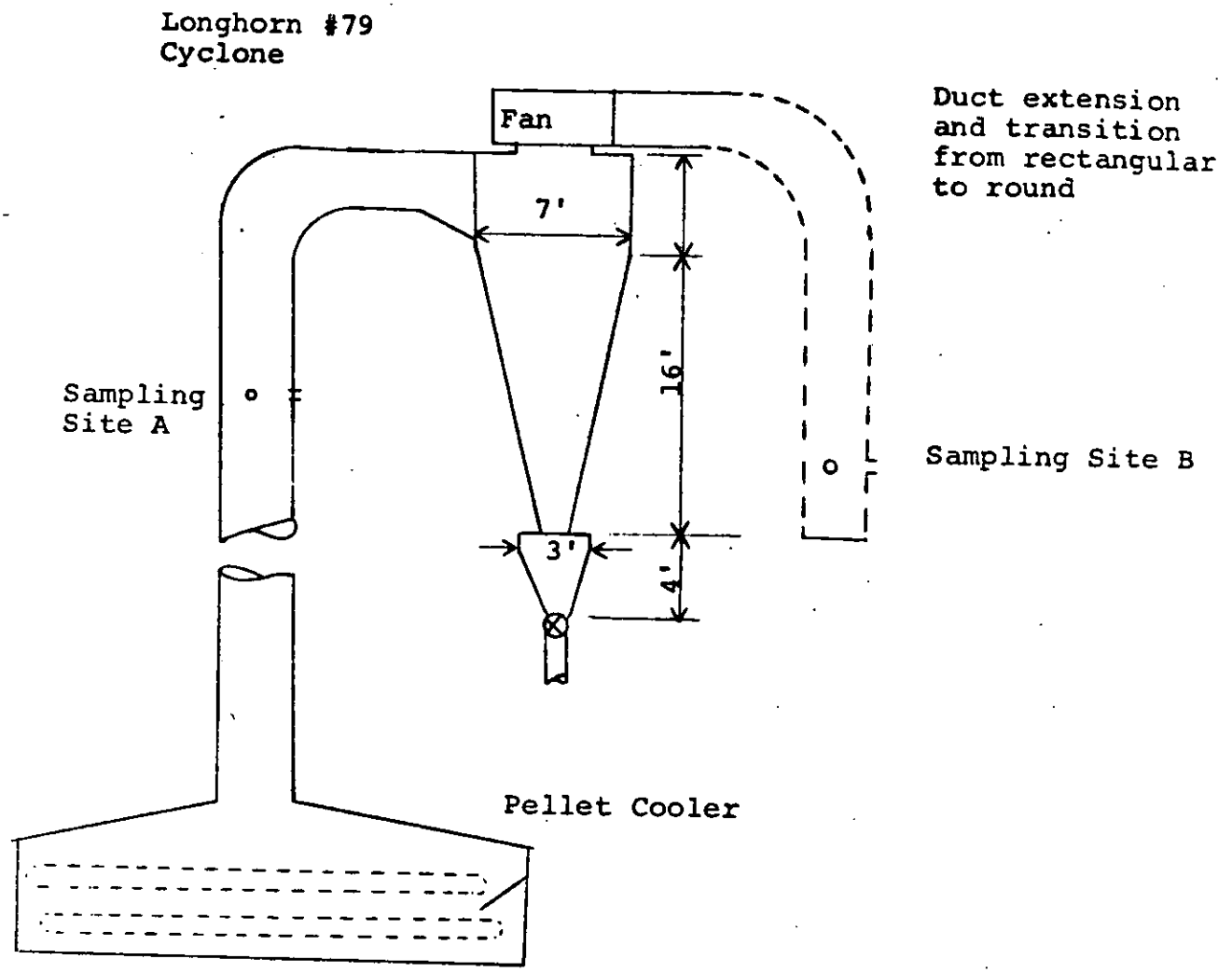


Figure 2. Pellet Cooler Mill 4

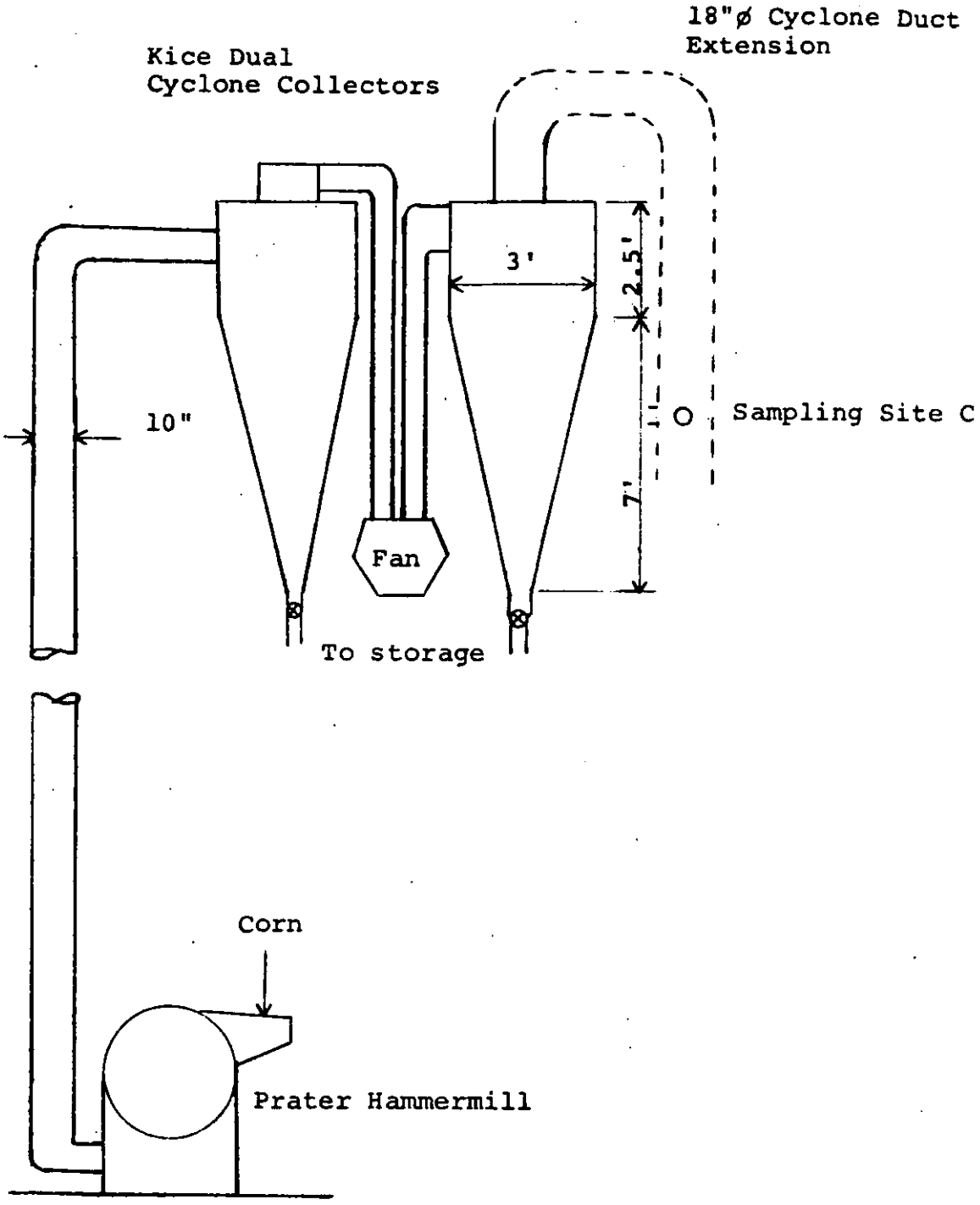


Figure 3. Hammermill System Mill 4

V. PROCESS OPERATION

Pellet Cooler

The pellet cooler operated in a normal manner. Feeds were chosen which provided long runs, i.e. about 2.5 hours. The composition of the feeds was previously shown in Table 3. The pellet mill operated at a power input of 130-150 amps during the first run and for 75% of the second run and then dropped off slowly to 110 amps.

The addition of a cyclone extension did not apparently effect the cooling air rate through the unit.

Hammermill

The hammermill operated continually in a normal manner. During each of these tests, Number 2 yellow corn with 2% FM was ground at a steady rate of 8 tons per hour. The hammermill operated at 1800 rpm, and a size 12 screen was used to yield a course grind. A sieve analysis of the ground corn yielded the following data:

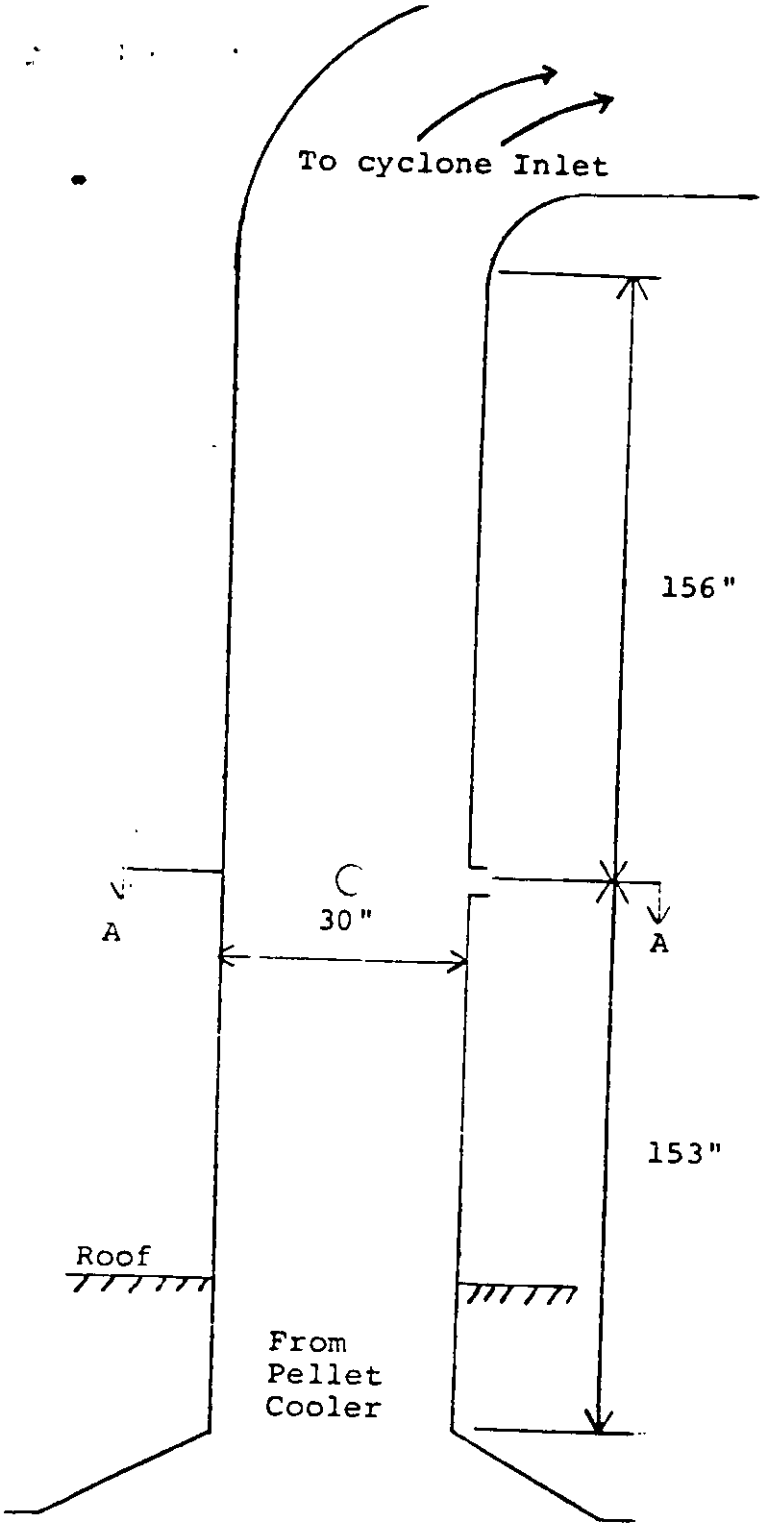
Tyler Screen Size	% Retained
8	5.5
24	58.5-65.0
42	85.5-87.5

The addition of the cyclone extension did not apparently affect the air flow through the process.

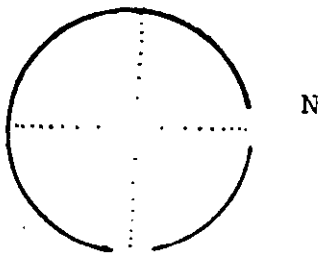
VI. LOCATION OF SAMPLING POINTS

Figures 4, 5, and 6 show the sampling ports and the number of sampling points at the sites used to determine emissions from these two operations. As shown in Figure 4, the pellet cooler cyclone inlet samples were collected at 32 points (16 along each diameter) in the 30 inch round vertical duct. This port was 5.1 diameters upstream from the bend leading into the cyclone and 5.2 diameters downstream from the transition duct leading from the pellet cooler hood. Figure 5 shows the pellet cooler cyclone outlet sampling site and the 36 traverse points (18 along each diameter) in the 34.5 inch round vertical duct. This port was located in the temporary duct extension and was 3.33 diameters downstream from the transition section and bend (duct changed from rectangular to round), and 0.83 diameters upstream from the duct outlet.

Figure 6 shows the hammermill cyclone outlet site and the 16 points (8 along each diameter) in an 18 inch round vertical duct. The sampling ports were 2 diameters upstream from the duct exit and 4.7 diameters downstream from a bend.



Point	Distance to Traverse Point, In.
1	1.0
2	1.5
3	2.6
4	3.8
5	5.1
6	6.6
7	8.5
8	11.3
9	18.8
10	21.5
11	23.4
12	24.9
13	26.3
14	27.5
15	28.5
16	29.0



Section AA

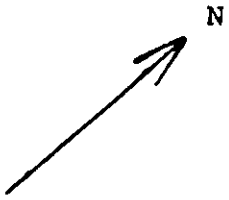


FIGURE 4. PELLET COOLER CYCLONE INLET SAMPLING LOCATION

TABLE I

MILL 5

SUMMARY OF TEST RESULTS

Test Run	Test Time	Grain Loading gr/DSCF	Process Weight Lbs/Hr	Allowable Emissions Lbs/Hr	Actual Emissions Lbs/Hr
1	10:17 to 11:23	0.0067	18,448	14.5	1.1
2	12:16 to 13:21	0.0092	16,000	13.0	1.6
3	13:40 to 14:43	0.0067	13,093	11.5	1.1

On the basis of these test results, the actual emissions meets the .25 gr/DSCF and the pounds per hour allowable emissions set by the Health Department.

III. TEST PROCEDURES

A. Method Used: Method 5 source sampling was conducted in accordance with requirements of the U.S. Environmental Protection Agency as set forth in 42 FR 37963, July 25, 1977, as amended.

B. Problems Encountered: No problems were encountered that affected testing.

"Mill 5" 8/19

Data cannot be used due to lack of adequate documentation

C. Sampling Site: The emissions test was conducted after a series of three cyclones on a rectangular duct measuring 40.5" x 27.25" with an equivalent diameter of 32.5". Six sample ports were placed 65" down (2.0 diameters upstream) from a bend in the duct and 17" up (0.5 diameters downstream) from the exit. Thirty points were sampled, five through each port for two minutes each for a total testing time of sixty minutes per test run.

Points on a Diameter	Probe Marks
1	2.7"
2	8.2"
3	13.6"
4	19.1"
5	24.5"