MRI REPORT

SOURCE TESTING REPORT
EMB Project No. 73-FRT-1

ARCO Chemical Company
Fort Madison, Iowa

Midwest Research Institute
Kansas City, Missouri 64110

EPA Contract 68-02-0228, Task 22

MRI Project No. 3585-C, Task No. 23

SOURCE TESTING REPORT
EMB Project No. 73-FRT-1

ARCO Chemical Company
Fort Madison, Iowa

by

E. P. Shea

Midwest Research Institute
Kansas City, Missouri 64110

EPA Contract 68-02-0228, Task 22

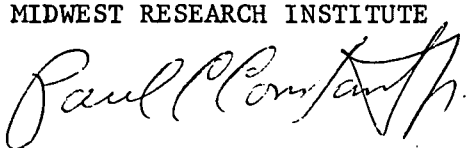
MRI Project No. 3585-C, Task No. 23

PREFACE

The work reported herein was conducted by Midwest Research Institute (MRI) pursuant to a task order issued by the Environmental Protection Agency (EPA) under the terms of EPA Contract No. 68-02-0228. Mr. E. P. Shea served as the Project Chief and directed the MRI field team consisting of Messrs. Henry Moloney, Acid and Water Sampler; William Maxwell, Engineering Technician; Reid Flippin, Testing Engineer; Michael Bechtold, Engineering Technician; and William Cunningham, Laboratory Technician. Mr. Winton Kelly, EPA, was Project Officer and Mr. Lee Beck was the Field Engineer responsible for collecting process data. Mr. E. P. Shea prepared this final report.

Approved for:

MIDWEST RESEARCH INSTITUTE



Paul C. Constant, Jr.
Program Manager

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

Under the Clean Air Act as amended, the Environmental Protection Agency is charged with the establishment of performance standards for stationary source categories which may contribute significantly to air pollution. A performance standard is a standard for emissions of air pollutants which reflect emission limitations attainable through the best emission reduction systems that have been adequately demonstrated (taking into account economic considerations).

The development of realistic performance standards requires accurate data on pollution emissions within the various source categories. The objective of this project was to collect the data on emissions of fluoride and ammonia at a diammonium phosphate fertilizer plant. The ARCO Chemical Company plant at Fort Madison, Iowa, was designated by EPA as representative of a well controlled plant and was therefore selected for the emission testing program. This report presents the results of the tests run at the fertilizer plant to determine the fluoride and ammonia emissions.

On Monday, 19 March 1973, the equipment and personnel arrived at the site. The platform erection was not finished. On Tuesday, 20 March 1973, the equipment was unloaded at the stack and the laboratory. The support rails were installed on Ports 1 and 2, but not on Ports 3 and 4. The platform uprights used to fasten the support rails were not located properly and ARCO maintenance people had to be recalled to change the uprights. A preliminary velocity and temperature traverse was run Tuesday on Ports 1 and 2. The moisture determination run was not successful, so an assumed moisture value was used in setting

up the nomograph for Run No. 1 on Wednesday, 21 March 1973. The assumed value of 20% was about three times the actual moisture. This erroneous assumption resulted in Run No. 1 having an 88.6 isokinetic value. The other four runs using a 7% moisture value had isokinetic values of 98.3, 103.2, 100.9, and 105.3

On Tuesday, 20 March 1973, we were informed by the project officer that sampling for ammonia was to be conducted if possible. We had enough equipment to do this and we were able to get sulfuric acid from ARCO so we ran five tests for fluoride and four additional tests for ammonia. The results of these tests are included in this report. The samples were collected and packaged in polypropylene sample jars and given to the project officer for delivery to the EPA analytical laboratory.

On Friday, 23 March 1973, we ran three tests--one fluoride, one ammonia, and one integrated gas sample--removed the equipment from the stack, loaded the truck, and cleared the site. On Saturday, 24 March 1973, the crew returned to Kansas City.

II. SUMMARY OF RESULTS

Table I presents a summary of results from the fluoride runs. The fluoride caught in the cyclone ranged from 0.00 to 0.2 lb/hr with an average emission of 0.108 lb/hr. The fluoride per ton of P_2O_5 ranged from 0.0 to 0.0123 lb/ton with an average of 0.007 lb/ton. The fluoride detected was present in the soluble form in the cyclone catch from all five runs. The

analysis for insoluble fluoride showed less than 0.06 mg which is the lower limit of detection for the analytical method used.

Total fluorides caught during each of the five emission tests are in Table I. As was the case in the cylcone catch, only soluble fluoride was detected from all runs except No. 4. In Run No. 4 there was 0.08 mg of insoluble fluoride detected. The total fluoride emitted ranged from 0.39 lb/hr to 0.85 lb/hr with an average emission of 0.554 lb/hr of fluoride. Table I also shows the emissions per ton of P_2O_5 processed. It ranges from 0.0758 lb/ton to 0.0555 lb/ton with average of 0.0356 lb/ton.

Table I shows also the results of the moisture and Orsat analysis of the stack gases for each fluoride run. The moisture varied from 5.4% to 7.5% with an average of 6.5%. There was no detectable CO present. The CO_2 content of the stack gas varied from 0.2% to 0.6%, with an average of 0.34%. The average oxygen content for the five runs was 20.58%, with a variance from 20.2% to 21.0%.

Table II shows the weight of fluoride collected in each emission test. The data as presented show the soluble and insoluble fluoride caught in the cyclone and soluble and insoluble fluorides in the total catch.

The analytical results for the scrubber liquid samples, the feed and product samples, are presented in Table III.

For the four ammonia runs, the analytical results show that there was no detectable ammonia discharged from the DAP stack during the test period. All of the analyses show < 0.3 mg of ammonia. The lower detection limit for the analytical method is 0.3 mg of ammonia. Using the average

TABLE I

SUMMARY OF RESULTS - TOTAL CATCH

NAME	DESCRIPTION	UNITS	1F	2F	3F	4F	5F
	DATE OF RUN		03-21-73	03-21-73	03-22-73	03-22-73	03-23-73
QS	STK FLOWRATE, DRY,STD CN	DSCFM	135060	142550	129498	138549	116248
QA	ACTUAL STACK FLOWRATE	ACFM	156408	165428	151009	158642	135750
PMOS	PERCENT MOISTURE BY VOL		6.5	6.6	6.5	5.4	7.5
PCO2	PERCENT CO2 BY VOL, DRY		.3	.6	.2	.4	.2
PO2	PERCENT O2 BY VOL, DRY		20.5	21.0	20.2	20.6	20.6
PCO	PERCENT CO BY VOL, DRY		0.0	0.0	0.0	0.0	0.0
	PROCESS FEED RATE	TONS P_2O_5 /HR	14.0	15.3	18.2	16.2	14.6
	FLUORIDES -- CYCLONE CATCH						
MF	FLUORIDE WT-CYCLONE	MG	.50	.70	.10	.80	0.0
CAN	FLUORIDE LOAD-PTL,STD CN	GR/DSCF	.00012	.00015	.00002	.00017	--
CAT	FLUORIDE LOAD-PTL,STK CN	GR/ACF	.00011	.00013	.00002	.00015	--
CAW	FLUORIDE EMIS-CYCLONE	LB/HR	.14	.18	.02	.20	--
	FLUORIDE EMISSIONS	LB/TON P_2O_5	0.01	0.0117	0.001	0.0123	0.0
MT	FLUORIDE WT-TOTAL	MG	1.70	3.30	1.90	2.28	1.60
CAO	FLUORIDE LOAD-TTL,STD CN	GR/DSCF	.00042	.00070	.00042	.00048	.00039
CAU	FLUORIDE LOAD-TTL,STK CN	GR/ACF	.00036	.00060	.00036	.00042	.00033
CAX	FLUORIDE EMIS-TOTAL	LB/HR	.49	.85	.47	.57	.39
	FLUORIDE EMISSIONS	LB/TON P_2O_5	0.035	0.0555	0.0258	0.0351	0.0267
IC	PERC IMPINGER CATCH		71.4	78.8	95.7	64.9	100.0

TABLE II

WEIGHT RESULTS - FLUORIDE RUNS

Run Number	Cyclone Catch Weight (mg)			Total Weight (mg)		
	Soluble Fluorides	Insoluble Fluorides	Total Fluorides	Soluble Fluorides	Insoluble Fluorides	Total Fluorides
1F	0.5	--	0.5	1.7	--	1.7
2F	0.7	--	0.7	3.3	--	3.3
3F	0.1	--	0.1	1.9	--	1.9
4F	0.8	--	0.8	2.2	0.08	2.28
5F	--	--	--	1.6	--	1.6

TABLE III

ANALYSIS RESULTS - FLUORIDE RUNS

Run No.	Sample Identification No.	Description of Sample	Total Fluorides	P_2O_5	pH	Ammonia
1F	503	Venturi scrubber inlet liquor (26% H_3PO_4)	17.3 gm/ℓ		0.52	
	504	Venturi scrubber outlet liquor (26% H_3PO_4)	13.8 gm/ℓ		2.93	100.8 gm/ℓ
	505[a]	Gypsum pond water	--	--	--	
	506	Reactor--granulator afterscrubber outlet liquor	1.7 gm/ℓ			592.6 mg/ℓ
	507	Cooler afterscrubber outlet liquor	1.8 gm/ℓ			504.1 mg/ℓ
	508[b]	Drier afterscrubber outlet liquor	--			--
	509	Feed Acid (54% H_3PO_4)	12.1 gm/ℓ	850 gm/ℓ		
	510	DAP product	26.4 mg/gm	520 mg/gm		211.2 mg/gm
2F	515	Venturi scrubber inlet liquor (26% H_3PO_4)	26.6 gm/ℓ		0.033	
	516	Venturi scrubber outlet liquor (26% H_3PO_4)	17.8 gm/ℓ		1.78	86 gm/ℓ
	517	Gypsum pond water	1.8 gm/ℓ	2.7 gm/ℓ	1.65	
	518	Reactor--granulator afterscrubber outlet liquor	1.7 gm/ℓ			449.6 mg/ℓ
	519	Cooler afterscrubber outlet liquor	1.9 gm/ℓ			463.0 mg/ℓ
	520	Drier afterscrubber outlet liquor	1.8 gm/ℓ			828.0 mg/ℓ
	521	Feed Acid (54% H_3PO_4)	15.2 gm/ℓ	800 gm/ℓ		
	522	DAP product	26.0 mg/gm	470 mg/gm		197.5 mg/gm
3F	527	Venturi scrubber inlet liquor (26% H_3PO_4)	25.6 gm/ℓ		0.28	
	528	Venturi scrubber outlet liquor (26% H_3PO_4)	6.0 gm/ℓ		5.38	107.5 gm/ℓ
	529	Gypsum pond water	2.0 gm/ℓ	2.8 gm/ℓ	1.75	
	530	Reactor--granulator afterscrubber outlet liquor	1.6 gm/ℓ			487.1 mg/ℓ
	531	Cooler afterscrubber outlet liquor	1.7 gm/ℓ			1.3 gm/ℓ
	532	Drier afterscrubber outlet liquor	1.7 gm/ℓ			580 mg/ℓ
	533	Feed Acid (54% H_3PO_4)	14.5 gm/ℓ	790 gm/ℓ		
	534	DAP product	24.4 mg/gm	500 mg/gm		228.2 mg/gm
4F	537	Venturi scrubber inlet liquor (26% H_3PO_4)	25.8 gm/ℓ		0.37	
	538[a]	Venturi scrubber outlet liquor (26% H_3PO_4)	--		--	--
	539	Gypsum pond water	1.8 gm/ℓ	2.8 gm/ℓ	1.73	
	540	Farm runoff water	1.1 mg/ℓ	14.5 mg/ℓ	--	
	541	Reactor--granulator afterscrubber outlet liquor	1.7 gm/ℓ			115.8 mg/ℓ
	542	Cooler afterscrubber outlet liquor	1.8 gm/ℓ			599.5 mg/ℓ
	543	Drier afterscrubber outlet liquor	1.7 gm/ℓ			1.3 gm/ℓ
	544	Feed Acid (54% H_3PO_4)	14.7 gm/ℓ	750 gm/ℓ		
	545	DAP product	26.0 mg/gm	480 mg/gm		201.0 mg/gm
5F	549	Venturi scrubber inlet liquor (26% H_3PO_4)	27.5 gm/ℓ		0.35	
	550	Venturi scrubber outlet liquor (26% H_3PO_4)	7.2 gm/ℓ		5.18	111.3 gm/ℓ
	551	Gypsum pond water	1.8 gm/ℓ	2.8 gm/ℓ	1.73	
	552	Reactor--granulator afterscrubber outlet liquor	1.8 gm/ℓ			910 mg/ℓ
	553	Cooler afterscrubber outlet liquor	1.8 gm/ℓ			630 mg/ℓ
	554	Drier afterscrubber outlet liquor	1.7 gm/ℓ			630 mg/ℓ
	555	Feed Acid (54% H_3PO_4)	15.5 gm/ℓ	730 gm/ℓ		
	556	DAP product	25.7 mg/gm	460 mg/gm		204.4 mg/gm

[a] Sample lost during shipment.
[b] Sample missing.

standard volume sampled, 44.135 DSCF and 0.3 mg NH_3, the concentration of ammonia is < 0.337 ppm.

Example Calculation

Ave VMSTD = 44.135 DSCF

Wt NH_3 = < 0.3 mg

DSCF x 0.0283 = NM^3

Mol. Wt NH_3 = 17

$$\frac{0.3 \text{ mg}}{44.135 \times \text{DSCF} \times 0.0283 \text{ NM}^3/\text{DSCF}} = 0.2367 \text{ mg/NM}^3$$

$$\text{NM}^3 \times \frac{24.2}{\text{Mol. Wt}} = \text{ppm}$$

$$\frac{0.2367 \text{ mg/NM}^3 \times 24.2}{17} = < 0.337 \text{ ppm}$$

During the first fluoride run it was discovered that Point No. 3 in Port No. 2 was a dead spot. At first it was thought that the pitot tubes and lines were plugged. The test was stopped and the lines examined, but nothing was found. No ΔP reading was observed at this point. The project officer consulted with the ARCO people and they confirmed that they indeed had a dead spot in the stack. We moved an inch away and finished the run. On all future runs we stayed an inch away from Point No. 3 in Port No. 2.

On a process weight basis, the results of the five test runs range from 0.026 to 0.055 lb F/ton P_2O_5 and average 0.036 lb F/ton P_2O_5.

In an attempt to compare the effectiveness of a spray-crossflow packed scrubber using fresh water with one using gypsum pond water, one of the five test runs was performed while one of the three packed scurbbers was using farm runoff water (not contaminated with fluorides) as the scrubbing liquor. Two such samples were to be taken, but due to process equipment failure, the collection of only one was possible. The result of this test run (Run No. 4) was 0.036 lb F/ton P_2O_5. The average of many tests performed while one scrubber uses farm runoff water should be lower than the average of many tests performed while all the scrubbers are scrubbing with pond water contaminated with fluorides. The result of this single sample is not sufficient for a valid comparison and no conclusion can be made.

The sampling train for all five test runs was modified to include an unheated cyclone between the probe and the impingers. This modification was made in an attempt to indicate the relative amounts of pond water mist and/or other particulates in the sampled gas stream. The cyclone catches

contained from 0 to 0.013 lb F/ton P_2O_5, which is from 0% to 35% of the total fluoride catches. Run No. 4 (using farm runoff water) yielded the highest value. If a significant quantity of fluoride contaminated mist is present in this plant's gas stream, the least amount of fluorides would be expected in the cyclone catch of Run No. 4. That this test did not yield the lowest percentage of fluorides captured in the cyclone, indicates that fluoride contaminated mist is not an appreciable portion of the total fluoride emisssions at this plant.

Both changes, the sampling of the plant while one of the scrubbers was using farm runoff water and the inclusion of the cyclone in the sampling train, were attempts to show strong trends in the amount of particulates in the gas stream and the effect of scrubbing fluorides with fresh water. The results fail to indicate any strong trends. A complete analysis would require different methods and more samples.

III. PROCESS DESCRIPTION AND OPERATION

The diammonium phosphate (DAP) facility at ARCO Chemical Company, Fort Madison, Iowa, is designed to produce 750 tons/day of product (345 tons P_2O_5/day). Normal operation is at the design rate.

At this location ammonia is reacted with phosphoric acid in a pre-neutralizer or reactor. Sulfuric acid is also added to the reaction mixture. The slurry from the reactor is fed to a granulator along with recycled off-size product and recovered dust. Additional ammonia is added in the granulator. From the granulator, the DAP product passes through a rotary

dryer. After drying, the product is screened to remove oversize and undersize product. The oversize product is ground in a cage mill and returned to the granulator along with the undersize fines. The on-size product is passed through a rotary cooler to storage.

Three separate systems are used to control the particulate, fluoride, and ammonia emissions from the process. The reactor-granulator system is equipped with a venturi scrubber followed by a crossflow packed scrubber of Teller design.

The dryer and cooler are each equipped with separate systems identical to the reactor-granulator control system, except that in each case, the venturi scrubber is preceded by a battery of four parallel cyclones for particulate removal.

Thirty percent acid, diluted to 25% with gypsum pond water, is used in each venturi scrubber to control fluorides and recover any ammonia in the gas stream. The spent scrubber liquor is returned to the process.

The packed scrubber serving the reactor-granulator can use either gypsum pond water containing 1,700 to 1,900 ppm fluoride as F (weight per volume), or farm runoff water with no fluoride content. The packed scrubbers serving the cooler and dryer use gypsum pond water as scrubbing liquor. A total of 130,000 to 150,000 SCFM are discharged from the three control systems through a common stack.

The first and second set of fluoride and ammonia samples were collected on 21 March 1973. The process operated at 100-110% of its design production rate, which is normal. The third and fourth sets of samples were

collected on 22 March 1973. During the first three tests, gypsum pond water was used in all three packed scrubbers to absorb fluorides. Prior to collection of the fourth sample, the reactor-granulator scrubber was switched to using farm runoff water, which is not contaminated with fluorides. The fifth and final set of samples was collected on 23 March 1973. These samples were programmed to be collected while the reactor-granulator packed scrubber was using farm runoff water. Collection of the sample began at 0939. At 0945, EPA was informed that there was a serious problem with the pump which delivers farm runoff water to the reactor-granulator scrubber. The scrubber was switched to using gypsum pond water at about 0948. The scrubbing water was switched almost instanteously. There was no time when the scrubber was dry or operating at reduced water flow rates. Sampling was continued without interruption. Except for this one incident, the process and control systems were operating at normal and uniform conditions.

The ambient temperature during testing remained around 35°F. At this temperature, the moisture in the stack gases created a dense plume which continued for 50-75 ft beyond the stack and rendered visible emission measurements difficult. However, throughout all five tests runs, there were visible emissions which remained after the moisture plume dissipated. These emissions were estimated to be from 10-15% opacity.

IV. LOCATION OF SAMPLING PORTS

Figure 1 shows the location of the sampling ports in the North DAP stack at ARCO Chemical Company. There are four ports installed 90 degrees

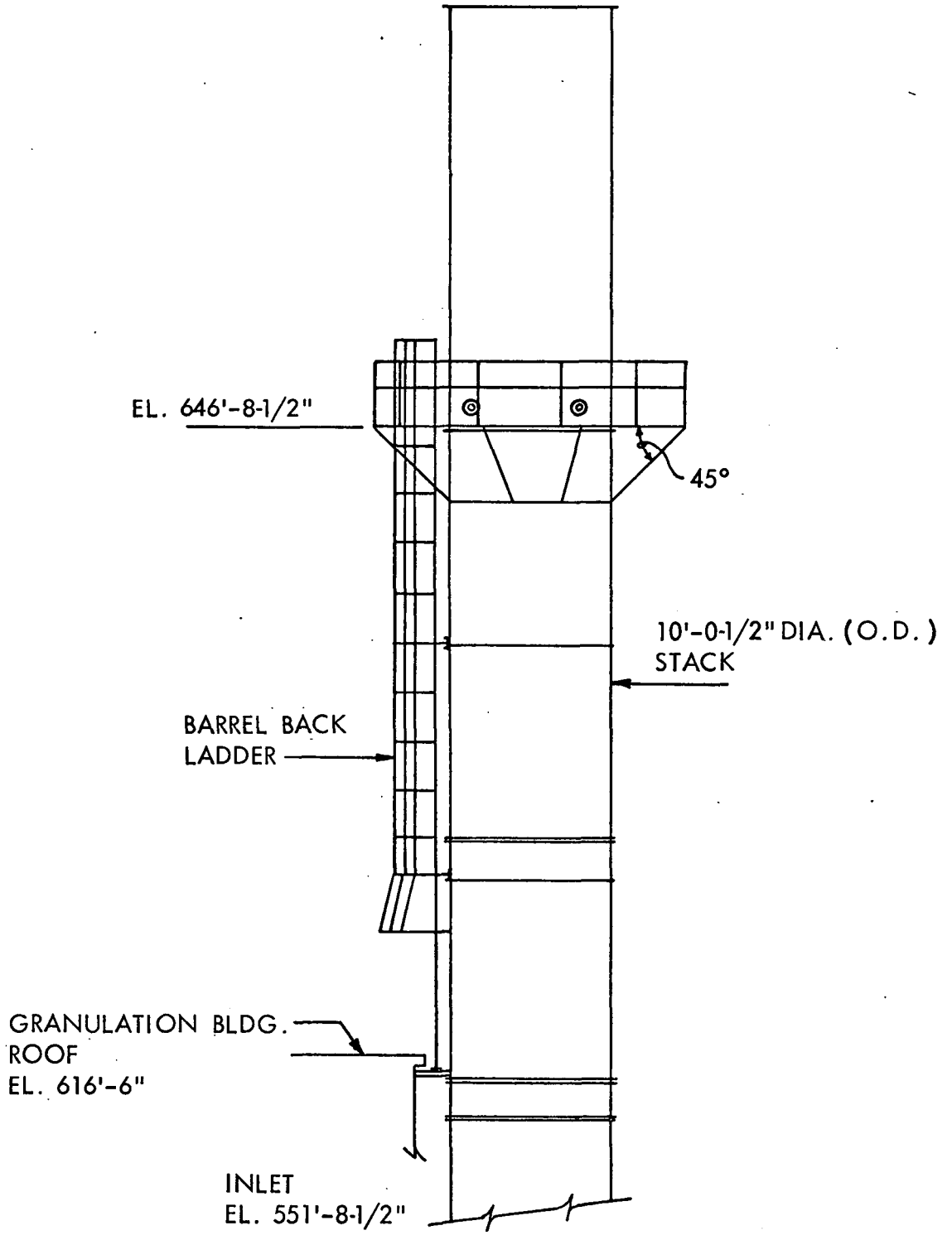


Figure 1 - DAP Plant Effluent Stack and Platform

apart at 8-1/2 pipe diameters from the upstream disturbance and 2-1/2 pipe diameters from the outlet. The fluoride samples were taken from three points in each port at distances of 5-1/4 in., 17-5/8 in., and 35-3/8 in., from the inside wall at each port.

The Orsat readings were obtained from integrated 30 min gas samples taken at a distance of 24 in. from the inside wall. The ammonia sampling was conducted at Point No. 3, Port No. 4 in the stack. Runs were of 1-hr duration.

During the fluoride emission tests, samples of scrubber feed, pond water makeup, scrubber outlet, feed acid and product, were taken. Figure 2 is a schematic, showing the location of the liquid samples taken. The product sample was obtained from the plant continuous composite sampler.

V. SAMPLING AND ANALYTICAL PROCEDURES

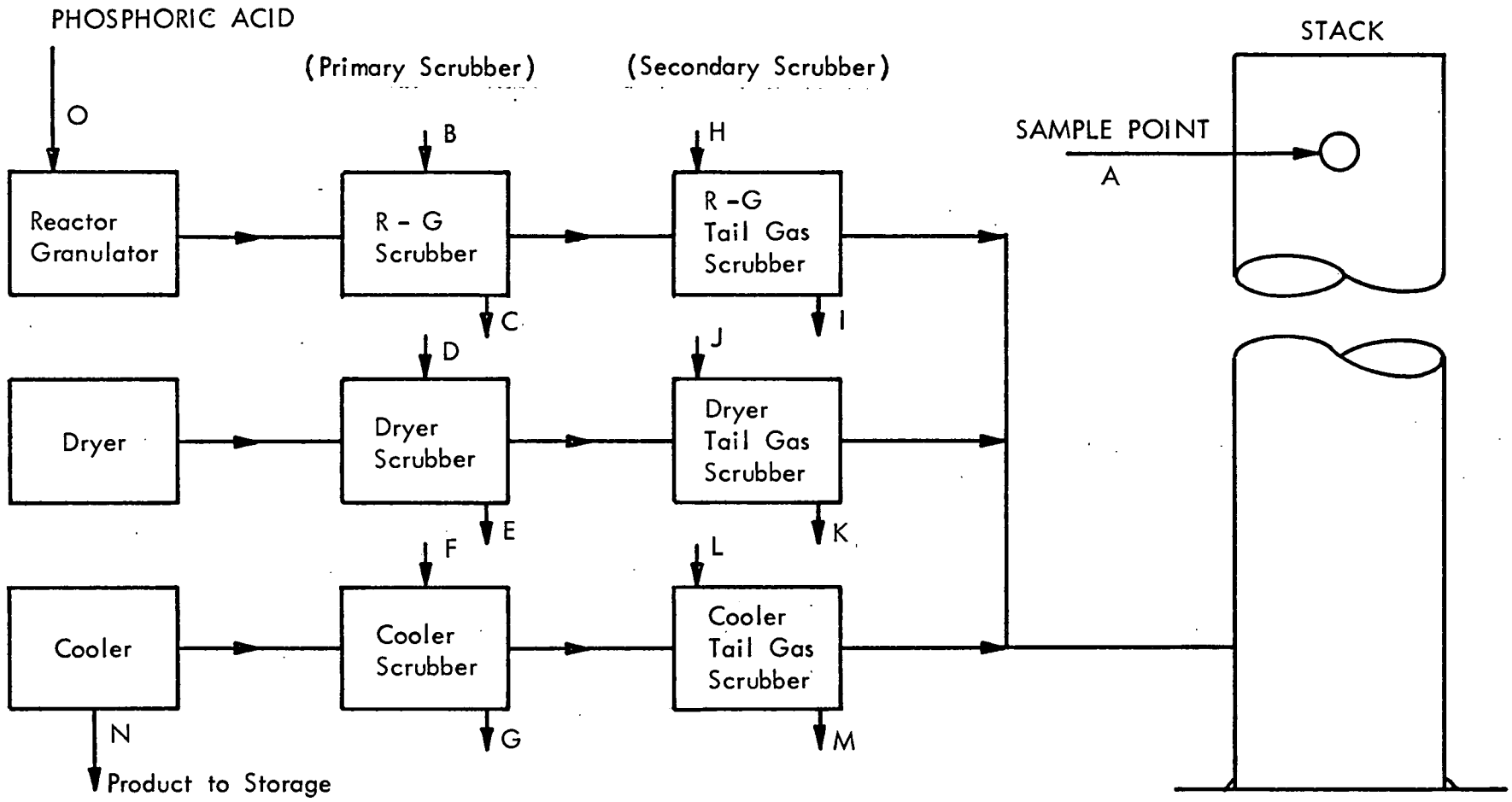
A. Fluorides

For the particulate fluoride sampling, the Research Appliance Company* Model 2343 "Staksamplr" equipment was used. The sampling train meets the specification of the Federal Register, 36, 17 August 1971, with one major change. The filter was installed between the third and last impinger instead of between the cyclone and first impinger, and No. 41 Whatman filter paper was used instead of the glass fiber filter. The analytical method used by the EPA Laboratory was the Spadns Zirconium Lake.[1/]

---

* Mention of a specific company or product does not constitute endorsement by EPA.

1/ APHA-AWWA-WPCF, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, 1971, pp. 174-176.



B,D,F - Primary Scrubber Feed-Composite (Approx. 25% Phosphoric Acid Solution)
H,J,L - Pond Water Make-Up-Composite
C,E,G - Primary Scrubber Outlet Discharge-Composite
I,K,M - Secondary Scrubber Outlet Discharge-Separate Samples

Figure 2 - Location of Liquid Samples

The network of sampling points has previously been described. The number of points on a traverse, sampling time at each point, and the sampling sequence were worked out in consultation with the EPA Field Officer. Preliminary measurements were made at the stack to determine temperature and velocity profiles. A moisture was assumed for the first test run, and calculated for the other tests from the moisture collected in the train on the previous run.

B. Ammonia

The ammonia sampling was conducted using the RAC* Model 2343 "Stak-samplr" equipment which meets the specification of the Federal Register, 36, 17 August 1971. There was one change: 100 ml of 30 g/liter H_2SO_4 was used in the first two impingers instead of 100 ml of water. The EPA laboratory used the Kjeldahl Distillation Analytical Method for ammonia.

C. Integrated Gas Samples

The equipment and procedure used for the collection of a cumulative or integrated gas sample are essentially the same as specified in the Federal Register. The gas sampling train, which deviates from the train design that is specified in the Register, is shown in Figure 3. This train design was approved by EPA prior to the test. The rate of sampling was controlled by adjusting a micrometer valve which acted as a critical orifice. The sampling

* Mention of a specific company or product does not constitute endorsement by EPA.

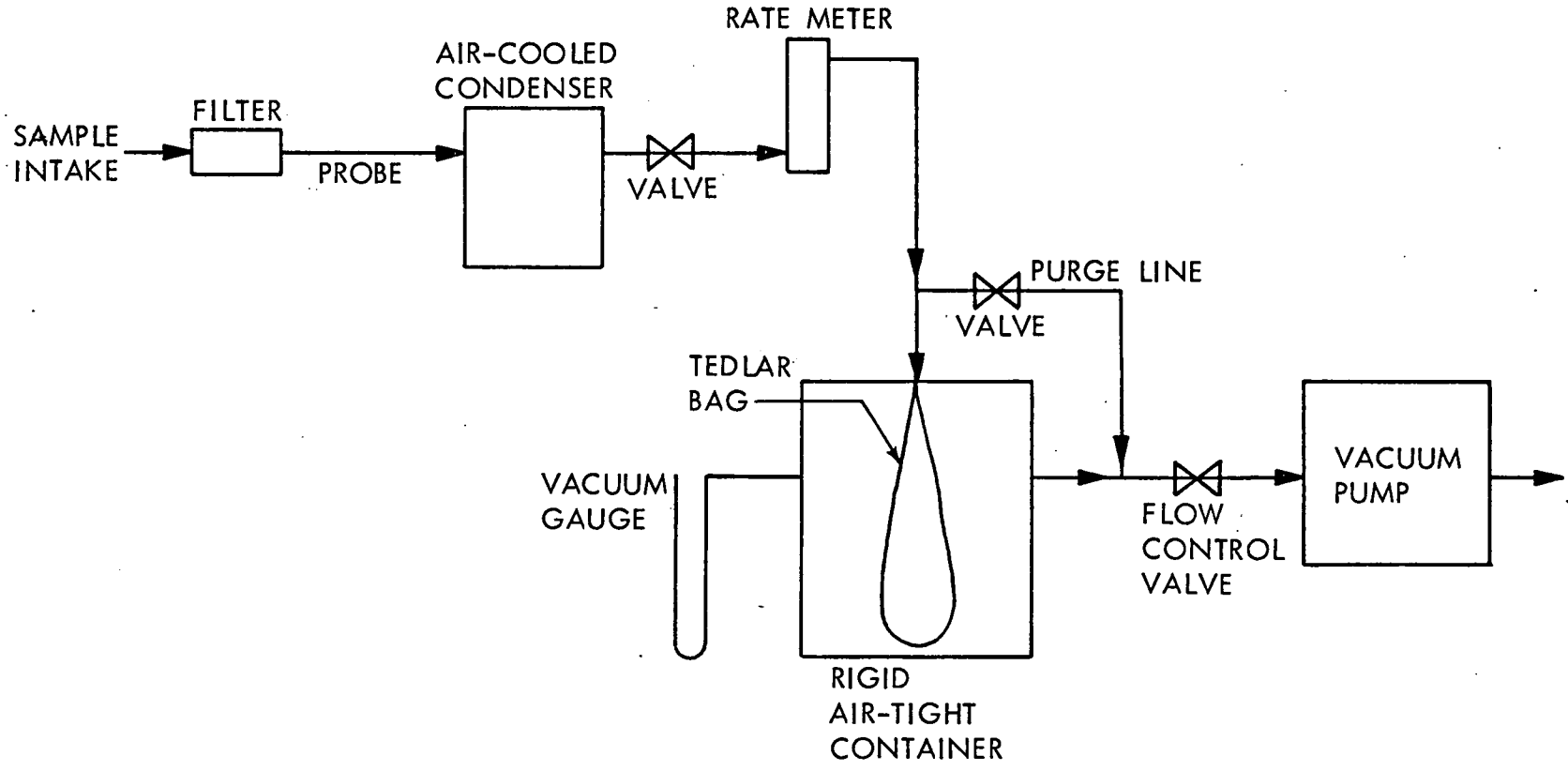


Figure 3 - Integrated Gas Sampling Train

rate was set at a constant value for any testing period, such that a total volume of gases between 1 and 1.5 cu ft were collected.

Analyses for carbon dioxide, oxygen, and carbon monoxide were performed in the field within a few hours after the sampling was completed, using an Orsat apparatus.

APPENDIX A

FLUORIDE RESULTS

This appendix contains Tables A-I through A-III. Table A-I shows the fluoride emission data for the total catch and cyclone catch. Table A-II is the sample calculations for fluoride total catch and cyclone catch. Table A-III contains the fluoride data and calculated values for the total catch and the cyclone catch.

TABLE A-I

FLUORIDE EMISSION DATA

NAME	DESCRIPTION	UNITS	1F	2F	3F	4F	5F
	DATE OF RUN		03-21-73	03-21-73	03-22-73	03-22-73	03-23-73
DN	PROBE TIP DIAMETER	IN	.250	.250	.250	.250	.250
TT	NET TIME OF RUN	MIN	120.0	120.0	120.0	120.0	120.0
PB	BAROMETRIC PRESSURE	IN.HG	29.80	29.78	29.72	29.60	29.80
PM	AVG ORIFICE PRES DROP	IN.H2O	.914	1.194	1.101	1.194	.897
VM	VOL DRY GAS-METER COND	DCF	61.51	72.86	68.86	72.45	63.30
TM	AVG GAS METER TEMP	DEG.F	60.3	66.4	60.1	61.6	63.6
VMSTD	VOL DRY GAS-STD COND	DSCF	62.53	73.21	69.88	73.03	63.94
VW	TOTAL H2O COLLECTED	ML	91.3	109.9	102.4	87.9	109.1
VWV	VOL H2O VAPOR-STD COND	SCF	4.33	5.21	4.85	4.17	5.17
PMOS	PERCENT MOISTURE BY VOL		6.5	6.6	6.5	5.4	7.5
MD	MOLE FRACTION DRY GAS		.935	.934	.935	.946	.925
PCO2	PERCENT CO2 BY VOL, DRY		.3	.6	.2	.4	.2
PO2	PERCENT O2 BY VOL, DRY		20.5	21.0	20.2	20.6	20.6
PCO	PERCENT CO BY VOL, DRY		0.0	0.0	0.0	0.0	0.0
PN2	PERCENT N2 BY VOL, DRY		79.2	78.4	79.6	79.0	79.2
MWD	MOLECULAR WT-DRY STK GAS		28.86	28.94	28.84	28.89	28.86
MW	MOLECULAR WT-STK GAS		28.16	28.21	28.13	28.30	28.04
CP	PITOT TUBE COEFFICIENT		.850	.850	.850	.850	.850
DPS	AVG STK VELOCITY HEAD	IN.H2O	.320	.353	.300	.330	.247
TS	AVG STACK TEMPERATURE	DEG.F	112.0	111.9	114.3	107.3	110.7
NP	NET SAMPLING POINTS		24	24	24	24	24
PST	STATIC PRES OF STACK	IN.HG	.02	.03	.03	-.03	.03
PS	STACK PRESSURE, ABSOLUTE	IN.HG	29.82	29.81	29.75	29.57	29.83
VS	AVG STACK GAS VELOCITY	FPM	1991	2106	1923	2020	1728
AS	STACK AREA	IN2	11310	11310	11310	11310	11310
QS	STK FLOWRATE, DRY,STD CN	DSCFM	135060	142550	129498	138549	116248
QA	ACTUAL STACK FLOWRATE	ACFM	156408	165428	151009	158642	135750
PERI	PERCENT ISOKINETIC		88.6	98.3	103.2	100.9	105.3
B	ANISO CORRECTION FACTOR		1.000	1.000	1.000	1.000	1.000
MF	FLUORIDE WT-CYCLONE	MG	.50	.70	.10	.80	0.0
MT	FLUORIDE WT-TOTAL	MG	1.70	3.30	1.90	2.28	1.60
IC	PERC IMPINGER CATCH		71.4	78.8	95.7	64.9	100
CAN	FL. LOAD-PTL,STD CN	GR/DSCF	.00012	.00015	.00002	.00017	0.0
CAO	FL. LOAD-TTL,STD CN	GR/DSCF	.00042	.00070	.00042	.00048	.00039
CAT	FL. LOAD-PTL,STK CN	GR/ACF	.00011	.00013	.00002	.00015	0.0
CAU	FL. LOAD-TTL,STK CN	GR/ACF	.00036	.00060	.00036	.00042	.00033
CAW	FLUORIDE EMIS-PARTIAL	LB/HR	.14	.18	.02	.20	0.0
CAX	FLUORIDE EMIS-TOTAL	LB/HR	.49	.85	.47	.57	.39
	PROCESS FEED RATE	TON P_2O_5/HR	14.0	15.3	18.2	16.2	14.6
	EMISSIONS CYCLONE	LB F/TON P_2O_5	.01	.0117	.001	.0123	0.0
	EMISSIONS TOTAL	LB F/TON P_2O_5	.035	.0555	.0258	.0351	.0267

TABLE A-II

EXAMPLE FLUORIDE CALCULATIONS

1. VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

$$VMSTD = \frac{17.71*VM*(PB + PM/13.6)}{TM+460.}$$

$$= \frac{17.71*\ 61.51*(29.80+\ \ .914/13.6)}{60.3+460.} = \quad 62.53 \text{ DSCF}$$

2. VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

$$VWV = 0.0474*VW = 0.0474*\ \ 91.3 = \quad 4.33 \text{ SCF}$$

3. PERCENT MOISTURE IN STACK GAS

$$PMOS = \frac{100.*VWV}{VMSTD+VWV} = \frac{100.*\ \ 4.33}{62.53+\ \ 4.33} = \quad 6.5 \text{ PERCENT}$$

4. MOLE FRACTION OF DRY STACK GAS

$$MD = \frac{100.-PMOS}{100.} = \frac{100.-\quad 6.5}{100.} = \quad .935$$

5. AVERAGE MOLECULAR WEIGHT OF DRY STACK GAS

$$MWD = (PCO2 * 44/100) + (PO2 * 32/100) + (PN2+PCO * 28/100)$$

$$= (\ \ .3 * 44/100) + (20.5 * 32/100) + (79.2 * 28/100)$$

$$= \quad 28.86$$

6. MOLECULAR WEIGHT OF STACK GAS

$$MW = MWD*MD + 18*(1-MD)$$

$$= \quad 28.9*\ .935 + 18*(1-\ .935) = \quad 28.16$$

TABLE A-II (Continued)

EXAMPLE FLUORIDE CALCULATIONS

7. STACK GAS VELOCITY AT STACK CONDITIONS

$$VS = 4360 * \sqrt{DPS * (TS+460)} * \sqrt{1/(PS*MW)}$$

$$= 4360 * \sqrt{.320*(112.0+460)} * \sqrt{1/(29.82*28.16)} = 1991 \text{ FPM}$$

8. STACK GAS VOLUMETRIC FLOW AT STANDARD CONDITIONS, DRY BASIS

$$QS = \frac{0.123*VS*AS*MD*PS}{TS+460}$$

$$= \frac{0.123*1991*11310*.935*29.82}{112.0+460} = 135060 \text{ DSCFM}$$

9. STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS

$$QA = \frac{QS * (TS+460)}{17.71 * PS * MD}$$

$$= \frac{135060*(112.0+460)}{17.71*29.82*.935} = 156408 \text{ ACFM}$$

10. PERCENT ISOKINETIC AND ANISO CORRECTION FACTOR

$$PERI = \frac{1032*(TS+460)*VMSTD}{VS*TT*PS*MD*(DN*DN)}$$

$$= \frac{1032*(112.0+460)*62.53}{1991*120.0*29.82*.935*.250*.250} = 88.6 \text{ PERCENT}$$

$$B = 1.000$$

TABLE A-II (Continued)

EXAMPLE FLUORIDE CALCULATIONS

11. FLUORIDE LOADING -- PROBE, CYCLONE, AND FILTER (AT STANDARD CONDITIONS)

$$CAN = 0.0154 * (MF/VMSTD) * B$$

$$= 0.0154*(\ .50/\ 62.53)*1.000 = .00012\ GR/DSCF$$

12. FLUORIDE LOADING -- TOTAL (AT STANDARD CONDITIONS)

$$CAO = 0.0154 * (MT/VMSTD) * B$$

$$= 0.0154*(\ 1.70/\ 62.53)*1.000 = .00042\ GR/DSCF$$

13. FLUORIDE LOADING -- PROBE, CYCLONE, AND FILTER (AT STACK CONDITIONS)

$$CAT = \frac{17.71*CAN*PS*MD}{TS+460}$$

$$= \frac{17.71*\ .0001*29.82*\ .935}{112.0+460} = .00011\ GR/ACF$$

14. FLUORIDE LOADING -- TOTAL (AT STACK CONDITIONS)

$$CAU = \frac{17.71*CAO*PS*MD}{TS+460}$$

$$= \frac{17.71*\ .0004*29.82*\ .935}{112.0+460} = .00036\ GR/ACF$$

TABLE A-II (Concluded)

EXAMPLE FLUORIDE CALCULATIONS

15. FLUORIDE EMISSION RATE
-- PROBE, CYCLONE, AND FILTER

CAW = 0.00857*CAN*QS

= 0.00857* .0001* 135060 = .14 LB/HR

16. FLUORIDE EMISSION RATE
-- TOTAL

CAX = 0.00857*CAO*QS

= 0.00857* .0004* 135060 = .49 LB/HR

TABLE A-III

FLUORIDE DATA AND CALCULATED VALUES

RUN- 1F DATE- 03-21-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	FLUORIDE WT-SOL (MG)	FLUORIDE WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
43.0	29.80	-.29	91.3	1.70	1.70	78.54	5.31	20.5	.3	0.0	.850
CYCLONE CATCH				.50	.50						

PORT- POINT		SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
1	1	5.00	7.50	.240	.660	50.0	49.0	5.0	105.0		.250	1751.3
1	1	5.00	9.77	.240	.660	54.0	50.0	3.0	105.0		.250	1751.3
1	2	5.00	11.54	.240	.660	55.0	50.0	3.0	105.0		.250	1751.3
1	2	5.00	13.38	.200	.520	57.0	53.0	5.0	107.0		.250	1601.6
1	3	5.00	15.82	.200	.570	59.0	54.0	5.0	106.0		.250	1600.1
1	3	5.00	18.41	.300	.850	61.0	55.0	5.0	107.0	75.0	.250	1961.5
2	1	5.00	20.81	.300	.850	55.0	55.0	5.0	107.0		.250	1961.5
2	3	5.00	23.26	.260	.740	62.0	56.0	5.0	107.0		.250	1826.1
2	2	5.00	25.69	.260	.740	65.0	57.0	5.0	108.0		.250	1827.7
2	2	5.00	28.14	.260	.740	68.0	58.0	5.0	108.0		.250	1827.7
2	3	5.00	29.56	.070	.210	56.0	58.0	3.0	108.0		.250	948.3
2	3	5.00	30.85	.070	.210	58.0	59.0	3.0	109.0		.250	949.2
3	1	5.00	33.55	.390	1.100	60.0	57.0	6.0	115.0		.250	2252.2
3	1	5.00	36.36	.390	1.100	63.0	58.0	6.5	115.0		.250	2252.2
3	2	5.00	39.33	.450	1.280	67.0	58.0	7.5	120.0		.250	2429.7
3	2	5.00	42.42	.460	1.300	69.0	59.0	7.0	120.0	65.0	.250	2456.6
3	3	5.00	45.55	.450	1.280	72.0	60.0	8.0	118.0		.250	2425.5
3	3	5.00	48.81	.490	1.390	74.0	61.0	8.0	118.0		.250	2531.0
4	1	5.00	51.50	.350	1.000	60.0	59.0	6.5	112.0	65.0	.250	2128.0
4	1	5.00	54.28	.410	1.200	65.0	60.0	7.0	111.0		.250	2301.2
4	2	5.00	57.36	.410	1.200	71.0	60.0	8.0	112.0		.250	2303.2
4	2	5.00	60.55	.410	1.200	72.0	62.0	8.0	112.0		.250	2303.2
4	3	5.00	63.63	.410	1.200	74.0	62.0	8.0	119.0		.250	2317.2
4	3	5.00	66.82	.420	1.280	74.0	63.0	8.0	115.0		.250	2337.2

TABLE A-III (Continued)

FLUORIDE DATA AND CALCULATED VALUES

RUN- 2F DATE- 03-21-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	FLUORIDE WT-SOL (MG)	FLUORIDE WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
50.0	29.78	-.35	109.9	3.30	3.30	78.54	66.88	21.0	.6	0.0	.850
CYCLONE CATCH				.70	.70						

PORT-POINT		SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
1	1	5.00	69.65	.350	1.020	54.0	53.0	4.0	110.0		.250	2122.9
1	1	5.00	72.46	.350	1.020	59.0	54.0	4.0	110.0		.250	2122.9
1	2	5.00	75.34	.380	1.120	67.0	55.0	4.0	109.0		.250	2210.1
1	2	5.00	78.56	.410	1.220	72.0	57.0	4.0	109.0	82.0	.250	2295.7
1	3	5.00	81.30	.330	1.000	75.0	59.0	4.0	120.0		.250	2079.4
1	3	5.00	84.12	.330	1.000	76.0	61.0	4.0	120.0		.250	2079.4
2	1	5.00	86.85	.280	.970	67.0	62.0	4.0	125.0		.250	1923.6
2	1	5.00	89.75	.320	1.060	70.0	63.0	4.0	125.0	95.0	.250	2056.4
2	2	5.00	92.46	.270	.950	76.0	64.0	4.0	125.0		.250	1889.0
2	2	5.00	95.24	.270	.950	78.0	64.0	4.0	125.0		.250	1889.0
2	3	5.00	97.30	.090	.320	76.0	66.0	2.0	122.0		.250	1087.8
2	3	5.00	98.99	.090	.320	74.0	66.0	2.0	122.0		.250	1087.8
3	1	5.00	102.28	.405	1.450	65.0	65.0	5.0	120.0	69.0	.250	2303.6
3	1	5.00	105.70	.405	1.450	70.0	64.0	5.5	110.0		.250	2283.7
3	2	5.00	109.20	.460	1.600	76.0	64.0	6.0	109.0		.250	2431.6
3	2	5.00	112.80	.460	1.600	80.0	65.0	6.0	109.0	61.0	.250	2431.6
3	3	5.00	116.34	.480	1.700	80.0	66.0	6.0	109.0		.250	2483.9
3	3	5.00	119.92	.480	1.700	81.0	66.0	6.0	108.0		.250	2481.8
4	1	5.00	123.15	.350	1.250	67.0	44.0	5.0	109.0		.250	2121.1
4	1	5.00	126.36	.350	1.250	70.0	63.0	5.0	105.0		.250	2113.6
4	2	5.00	129.74	.410	1.450	71.0	63.0	5.5	101.0	55.0	.250	2279.5
4	2	5.00	133.12	.410	1.450	72.0	63.0	6.0	100.0		.250	2277.5
4	3	5.00	136.45	.400	1.400	72.0	62.0	5.5	100.0		.250	2249.5
4	3	5.00	139.74	.400	1.400	70.0	62.0	5.5	100.0		.250	2249.5

TABLE A-III (Continued)

FLUORIDE DATA AND CALCULATED VALUES

RUN- 3F DATE- 03-22-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	FLUORIDE WT-SOL (MG)	FLUORIDE WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
45.0	29.72	-.35	102.4	1.90	1.90	78.54	140.12	20.2	.2	0.0	.850
CYCLONE CATCH				.10	.10						

PORT-POINT		SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
1	1	5.00	142.98	.230	.750	48.0	48.0	5.0	109.0		.250	1723.4
1	1	5.00	145.40	.230	.750	54.0	50.0	5.0	110.0	50.0	.250	1724.9
1	2	5.00	148.20	.290	1.020	55.0	50.0	6.0	110.0		.250	1936.9
1	2	5.00	151.08	.310	1.110	59.0	51.0	7.0	108.0		.250	1999.1
1	3	5.00	153.78	.250	.910	58.0	52.0	6.0	109.0		.250	1796.8
1	3	5.00	156.48	.260	.920	60.0	52.0	6.0	108.0		.250	1830.8
2	1	5.00	159.03	.240	.870	50.0	52.0	5.0	106.0		.250	1755.9
2	1	5.00	161.58	.230	.800	56.0	52.0	5.0	106.0		.250	1718.9
2	2	5.00	163.86	.190	.660	60.0	53.0	4.0	108.0		.250	1565.0
2	2	5.00	166.22	.200	.690	62.0	54.0	4.0	110.0		.250	1608.5
2	3	5.00	167.48	.030	.100	61.0	55.0	2.0	114.0		.250	625.2
2	3	5.00	168.45	.030	.100	60.0	56.0	2.0	113.0	50.0	.250	624.6
3	1	5.00	171.79	.360	1.350	57.0	56.0	8.0	115.0		.250	2167.5
3	1	5.00	174.93	.360	1.350	65.0	57.0	8.0	116.0	50.0	.250	2169.4
3	2	5.00	178.35	.410	1.570	71.0	59.0	8.0	116.0		.250	2315.1
3	2	5.00	181.81	.410	1.570	74.0	60.0	8.5	115.0		.250	2313.1
3	3	5.00	185.31	.450	1.700	77.0	62.0	10.0	117.0		.250	2427.6
3	3	5.00	188.97	.450	1.700	79.0	62.0	10.0	115.0		.250	2423.3
4	1	5.00	192.20	.340	1.250	60.0	62.0	8.5	125.0	50.0	.250	2124.7
4	1	5.00	195.45	.340	1.250	68.0	62.0	9.0	120.0		.250	2115.6
4	2	5.00	198.80	.390	1.450	70.0	62.0	9.0	118.0		.250	2261.9
4	2	5.00	202.17	.400	1.500	72.0	62.0	9.0	119.0		.250	2292.7
4	3	5.00	205.57	.400	1.500	75.0	63.0	9.5	121.0	50.0	.250	2296.6
4	3	5.00	208.98	.410	1.550	76.0	64.0	9.5	122.0		.250	2327.2

TABLE A-III (Continued)

FLUORIDE DATA AND CALCULATED VALUES

RUN- 4F DATE- 03-22-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	FLUORIDE WT-SOL (MG)	FLUORIDE WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
54.0	29.60	.35	87.9	2.20	2.28	78.54	209.09	20.6	.4	0.0	.850
CYCLONE CATCH				.80	.80						

PORT-POINT	SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
1 1	5.00	211.82	.250	.930	54.0	54.0	5.0	105.0		.250	1790.4
1 1	5.00	214.64	.270	1.000	59.0	55.0	5.0	103.0		.250	1857.4
1 2	5.00	217.92	.360	1.310	66.0	56.0	5.0	105.0		.250	2148.5
1 2	5.00	221.24	.360	1.310	68.0	57.0	5.0	105.0		.250	2148.5
1 3	5.00	224.39	.330	1.210	68.0	58.0	5.0	106.0		.250	2058.8
1 3	5.00	227.50	.310	1.180	66.0	58.0	5.0	106.0		.250	1995.5
2 1	5.00	230.58	.300	1.120	58.0	58.0	4.5	108.0		.250	1966.5
2 1	5.00	233.68	.300	1.120	64.0	58.0	4.5	116.0		.250	1980.3
2 2	5.00	236.23	.220	.790	67.0	60.0	3.5	117.0	50.0	.250	1697.3
2 2	5.00	238.72	.210	.750	67.0	60.0	3.5	117.0		.250	1658.3
2 3	5.00	240.22	.060	.220	64.0	61.0	1.0	117.0		.250	886.4
2 3	5.00	241.49	.050	.185	62.0	61.0	1.0	110.0		.250	804.2
3 1	5.00	244.62	.360	1.290	56.0	58.0	5.0	110.0		.250	2158.0
3 1	5.00	247.77	.360	1.290	61.0	59.0	5.0	107.0		.250	2152.3
3 2	5.00	251.13	.420	1.500	66.0	59.0	5.5	106.0		.250	2322.7
3 2	5.00	254.53	.420	1.500	68.0	60.0	5.5	106.0		.250	2322.7
3 3	5.00	258.01	.450	1.600	69.0	60.0	6.0	103.0		.250	2397.8
3 3	5.00	261.54	.460	1.630	69.0	60.0	6.0	103.0		.250	2424.3
4 1	5.00	264.75	.360	1.300	60.0	59.0	5.0	105.0		.250	2148.5
4 1	5.00	267.96	.380	1.350	64.0	60.0	5.0	108.0		.250	2213.2
4 2	5.00	271.31	.420	1.500	66.0	60.0	5.5	107.0		.250	2324.7
4 2	5.00	274.71	.420	1.500	69.0	60.0	5.5	107.0		.250	2324.7
4 3	5.00	278.11	.430	1.530	67.0	60.0	6.0	105.0	50.0	.250	2348.1
4 3	5.00	281.54	.430	1.530	66.0	60.0	6.0	105.0		.250	2348.1

TABLE A-III (Concluded)

FLUORIDE DATA AND CALCULATED VALUES

RUN- 5F DATE- 03-23-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	FLUORIDE WT-SOL (MG)	FLUORIDE WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
52.0	29.80	-.39	109.1	1.60	1.60	78.54	281.65	20.6	.2	0.0	.850
CYCLONE CATCH				0.0	0.0						

PORT-POINT		SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
1	1	5.00	283.94	.190	.685	53.0	54.0	4.0	109.0		.250	1566.8
1	1	5.00	286.32	.190	.685	56.0	54.0	5.0	110.0		.250	1568.2
1	2	5.00	289.03	.260	.930	60.0	55.0	5.0	110.0		.250	1834.4
1	2	5.00	291.80	.270	.960	61.0	56.0	5.0	109.0		.250	1867.7
1	3	5.00	294.41	.230	.830	64.0	57.0	5.2	107.0		.250	1720.8
1	3	5.00	297.03	.220	.780	64.0	58.0	5.5	110.0		.250	1687.4
2	1	5.00	299.50	.210	.750	58.0	58.0	5.0	108.0	50.0	.250	1645.7
2	1	5.00	302.00	.210	.750	61.0	59.0	5.0	110.0		.250	1648.6
2	2	5.00	304.24	.150	.570	64.0	60.0	4.0	110.0		.250	1393.4
2	2	5.00	306.44	.150	.570	66.0	60.0	4.0	110.0		.250	1393.4
2	3	5.00	307.73	.010	.110	63.0	61.0	2.0	110.0		.250	359.8
2	3	5.00	308.83	.010	.110	63.0	62.0	2.0	110.0		.250	359.8
3	1	5.00	311.64	.280	1.000	62.0	62.0	6.0	112.0		.250	1907.0
3	1	5.00	314.48	.280	1.000	68.0	63.0	6.0	112.0		.250	1907.0
3	2	5.00	317.55	.340	1.210	70.0	64.0	7.0	112.0		.250	2101.4
3	2	5.00	320.65	.330	1.180	72.0	65.0	7.0	112.0		.250	2070.3
3	3	5.00	323.71	.360	1.300	76.0	66.0	8.0	112.0		.250	2162.4
3	3	5.00	326.80	.360	1.300	76.0	67.0	8.0	110.0		.250	2158.6
4	1	5.00	329.91	.290	1.050	64.0	65.0	7.0	110.0		.250	1937.4
4	1	5.00	332.87	.290	1.050	68.0	65.0	7.0	112.0		.250	1940.8
4	2	5.00	335.90	.330	1.200	72.0	65.0	8.0	110.0		.250	2066.7
4	2	5.00	338.95	.330	1.200	72.0	66.0	8.0	110.0		.250	2066.7
4	3	5.00	341.95	.330	1.180	73.0	66.0	7.0	115.0	60.0	.250	2075.7
4	3	5.00	344.95	.320	1.120	73.0	66.0	7.0	114.0	60.0	.250	2042.2

APPENDIX B

GASEOUS RESULTS

Tables B-I, B-II, and B-III contain the results of the testing for ammonia in the stack gas from the DAP plant. Table B-I contains the summary of results, and Table B-II contains the ammonia emission data. Table B-III contains the ammonia data and calculated values.

The results of the moisture and Orsat analysis are presented in Section III of this report.

TABLE B-I

SUMMARY OF RESULTS - AMMONIA

NAME	DESCRIPTION	UNITS	1-NH3	2-NH3	3-NH3	4-NH3
	DATE OF RUN		03-21-73	03-21-73	03-22-73	03-23-73
QS	STK FLOWRATE, DRY,STD CN	DSCFM	149763	166169	162765	151092
QA	ACTUAL STACK FLOWRATE	ACFM	170816	188266	184013	171879
PMOS	PERCENT MOISTURE BY VOL		7.0	6.7	6.4	7.5
PCO2	PERCENT CO2 BY VOL, DRY		.3	.6	.2	.2
PO2	PERCENT O2 BY VOL, DRY		20.5	21.0	20.2	20.6
PCO	PERCENT CO BY VOL, DRY		0.0	0.0	0.0	0.0
AMMONIA -- TOTAL CATCH						
MT	AMMONIA WT-TOTAL	MG	< .30	< .30	< .30	< .30
CAO	AMMONIA LOAD-TTL,STD CN	GR/DSCF				
CAU	AMMONIA LOAD-TTL,STK CN	GR/ACF				
CAX	AMMONIA EMIS-TOTAL	LB/HR				

DATE OF OUTPUT 07-13-73
PROGRAM DATE 01-31-72

TABLE B-II

AMMONIA EMISSION DATA

NAME	DESCRIPTION	UNITS	1-NH3	2-NH3	3-NH3	4-NH3
	DATE OF RUN		03-21-73	03-21-73	03-22-73	03-23-73
DN	PROBE TIP DIAMETER	IN	.250	.250	.250	.250
TT	NET TIME OF RUN	MIN	60.0	60.0	60.0	60.0
PB	BAROMETRIC PRESSURE	IN.HG	29.80	29.87	29.72	29.80
PM	AVG ORIFICE PRES DROP	IN.H2O	1.844	1.845	1.840	1.840
VM	VOL DRY GAS-METER COND	DCF	43.79	43.67	44.93	42.68
TM	AVG GAS METER TEMP	DEG.F	62.1	73.0	62.5	65.3
VMSTD	VOL DRY GAS-STD COND	DSCF	44.46	43.54	45.46	43.08
VW	TOTAL H2O COLLECTED	ML	70.5	65.7	65.8	73.2
VWV	VOL H2O VAPOR-STD COND	SCF	3.34	3.11	3.12	3.47
PMOS	PERCENT MOISTURE BY VOL		7.0	6.7	6.4	7.5
MD	MOLE FRACTION DRY GAS		.930	.933	.936	.925
PCO2	PERCENT CO2 BY VOL, DRY		.3	.6	.2	.2
PO2	PERCENT O2 BY VOL, DRY		20.5	21.0	20.2	20.6
PCO	PERCENT CO BY VOL, DRY		0.0	0.0	0.0	0.0
PN2	PERCENT N2 BY VOL, DRY		79.2	78.4	79.6	79.2
MWD	MOLECULAR WT-DRY STK GAS		28.86	28.94	28.84	28.86
MW	MOLECULAR WT-STK GAS		28.10	28.20	28.14	28.05
CP	PITOT TUBE COEFFICIENT		.850	.850	.850	.850
DPS	AVG STK VELOCITY HEAD	IN.H2O	.372	.456	.434	.382
TS	AVG STACK TEMPERATURE	DEG.F	99.8	99.7	97.3	96.0
NP	NET SAMPLING POINTS		12	12	12	12
PST	STATIC PRES OF STACK	IN.HG	-0.00	.03	.03	.03
PS	STACK PRESSURE, ABSOLUTE	IN.HG	29.80	29.90	29.75	29.83
VS	AVG STACK GAS VELOCITY	FPM	2175	2397	2343	2188
AS	STACK AREA	IN2	11310	11310	11310	11310
QS	STK FLOWRATE, DRY,STD CN	DSCFM	149763	166169	162765	151092
QA	ACTUAL STACK FLOWRATE	ACFM	170816	188266	184013	171879
PERI	PERCENT ISOKINETIC		113.6	100.2	106.8	109.0
B	ANISO CORRECTION FACTOR		1.000	1.000	1.000	1.000

TABLE B-III

AMMONIA DATA AND CALCULATED VALUES

RUN- 1-NH3 DATE- 03-21-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	PARTIC WT-PTL (MG)	PARTIC WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
43.0	29.80	0.00	70.5	< .30	< .30	78.54	936.05	20.5	.3	0.0	.850

PORT-POINT	SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
	5.00	939.54	.365	1.840	55.0	51.0	8.5	105.0	50.0	.250	2162.7
	5.00	943.35	.370	1.840	58.0	51.0	8.5	102.0	52.0	.250	2171.7
	5.00	947.30	.360	1.840	63.0	53.0	8.0	100.0		.250	2138.3
	5.00	951.06	.370	1.840	68.0	54.0	7.0	96.0		.250	2160.1
	5.00	954.03	.375	1.840	70.0	56.0	7.0	96.0		.250	2174.6
	5.00	958.38	.380	1.850	70.0	57.0	7.0	95.0		.250	2187.1
	5.00	961.09	.370	1.850	70.0	57.0	7.0	98.0		.250	2163.9
	5.00	965.51	.370	1.840	71.0	59.0	7.5	94.0		.250	2156.2
	5.00	969.41	.370	1.840	71.0	59.0	8.0	100.0		.250	2167.8
	5.00	972.72	.380	1.900	72.0	60.0	9.0	106.0		.250	2208.7
	5.00	976.26	.380	1.850	72.0	60.0	10.0	106.0		.250	2208.7
	5.00	979.84	.380	1.800	73.0	61.0	13.0	101.0		.250	2198.9

TABLE B-III (Continued)

AMMONIA DATA AND CALCULATED VALUES

RUN- 2-NH3 DATE- 03-21-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	PARTIC WT-PTL (MG)	PARTIC WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
50.0	29.87	-.35	65.7	< .30	< .30	78.54	980.68	21.0	.6	0.0	.850

PORT-POINT	SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
3 1	5.00	984.22	.500	1.840	57.0	54.0	5.0	98.0		.250	2507.0
	5.00	987.90	.460	1.840	65.0	55.0	5.0	98.0		.250	2404.6
	5.00	991.39	.450	1.840	74.0	57.0	5.5	99.0	50.0	.250	2380.4
	5.00	995.03	.460	1.840	80.0	60.0	6.0	99.0	50.0	.250	2406.7
	5.00	998.60	.460	1.840	84.0	62.0	6.0	100.0		.250	2408.9
	5.00	1002.37	.460	1.840	87.0	63.0	6.0	100.0		.250	2408.9
	5.00	1005.95	.450	1.840	88.0	66.0	6.5	100.0		.250	2382.6
	5.00	1009.60	.450	1.840	88.0	66.0	7.0	100.0		.250	2382.6
	5.00	1013.31	.450	1.840	90.0	67.0	7.0	100.0		.250	2382.6
	5.00	1017.02	.450	1.840	93.0	68.0	7.5	101.0		.250	2384.7
	5.00	1020.67	.440	1.840	94.0	70.0	8.0	101.0		.250	2358.0
	5.00	1024.35	.440	1.900	93.0	70.0	10.0	101.0		.250	2358.0

TABLE B-III (Continued)

AMMONIA DATA AND CALCULATED VALUES

RUN- 3-NH3 DATE- 03-22-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	PARTIC WT-PTL (MG)	PARTIC WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
45.0	29.72	-.35	65.8	< .30	< .30	78.54	24.80	20.2	.2	0.0	.850

PORT-POINT	SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
3 1	5.00	28.55	.430	1.840	50.0	45.0	8.0	97.0		.250	2331.2
	5.00	32.19	.430	1.840	60.0	48.0	8.0	97.0		.250	2331.2
	5.00	35.85	.430	1.840	66.0	50.0	9.0	97.0		.250	2331.2
	5.00	39.58	.430	1.840	69.0	52.0	9.0	98.0		.250	2333.3
	5.00	43.35	.430	1.840	72.0	53.0	9.0	95.0		.250	2327.0
	5.00	47.10	.430	1.840	73.0	55.0	9.0	95.0	50.0	.250	2327.0
	5.00	50.80	.430	1.840	75.0	56.0	9.0	95.0		.250	2327.0
	5.00	54.57	.430	1.840	76.0	57.0	9.0	95.0		.250	2327.0
	5.00	58.32	.440	1.840	76.0	58.0	9.0	100.0		.250	2364.5
	5.00	62.09	.440	1.840	76.0	58.0	9.5	101.0		.250	2366.6
	5.00	65.89	.440	1.840	78.0	60.0	10.0	99.0		.250	2362.4
	5.00	69.73	.450	1.840	78.0	60.0	10.5	98.0		.250	2386.9

TABLE B-III (Concluded)

AMMONIA DATA AND CALCULATED VALUES

RUN- 4-NH3 DATE- 03-23-73

ATMOS TEMP (DG.F)	ATMOS PRES (I.HG)	STACK VAC (I.H2O)	H2O COND (ML)	PARTIC WT-PTL (MG)	PARTIC WT-TTL (MG)	STACK AREA (FT2)	INIT VOL (DCF)	PERC O2 DRY	PERC CO2 DRY	PERC CO DRY	PITOT TUBE COEF
52.0	29.80	-.35	73.2	< .30	< .30	78.54	69.81	20.6	.2	0.0	.850

PORT-POINT	SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (D.F)	TEMP OUT (D.F)	TRAIN VAC (I.HG)	STACK TEMP (D.F)	BOX TEMP (D.F)	PROBE T DIA (IN)	VEL (FPM)
4	5.00	73.24	.380	1.840	61.0	54.0	8.0	100.0		.250	2198.2
	5.00	76.88	.380	1.840	66.0	55.0	7.7	100.0		.250	2198.2
	5.00	80.34	.380	1.840	68.0	56.0	7.7	98.0		.250	2194.3
	5.00	83.86	.375	1.840	70.0	57.0	7.7	97.0		.250	2177.8
	5.00	87.41	.375	1.840	71.0	58.0	8.0	96.0		.250	2175.9
	5.00	91.00	.260	1.840	73.0	60.0	8.0	95.0		.250	1810.2
	5.00	94.54	.290	1.840	73.0	60.0	8.0	95.0		.250	1911.7
	5.00	98.09	.325	1.840	73.0	61.0	8.0	94.0		.250	2022.0
	5.00	101.70	.405	1.840	74.0	62.0	8.0	94.0		.250	2257.2
	5.00	105.27	.420	1.840	74.0	62.0	8.0	95.0		.250	2300.7
	5.00	108.86	.480	1.840	76.0	63.0	9.0	94.0		.250	2457.3
	5.00	112.49	.520	1.840	76.0	64.0	9.0	94.0		.250	2557.6

APPENDIX C

OPERATIONS RESULTS

The production rates of the ARCO Chemical Company Diammonium Phosphate Plant at Fort Madison, Iowa, during the week we tested, are contained in Table C-I. During the first testing day, the process operated at 100-110% of design rate which is considered normal for this plant.

TABLE C-I

PRODUCTION RATE

Date	Run No.	Tons P_2O_5/Hr
21 March 1973	1	14.0
21 March 1973	2	15.3
22 March 1973	3	18.2
22 March 1973	4	16.2
22 March 1973	5	14.6

APPENDIX D

FIELD DATA

This section presents the actual field data from the testing.

MIDWEST RESEARCH INSTITUTE

RUN 1F

MRI Project Number 3585-C 23
Field Dates 3-19 -- 3-24-73
Plant ARCO CHEMICAL
Sampling Location DAP N. (GRANULATION)
Sampling Date 3-21-73

FIELD CREW

Crew Chief: Shea

Testing Engineer: 1 Maxwell; 2 Flynn; 3

Engr. Technician: 1 Beckfold; 2 Maloney; 3

Lab Technician: 1 Cunningham; 2; 3

Process Engineer: 1 LEE Beck; 2

Other: 1 WINTON KELLY - Proj. ENGR; 2

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT ARCO
DATE 3/21 - 3/23/73
SAMPLING LOCATION DAP PLANT N. STACK
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 10' 10 1/2"
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 10 1/2"
STACK I.D., (DISTANCE A - DISTANCE B) 10'
NEAREST UPSTREAM DISTURBANCE 85'
NEAREST DOWNSTREAM DISTURBANCE 30'
CALCULATOR Slea

$10^2 \cdot \pi(5)^2$

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	4.4	120	5 1/4	10 1/2"	15 3/4"
2	14.7	"	17 5/8	"	28 1/8
3	29.5	"	35 3/8	"	45 7/8

PRELIMINARY VELOCITY TRAVERSE

F-1A

PLANT ARCO
DATE 20 March 73
LOCATION DAP North stack
STACK I.D. 101
BAROMETRIC PRESSURE, in. Hg 29.8
STACK GAUGE PRESSURE, in. H_2O +.35-.37
OPERATORS Shea

SCHEMATIC OF TRAVERSE POINT LAYOUT

	TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
#1	1	0.3	~~90~~
	2	0.42	104
	3	0.39	104
#2	2½	0.42	101
	1½	0.46	101
	1	0.33	100
	AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

F-1

NOMOGRAPH DATA

PLANT ARCO

DATE 21 March 73

SAMPLING LOCATION DAP North stack

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	68
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	20% assume
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.8
STATIC PRESSURE IN STACK, in. Hg +.035" H_2O ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	29.813 ~~0.0~~
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.0
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	102
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.4
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	0.44
C FACTOR	0.72	
CALCULATED NOZZLE DIAMETER, in.	.25	
ACTUAL NOZZLE DIAMETER, in.	.25	
REFERENCE Δp, in. H_2O	.65	102

EPA (Dur) 234
4/72

RUN F-1

DRY MOLECULAR WEIGHT DETERMINATION

PLANT ARCO
DATE 2 March 73
SAMPLING TIME (24-hr CLOCK) 1150 - 1250
SAMPLING LOCATION DAP North Stack Port #3 Point 1½
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) INTI
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 45 °F
OPERATOR FLIPPIN

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	.14	.4	~~.05~~ .2	.2	.2	.2	.2x66	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.8	~~.4~~ 20.4	20.7	20.5	20.9	20.7	20.57	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.8	0	20.7	0	20.9	0	0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

FIELD DATA

PLANT ARCO
DATE 2/21/23
SAMPLING LOCATION DAP
SAMPLE TYPE FLOURIDE
RUN NUMBER F-1
OPERATOR SLW
AMBIENT TEMPERATURE 43
BAROMETRIC PRESSURE 29.8
STATIC PRESSURE, (P_s) -.29 + #3
FILTER NUMBER (s) 1F

PROBE LENGTH AND TYPE 3' 6/.
NOZZLE I.D. .25
ASSUMED MOISTURE, % 20
SAMPLE BOX NUMBER 8
METER BOX NUMBER 4
METER $\Delta H_@$ 1.8
C FACTOR .72
PROBE HEATER SETTING 350
HEATER BOX SETTING —
REFERENCE Δp .65 - .102

yellow Pitot
Red Orifice

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	5	503.12										
1/1	0 1052	7.5	0.24	0.66	0.66	106	46	48		—	—	
1	5 1057	75.00	0.24	0.66	.66	105	50	49	5	—	—	170
1	10 1102	97.70	0.24	0.66	0.66	105	54	50	3			
2	5 1107	116.40	0.2	0.57	0.57	105	55	50	3			
	10 1112	131.57	0.2	0.57	0.57	107	57	53	5			200
3	5 1120	15.820	03	.85	.85	106	59	54	5			
	10 1125	18.415	0.3	0.85	.85	107	61	55	5	75		188
2/1	5 1149	20.810	0.26	0.74	0.74	107	55	55	5			180
	10 1154	23.260	0.26	0.74	.74	107	62	56	5			
2	5 1200	25.690	0.26	0.74	.74	108	65	57	5			202
	10 1205	28.140	0.26	0.74	0.74	108	68	58	5			250
3	5 1230	29.562	0.07	0.21	0.21	108	56	59	3			
	10 1235	30.854	0.07	0.21	0.21	109	55	59	3	30.854-V		
3/1	5 1250	33.550	0.39	1.1	1.1	105	60	57	6			170
	10 1255	36.360	0.39	1.1	1.1	115	63	59	6.5			175
2	5 1300	39.33	0.45	1.28	1.28	120	67	58	7.5			185
	10 1305	42.42	0.46	1.3	1.3	120	69	59	7.0	65		
3	5 1310	45.550	0.405	1.28	1.28	118	72	60	8.0			182/250
	10 1315	48.810	0.49	1.39	1.39	118	74	61	8.0			188
4/1	5 1330	51.500	0.39	1.0	1.0	112	60	64	6+	65	250	170
	10 1335	54.280	0.41	1.2	1.2	111	65	60	7			185
2	5 1340	57.360	0.41	1.2	1.2	112	71	60	8			190
	10 1345	60.550	0.41	1.2	1.2	112	72	62	8			

COMMENTS:

[redacted] 2 of [redacted]

3/21/23 1-F ARCO

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4/3	5	1350	63630	.41	1.2	1.2	119	74	62	9		
	10	1355	66821	.42	1.28	1.28	115	74	63	8		

EPA (Dur) 236

ANALYTICAL DATA

PLANT ARCO

DATE 3-21-73

SAMPLING LOCATION DAP (Granulation) N

SAMPLE TYPE Fluoride

RUN NUMBER (1- FLORIDE) F-1

SAMPLE BOX NUMBER 3

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

H_2O

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

Cyclone moisture 12.2 ml.

Final Vol. w/Wash 401 ml
+ 20-Dist. Wash
421
125 ml probe wash
546 Total

IMPINGERS				
FINAL VOLUME	266 ml			
INITIAL VOLUME	200 ml			
NET VOLUME	66 ml			
SILICA GEL				
FINAL WEIGHT	669.7 g	_____ g	_____ g	
INITIAL WEIGHT	656.6 g	_____ g	_____ g	
NET WEIGHT	13.1 g	_____ g	_____ g	

TOTAL MOISTURE ~~49.1~~ 91.3 g

EPA (Dur) 231
4/72

936,054

FIELD DATA

PLANT ARCO
DATE 3/21/13
SAMPLING LOCATION ARCO
SAMPLE TYPE NH3
RUN NUMBER NH3-1
OPERATOR S Rue, Kelly
AMBIENT TEMPERATURE 43
BAROMETRIC PRESSURE 29.8
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) 1-NH3

PROBE LENGTH AND TYPE 6' Glass
NOZZLE I.D. .174"
ASSUMED MOISTURE, % 20%
SAMPLE BOX NUMBER 9
METER BOX NUMBER 6
METER $\Delta H_@$ 1.84
C FACTOR .75
PROBE HEATER SETTING 350
HEATER BOX SETTING 195°F
REFERENCE Δp .63

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min		GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	10 58	0	936.054									
Pt #4	11 03	5	934.545	0.365	1.84		105	55	52	7.5	50	90
	1108	10	943.35	0.37	1.84		102	55	51	9.5	52	175
Point #3	1113	15	947.30	0.36	1.84		100	63	53	8.0		50
	1118	20	951.06	.37	1.84		96	68	54	7.0		
	1123	25	954.03	.375	1.84		96	70	56	7.0		
	1128	30	958.38	.38	1.85		95	70	57	7.0		
	1133	35	961.89	.37	1.85		98	70	57	7.0		
	1138	40	965.51	.37	1.84		94	71	59	7.5		
	1143	45	969.41	.37	1.84		100	71	59	8.6		
	1148	50	972.72	.38	1.90		100	72	60			
	1153	55	976.26	.38	1.85		106	72	60	10.0		
	1158	60	979.84	.38	1.80		101	73	61	13.0		

COMMENTS:

ANALYTICAL DATA

PLANT ARCO

DATE 3/21/73

SAMPLING LOCATION DAP N. STACK

SAMPLE TYPE Ammonia

RUN NUMBER NH_3 - 1

SAMPLE BOX NUMBER _____

CLEAN-UP MAN Cunningham

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

H_2SO_4 (30 g/L)

MOISTURE

IMPINGERS

FINAL VOLUME 260 ml

INITIAL VOLUME 200 ml

NET VOLUME 60 ml

SILICA GEL

FINAL WEIGHT	636.3 g	_____ g	_____ g
INITIAL WEIGHT	625.8 g	_____ g	_____ g
NET WEIGHT	10.5 g	_____ g	_____ g

70.5

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

F-2

NOMOGRAPH DATA

PLANT ARCO

DATE 3/21/73

SAMPLING LOCATION DAP N. STACK

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.8
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	7%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.78
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	0.013 P_s	29.793
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	111
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.37
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.48
C FACTOR		0.94
CALCULATED NOZZLE DIAMETER, in.		0.25
ACTUAL NOZZLE DIAMETER, in.		0.25
REFERENCE Δp, in. H_2O		0.52

EPA (Dur) 234
4/72

RUN F-2

DRY MOLECULAR WEIGHT DETERMINATION

PLANT ARCO
DATE 3/21/73
SAMPLING TIME (24-hr CLOCK) 1620 — 1650
SAMPLING LOCATION DAP #3 Port Point 1½
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) INT
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 50
OPERATOR FLIPPIN

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2		.6		.7		.6		44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.8	21.2	21.6	20.9	21.4	20.8		32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	21.8	0	21.6	0	21.4	0		28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

F1.-2

FIELD DATA

PLANT ARCO
DATE 3/21/73
SAMPLING LOCATION DAP N. STACK
SAMPLE TYPE F1.
RUN NUMBER 2
OPERATOR Shea
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.73
STATIC PRESSURE, (P_s) 0.35 -1.0
FILTER NUMBER (s) 2

LEAK OK

.52 to Ref.

PROBE LENGTH AND TYPE 3' 6I.
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, % 20.0
SAMPLE BOX NUMBER 6
METER BOX NUMBER 4
METER $\Delta H_@$ 1.50
C FACTOR .72 * .94
PROBE HEATER SETTING 50
HEATER BOX SETTING
REFERENCE Δp .52

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	5 / 1600	66.881										
1/1	5 1609	69.65	0.35	1.02	102	110	52	53	4			166
	10 1614	72.46	0.35	102	102	110	59	54	4		50	
2	5 1619	75.34	0.38	1.12	1.12	109	67	55	4			
	10 1624	78.56	0.40	1.22	1.22	109	72	57	4	82		161
3	5 1629	81.30	0.33	1.0	1.00	120	75	59	4		50	
	10 1634	84.122	0.33	1.00	1.00	120	76	61	4			
2/1	5 1650	86.85	0.28	89	89	0.99 125	67	62	4			X
	10 1655	89.75	0.32	1.06	1.06	125	70	63	4	95		195 6.59
2	5 1700	92.460	0.27	.95	.95	125	76	64	4			6
	10 1705	95.240	0.27	95	95	125	78	64	4			H20
3	5 1710	97.300	0.09	.32	.32	122	76	66	2			
	10 1715	98.991	0.09	.32	.32	122	74	66	3			
3/1	5 1728	102.28	0.405	1.45	1.45	120	65	65	5	69		215
	10 1733	105.700	0.405	1.45	1.45	110	70	64	5.5			
2	5 1738	109.200	0.46	1.60	1.60	109	76	64	6.0			
	10 1743	112.800	0.46	1.60	1.60	109	80	65	6.0	61		192
3	5 1748	116.340	0.48	1.70	1.70	109	80	66	6.0		50	
	10 1753	119.924	0.48	1.70	1.70	108	81	66	6.0			
4/1	5 1805	123.150	0.35	1.25	1.25	109	67	64	5.0			
	10 1810	126.360	0.35	1.25	1.25	105	70	63	5.0			
4/2	5 1815	129.740	0.41	1.45	1.45	101	71	63	5.5	55		190
	10 1820	133.120	0.41	1.45	1.45	100	72	63	6.0			

COMMENTS:

EPA (Dur) 235

Test #2 F1-2

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4/3	5	1825	136,450	0.4	1.4	1.4	100	72	62	5.5		
3	10	1830	139,740	0.4	1.4	1.4	100	70	62	5.5		
			66,887									
			72,853 cu ft.									

EPA (Dur) 236

ANALYTICAL DATA

PLANT ARCO

DATE 3-21-73

SAMPLING LOCATION DAP (GRANULATION) N

SAMPLE TYPE Fluoride

RUN NUMBER F-2

SAMPLE BOX NUMBER _____

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

H_2O

MOISTURE

IMPINGERS				
FINAL VOLUME	~~276~~ ml	288		
INITIAL VOLUME	~~200~~ ml	200		
NET VOLUME	~~76~~ ml	88		
SILICA GEL				
FINAL WEIGHT	632.9 g	____ g	____ g	
INITIAL WEIGHT	618.2 g	____ g	____ g	
NET WEIGHT	14.7 g	____ g	____ g	

1.2 ml - Cyclone

Imp. Water = 288 ml.

After Wash = 450 ml.

PROBE WASH = +214 ml

664 ml

GRAD WASH = +10 ml

674 ml

TOTAL MOISTURE _____ g

Total moisture 102.7

+ Cyclone 7.2

109.9

EPA (Dur) 231
4/72

NH3

FIELD DATA

PLANT ARCO
DATE 3/21/73
SAMPLING LOCATION DAP N. STACK
SAMPLE TYPE NH3
RUN NUMBER 2
OPERATOR Shea
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 29.87
STATIC PRESSURE, (P_s) -0.35 "H_2O
FILTER NUMBER (s) 2

PROBE LENGTH AND TYPE 6' Gl.
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, % 20%
SAMPLE BOX NUMBER 9
METER BOX NUMBER 6
METER $\Delta H_@$ 1.84
C FACTOR 6.72
PROBE HEATER SETTING ~~350~~ 6
HEATER BOX SETTING 250
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

Port #4

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
	5 / 1610	980.684										
LPt. Port 3	1615	984.225	0.5	1.84		98	57	54	5	162		130
2	1620	987.900	0.46	1.84		98	65	55	5			
3	1625	991.390	0.45	1.84		99	74	57	5.5	180	50	158
4	1630	995.030	0.46	1.84		99	80	60	6.0		50	
5	1635	998.600	0.46	1.84		100	84	62	6.0			
6	1640	2.370	0.46	1.84		100	87	63	6.0	183		
7	1645	5.950	0.45	1.84		100	88	66	6.5	176		
8	1650	9.600	0.45	1.84		100	89	66	7.0	176		
9	1655	13.31	0.45	1.84		100	90	67	7.0	212		171
10	1700	17.02	0.45	1.84		101	93	68	7.5	168		170
11	1705	20.67	0.44	1.84		101	94	70	8.0	217		
12	1710	24.35	0.44	1.90		101	93	70	10.0	197		

COMMENTS:

ANALYTICAL DATA

PLANT ARCO

DATE 3-21-73

SAMPLING LOCATION DAP (GRANULATION

SAMPLE TYPE Ammonia

RUN NUMBER NH_3 - 2

SAMPLE BOX NUMBER 9

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

H_2SO_4 (30g/ℓ)

MOISTURE

IMPINGERS			
FINAL VOLUME	256 ml		
INITIAL VOLUME	200 ml		
NET VOLUME	56 ml		
SILICA GEL			
FINAL WEIGHT	646.0 g	_____ g	_____ g
INITIAL WEIGHT	636.3 g	_____ g	_____ g
NET WEIGHT	9.7 g	_____ g	_____ g

Vol after washing 321
+20
341
+41
Total = 382

TOTAL MOISTURE 65.7 g

EPA (Dur) 231
4/72

NOMOGRAPH DATA

PLANT ARCO

DATE 22 March 73

SAMPLING LOCATION DAP North stack

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.80
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	68 ~~48~~
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	7%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	28.72
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	.013 P_s	29.733 in H 20 0.35
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	110
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.40
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	0.48
C FACTOR		0.94
CALCULATED NOZZLE DIAMETER, in.		.25
ACTUAL NOZZLE DIAMETER, in.		.25
REFERENCE Δp, in. H_2O		.52

EPA (Dur) 234
4/72

F1-3

FIELD DATA

PLANT ARCO
DATE 3/22/73
SAMPLING LOCATION DAP N. STACK
SAMPLE TYPE F1
RUN NUMBER 3
OPERATOR Shea
AMBIENT TEMPERATURE 45°F
BAROMETRIC PRESSURE 29.72
STATIC PRESSURE, (P_s) +0.35
FILTER NUMBER (s) 3

PROBE LENGTH AND TYPE 3'6"
NOZZLE I.D. 1/4
ASSUMED MOISTURE, % 7%
SAMPLE BOX NUMBER
METER BOX NUMBER 4
METER $\Delta H_@$ 1.80
C FACTOR .84
PROBE HEATER SETTING 50-60
HEATER BOX SETTING
REFERENCE Δp .52

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	PROBE TEMP
		1004	140.117	0.23									
P1/1	5	1009	142.980	~~0.15~~	~~0.55~~	0.73	109	48	48	5	60	~~50~~	245
	10	1014	145.400	0.23	0.75	0.75	110	54	50	5	65	<50	185
2	5	1019	148.200	0.29	1.02	1.02	110	55	50	6			
	10	1024	151.085	0.31	1.11	1.11	108	54	51	7			
3	5	1029	153.780	0.25	.91	.91	109	58	52	6			
	10	1034	156.476	0.26	.92	.92	108	60	52	6	61		162
P1/2-1	5	~~1044~~ 1040	159.036	0.24	.87	.87	106	50	52	5	55		114
	10	1054	161.576	0.23	0.80	0.80	106	56	52	5	58		130
2	5	1059	163.855	0.19	0.66	0.66	108	60	53	4	60		143
	10	1104	166.215	0.20	0.69	0.69	110	62	54	4	66		158
3	5	1109	167.483	0.03	0.10	0.10	114	61	55	2	67		132
	10	1114	168.452	0.03	0.10	0.10	113	60	56	2	69	<50	132
P1/3-1	5	~~1124~~ 1124	171.792	6.36	1.35	1.35	115	57	56	8	67		125
	10	1134	174.935	0.36	1.35	1.35	116	65	57	8	73	90	135
2	5	1139	178.351	0.41	1.57	1.57	116	71	59	8	75		144
	10	1144	181.815	0.41	1.57	1.57	115	74	60	8.5	72		157
3	5	1149	185.310	0.45	1.70	1.70	117	77	62	10.0	75		166
	10	1154	188.967	0.45	1.70	1.70	115	79	62	10	75		170
P1/4-1	5	~~1218~~ 1213	192.200	0.34	1.25	1.25	125	60	62	8.5	70	50	181
	10	1223	195.450	0.34	1.25	1.25	120	68	62	9.0	70		202
2	5	1228	198.800	0.39	1.45	1.45	118	70	62	9.0	72		210
	10	1233	202.170	0.40	1.50	1.50	119	72	62	9.0	74		
				~~0.40~~									

COMMENTS:

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4|3	5 1238	205,570	0,40	1,50		121	75	63	9,5	74	50
	10 1243	208,982	0.41	1,55		122	76	64	9.5	76	

206
205

EPA (Dur) 236

DRY MOLECULAR WEIGHT DETERMINATION

PLANT ARCO
DATE 3/22/73
SAMPLING TIME (24-hr CLOCK) 1108 — 1138
SAMPLING LOCATION DAP N. ST ACID Port #1 Point 1½
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Int
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 46
OPERATOR BECHTOLD

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.3	20.2	20.2	20.0	20.4	20.2	20.2	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.3	0	20.2	0	20.4	0	0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

F-3

ANALYTICAL DATA

PLANT ARCO

DATE 3-22-73

SAMPLING LOCATION DAP (GRANULATION) N

SAMPLE TYPE Fluoride

RUN NUMBER F-3

SAMPLE BOX NUMBER 3

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

Glycone - 9.3 + 4.8 = 14.1 ml.

Imp Vol = 274 ml.
After Wash Vol = 342 ml.
+ Probe Wash + 355
Total = 697 ml

MOISTURE

IMPINGERS

FINAL VOLUME	274 ml		
INITIAL VOLUME	200 ml		
NET VOLUME	74 ml		

SILICA GEL

FINAL WEIGHT	684.0 g	_____ g	_____ g
INITIAL WEIGHT	669.7 g	_____ g	_____ g
NET WEIGHT	14.3 g	_____ g	_____ g

88.3 + 14.1

TOTAL MOISTURE 102.4 g

FIELD DATA

PLANT ARCO
DATE 3/22/73
SAMPLING LOCATION DAP STACK
SAMPLE TYPE NH3
RUN NUMBER 3
OPERATOR Shaw
AMBIENT TEMPERATURE 45
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) +35
FILTER NUMBER (s) 3

PROBE LENGTH AND TYPE 6' GL.
NOZZLE I.D. 1/4
ASSUMED MOISTURE, % 7%
SAMPLE BOX NUMBER 9
METER BOX NUMBER 6
METER $\Delta H_@$ 1.84
C FACTOR
PROBE HEATER SETTING ~~250~~ 7
HEATER BOX SETTING 2.50
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	~~IMPINGER~~ TEMPERATURE, °F	
Port #3 Point #3	5 / 1101	~~24437~~										
	0 TIME	24.797	0.42	1.84	1.84	10.5						
1	5 1106	28.550	0.43	1.84	~~1.84~~	97	50	45	8	164		142
2	10 1111	32.190	0.43	1.84	1.84	97	60	48	8	132		162
3	15 1116	35.850	0.43	1.84	1.84	97	66	50	~~8~~ 9	110		168
4	20 1121	39.550	0.43	1.84	1.84	98	69	52	9	122		168
5	25 1126	43.~~250~~350	0.43	1.84	1.84	95	72	53	9			
6	30 1131	47.100	0.43	1.84	1.84	95	73	55	9	130	50	172
7	35 1136	50.800	0.43	1.84	1.84	95	75	56	9	130		171
8	40 1141	54.570	0.43	1.84	1.84	95	76	57	9	130		168
9	45 1146	58.320	0.44	1.84	1.84	100	76	58	9			
10	50 1151	62.090	0.44	1.84	1.84	101	76	58	9 1/2	115		170
11	55 1156	65.870	0.44	1.84	1.84	99	74	60	10	155		180
12	60 1201	69.732	0.45	1.84	1.84	98	78	60	10 1/2	120		185

COMMENTS:

NH_3-3

ANALYTICAL DATA

PLANT ARCO

DATE 3-22-93

SAMPLING LOCATION DAP N (GRANULATION)

SAMPLE TYPE Ammonia

RUN NUMBER NH_3-3

SAMPLE BOX NUMBER _____

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS				
FINAL VOLUME	256 ml			
INITIAL VOLUME	200 ml	H_2SO_4 (30g/l)		
NET VOLUME	56 ml			
SILICA GEL				
FINAL WEIGHT	6374 g	_____ g	_____ g	
INITIAL WEIGHT	6276 g	_____ g	_____ g	
NET WEIGHT	98 g	_____ g	_____ g	

256
+ 406 wash
Total 662 ml

TOTAL MOISTURE 658 g

EPA (Dur) 231
4/72

F-4

NOMOGRAPH DATA

PLANT ARCO

DATE 22 March 73

SAMPLING LOCATION DAP:- North Stack

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.80
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	74
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	7%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.6
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	99.613
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	105
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.37
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.42
C FACTOR		.94
CALCULATED NOZZLE DIAMETER, in.		.25
ACTUAL NOZZLE DIAMETER, in.		.25
REFERENCE Δp, in. H_2O		0.52

EPA (Dur) 234
4/72

F-4

FIELD DATA

PLANT ARCO
DATE 3/22/73
SAMPLING LOCATION DAP N. STACK
SAMPLE TYPE F.
RUN NUMBER 4
OPERATOR Shea
AMBIENT TEMPERATURE 54°F
BAROMETRIC PRESSURE 29.6
STATIC PRESSURE, (P_s) -.35
FILTER NUMBER (s) 4

Lk chk 0.001/min

PROBE LENGTH AND TYPE 3' GI.
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, % 7%
SAMPLE BOX NUMBER
METER BOX NUMBER 4
METER $\Delta H_@$ 1.80
C FACTOR .72
PROBE HEATER SETTING .55
HEATER BOX SETTING —
REFERENCE Δp .52

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

1 d 2

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
	0	1520	209.086										
P1/1	5	1525	211.820	0.25	0.93	0.93	105	54	54	5			160
2	10	1530	214.640	0.27	1.00	1.00	103	59	55	5	65		
2	5	1535	217.920	0.36	1.31	1.31	105	66	56	5	65		
	10	1540	221.240	0.36	1.31	1.31	105	68	57	5			170
3	5	1545	224.390	0.33	1.21	1.21	106	68	58	5	65		176
	10	1550	227.505	0.31	1.18	1.18	106	66	58	5	65		182
P2/1	5	1603 1558	230.580	0.30	1.12	1.12	108	58	58	4.5	69		160
	10	16.08	233.680	0.30	1.12	1.12	116	64	58	4.5	80		191
2	5	16.13	236.235	0.22	.79	.79	117	67	60	3.5	88	50	204
	10	16.18	238.725	.21	.75	.75	117	67	60	3.5	85		200
3	5	16.23	240.225	.06	.22	.22	117	64	61	1.0	79		208
	10	16.28 16.38	241.490	.05	.185	.185	110	62	61	1.0	79		210
P/3 1	5	16.43	244.620	.36	1.29	1.29	110	56	58	5.0	66		187
	10	16.48	247.710	.36	1.29	1.29	107	61	58	5.0	67		200
2	5	16.53	251.130	.42	1.50	1.50	106	66	59	5.5	66		204
	10	16.58	254.530	.42	1.50	1.50	106	68	60	5.5	64		204
3	5	17.03	258.010	.45	1.60	1.60	103	69	60	6.0	63		204
	10	17.08	261.540	.46	1.63	1.63	103	69	60	6.0	63		208
P/4 1	5	17.21 17.16	264.755	.36	1.30	1.30	105	60	59	5.0	56		176
	10	17.26	267.465	.38	1.35	1.35	108	64	60	5.0	57		186
2	5	17.31	271.315	.42	1.50	1.50	107	66	60	5.5	56	50	187
	10	17.36	274.710	.42	1.50	1.50	107	69	60	5.5	56		188

COMMENTS:

EPA (Dur) 235

212

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
3	5 17,41	278,110	,43	1.53	1.53	105	67	60	6.0	56	
	10 17,46	281,545	,43	1.53	1.53	105	66	60	6.0	56	

190
192

65

F-4

EPA (Dur) 236

RUN F-4

DRY MOLECULAR WEIGHT DETERMINATION

PLANT ARCO

DATE 3/22/73

SAMPLING TIME (24-hr CLOCK) 1534 — 1604

SAMPLING LOCATION DAP Port 4 IN. STACK

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) INT

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 540

OPERATOR Shea

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.4	.4	0.4	0.4	.4	.4	.4	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.0	20.6	~~20.0~~	20.6	21.0	20.6	20.6	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	21.0	0.0	21.0	0.0	21.0	~~20.6~~ 0	0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100.0	79.0	100.0	79.0	100.0	79.0	79.0	28/100	
								TOTAL	

EPA (Dur) 230
4/72

ANALYTICAL DATA

PLANT ARCO

DATE 3-22-13

SAMPLING LOCATION DAP (GRANULATION) N

SAMPLE TYPE Fluoride

RUN NUMBER F-4

SAMPLE BOX NUMBER 3

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

Cyclone — 9.6 + 1.5 = 11.1 ml.

Imp Water — Total Vol = 261

Imp Wash + 445

Probe Wash 215

Total 921 ml.

MOISTURE

IMPINGERS			
FINAL VOLUME	261 ml		
INITIAL VOLUME	200 ml		
NET VOLUME	61 ml		
SILICA GEL			
FINAL WEIGHT	631.8 g	_____ g	_____ g
INITIAL WEIGHT	616.0 g	_____ g	_____ g
NET WEIGHT	15.8 g	_____ g	_____ g

TOTAL MOISTURE 87.9 g

61 + 15.8 + 11.1 = 87.9

EPA (Dur) 231
4/72

FIELD DATA NH3 - 4

PLANT ARCO
DATE 3/23/73
SAMPLING LOCATION DAP N. STACK PT
SAMPLE TYPE NH3
RUN NUMBER 4
OPERATOR Shea
AMBIENT TEMPERATURE 52
BAROMETRIC PRESSURE 29.8
STATIC PRESSURE, (P_s) 0.35
FILTER NUMBER (s) N/A

PROBE LENGTH AND TYPE 6' gl.
NOZZLE I.D. .14
ASSUMED MOISTURE, % 7
SAMPLE BOX NUMBER
METER BOX NUMBER 6
METER $\Delta H_@$ 1.84
C FACTOR
PROBE HEATER SETTING 7
HEATER BOX SETTING 250
REFERENCE Δp —

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

Port #4
Pt. 3

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F PROBE	IMPINGER TEMPERATURE, °F
	5 0931	28.647									
1	~~5 0944~~		~~.49~~	~~1.85~~	~~2.85~~	104	53	54	4	69	
0 2	~~10~~ 9.48	69.808	.38/.39	1.84		105	56	54	6.5	115	
1 3	9.53	73.24	.38	1.84		100	61	54	~8.0	145	
2 4	58	76.88	.38	1.84		100	66	55	7.75	180	
3 5	10.03	80.34	.38	1.84		98	68	56	7.75	136	
4 6	.08	83.86	.37/.38	1.84		97	70	57	7.75	192	
5 7	.13	87.41	.37/.38	1.84		96	71	58	~8.0	198	
6 8	.18	90.60	.25/.27	1.84		95	73	60	~8.0	200	
7 9	.23	94.54	.28/.30	1.84		95	73	60	~8.0	150	
8 10	.28	98.09	.31/.32	.35	1.84	94	73	61	~8.0	103	
9 11	.33	101.70	.40/.41		1.84	94	74	62	~8.0	110	
10 12	.38	105.27	.43/.45	1.84		95	74	62	~8.0	168	
11	.43	108.86	.48	1.84		94	76	63	9.0	198	
12	1.48	112.494	.52	1.84		94	76	64	~9.0	200	

COMMENTS:

NH3-4

ANALYTICAL DATA

PLANT ARCO

DATE ~~3-14~~ 3-23-73

SAMPLING LOCATION DAP N (GRANULATION)

SAMPLE TYPE Ammonia

RUN NUMBER NH3-4

SAMPLE BOX NUMBER 9

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS

FINAL VOLUME	262 ml		
INITIAL VOLUME	200 ml	H_2SO_4 (3cg/l)	
NET VOLUME	62 ml		

SILICA GEL

FINAL WEIGHT	6486 g	_____ g	_____ g
INITIAL WEIGHT	6374 g	_____ g	_____ g
NET WEIGHT	112 g	_____ g	_____ g

Imp Water 262
Wash + 309
571 ml.
Wash. + 25 ml
596 ml

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

69 62
11.2
73.2

F-5

NOMOGRAPH DATA

PLANT AZCO

DATE 23 March 73

SAMPLING LOCATION DAP North stack

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.80
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	73
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	7%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.8
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	29.813
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	110
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.27
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	0.36
C FACTOR	0.84	
CALCULATED NOZZLE DIAMETER, in.	.25"	
ACTUAL NOZZLE DIAMETER, in.	.25"	
REFERENCE Δp, in. H_2O	.52	

[redacted]

FIELD DATA F-5

PLANT ARCO
DATE 3/23/73
SAMPLING LOCATION DAP STACK
SAMPLE TYPE FL
RUN NUMBER 5 Mod
OPERATOR
AMBIENT TEMPERATURE 52
BAROMETRIC PRESSURE 29.8
STATIC PRESSURE, (P_s) +0.39 Port 3 Point 3 @1131
FILTER NUMBER (s) 3

PROBE LENGTH AND TYPE 3' 6L
NOZZLE I.D. 1/4
ASSUMED MOISTURE, % 7%
SAMPLE BOX NUMBER
METER BOX NUMBER 4
METER $\Delta H_@$ 1.80
C FACTOR
PROBE HEATER SETTING 60
HEATER BOX SETTING
REFERENCE Δp .52

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

1 of 2

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	5 0939	281.647										
P1 1	5 0944	283.94	0.19	0.685	.685	109	53	54	4	59		275
	10 0949	286.32	0.19	0.685	.685	110	56	54	5	61		190
2	5 0954	289.03	0.26	0.93	.93	109	60	55	5	65		160
	10 0959	291.80	0.27	0.96	.96	109	61	56	5	61		175
3	5 1004	294.41	0.23	0.83	0.83	107	64	57	5+	65		180
	10 1009	297.029	0.22	0.78	0.78	110	64	58	5.5	65		170
P2 1	5 1019	299.500	0.21	0.75	0.75	108	58	58	5	64	50	180
	10 1024	302.000	0.21	0.75	0.75	110	61	59	5	64		185
2	5 1034	304.24	0.15	0.57	0.57	110	64	60	4	65		190
	10 1039	306.44	0.15	0.57	0.57	110	66	60	4	70		199
3	5 1044	307.73	0.01	0.11	0.11	110	63	61	2	68		208
	10 1049	308.928	0.01	0.11	0.11	110	63	62	2	70		210
P3 1	5 1103 10:58	311.64	0.28	1.00	1.00	112	62	62	6	70		212
	10 1108	314.48	0.28	1.00	1.00	112	68	63	6	71		209
2	5 1113	317.55	0.34	1.21	1.21	112	70	64	7	72		205
	10 1118	320.65	0.33	1.18	1.18	112	72	65	7	75		212
3	5 1123	323.71	0.36	1.30	1.30	112	76	66	8	79		220
	10 1129	326.850	0.36	1.30	1.30	110	76	67	8	75		195
P4 1	5 1143 1138	329.910	0.29	1.05	1.05	110	64	65	7	70		200
	10 1148	332.870	0.29	1.05	1.05	112	68	65	7	70		200
2	5 1153	335.90	0.33	1.20	1.20	110	72	65	8	70		201
	10 1158	338.95	0.33	1.20	1.20	110	72	66	8	69		

COMMENTS:

212

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4/3	5 1203	34195	0.33	1.18	1.18	115	73	66	7	72	60
	10 1208	34.962	0.32	1.12	1.12	114	73	66	7	71	60

210
218

72

F-5

RUN F-5

DRY MOLECULAR WEIGHT DETERMINATION

PLANT ARCO

DATE 3/23/73

SAMPLING TIME (24-hr CLOCK) 1005 — 1035

SAMPLING LOCATION DAP N. STACK PORT 3 Point 1 1/2

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) INT

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 52

OPERATOR Shea

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.8	20.6	20.8	20.6	20.8	20.6	20.6	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.8	0	20.8	0	20.8	0	0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)		79.2		79.2		79.2	79.2	28/100	
								TOTAL	

EPA (Dur) 230
4/72

ANALYTICAL DATA

PLANT ARCO

DATE 3-23-73

SAMPLING LOCATION DAP N (GRANULATION)

SAMPLE TYPE Fluoride

RUN NUMBER F-5

SAMPLE BOX NUMBER _____

CLEAN-UP MAN CUNNINGHAM

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER _____ _____ — CONTAINER _____ _____ mg

_____ _____

_____ _____

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS				
FINAL VOLUME	283 ml			
INITIAL VOLUME	200 ml			
NET VOLUME	83 ml			
SILICA GEL				
FINAL WEIGHT	645.8 g	_____ g	_____ g	
INITIAL WEIGHT	631.7 g	_____ g	_____ g	
NET WEIGHT	14.1 g	_____ g	_____ g	

cyclone = 7.2 + 4.8 = 12.0 ml

wash = 449 ml + 25 ml = 474 + 38.3 = 75.7 ml

TOTAL MOISTURE _____ g

APPENDIX E

LABORATORY REPORT

This section presents the report on fluoride, ammonia, pH and P_2O_5 analysis which were performed by EPA.

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) | 3 (MO) | 21 (DAY)

FIRST IDENT. NO. USED: S 73 000511

LAST IDENT. NO. USED: S73 000512

TEST NO: 73 FRT1

RUN NO: F-1

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

RECD. / RCRD.: 4-5-73

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: St. Madison, Iowa

FUEL USED: none

COPIES TO: P. O. / LAB: 6-13-73

SAMPLING METHOD: EPA Flourides

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT³): 61.509

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S 73 000511	cyclone contents + wash	N/A	250	Soluble and Insoluble flourides (12.2 ml stock H₂O)
512	impinger contents, filter + wash	N/A	~~546~~ 550	Soluble and Insoluble flourides (66 ml stock H₂O)

76

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS

ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

ent No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initial

...lysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

...er Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	Soluble fluorides	Insoluble fluorides								
511	[X] 0.5 mg	[X] < 0.06 mg								
512	[X] 1.2 mg	[X] < 0.06 mg								
...lyst	DMG + JM	DMG + JM								
...thod	SPADNS	SPADNS								

...ments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) 3 (MO) 21 (DAY)

FIRST IDENT. NO. USED: S 73 000523

LAST IDENT. NO. USED: S 73 000524

TEST NO: 73 FRT-1

RUN NO: F 2

RECD. / RCRD.: 4-5-73

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft. Madison, Iowa

FUEL USED: none

COPIES TO: P. O. / LAB: 6-13-73

SAMPLING METHOD: EPA - Flourides

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT^3): 72.859

FILED:

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S73000523	cyclone contents + wash	N/A	[illegible]	Soluble + Insoluble Flourides (7.2 ml stock H_2O)
524	impinger contents, filter + washes	N/A	~~674~~ 720 ml	" " " " (88 ml stock H_2O)

78

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

5
2.0 mg
2.0 mg

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initial

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No. 76	Soluble fluorides	Insoluble fluorides									
523	☒ 0.7 mg	☒ <0.06 mg									
524	☒ 2.6 mg	☒ <0.06 mg									
Analyst	DMG + JM	DMG + JM									
Method	SPADNS	SPADNS									

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) | 3 (MO) | 22 (DAY)

FIRST IDENT. NO. USED: S 73 000535

LAST IDENT. NO. USED: S 73 000536

TEST NO: 73 FRT 1

RUN NO: F3

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft Madison, Iowa

FUEL USED: none

SAMPLING METHOD: EPA Flourides

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT³): 68.865

RECD. / RCRD.: 4-5-73

COPIES TO

P. O. / LAB: 6-13-73

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S73000535	cyclone contents + wash	N/A	250	Soluble + Insoluble flourides (14.1 mg stack H_2O)
80 536	impinger contents, filter + washes	N/A	~~697~~ 660 ml	" " " " (74 mg stack H_2O)

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/12/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	No	K	Ca	Si	Mg	Ba					Analyst's Initial

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No. 81	Soluble fluoride	Insoluble fluoride								
535	X 0.1 mg	X <0.06 mg								
536	X 1.8 mg	X <0.06 mg								
Analyst	DMG+JM	DMG+JM								
Method	SPADNS	SPADNS								

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) 3 (MO) 22 (DAY)

FIRST IDENT. NO. USED: 573 000546

LAST IDENT. NO. USED: S 73000 548

TEST NO: 73 FRT 1

RUN NO: F4

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

RECD. / RCRD.: 4-5-73

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft. Madison, Iowa

FUEL USED: none

COPIES TO: P. O. / LAB.: 6-13-73

SAMPLING METHOD: EPA - Flourides

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT3): 72.459

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
573 000546	cyclone contents & wash	N/A	250	Soluble & Insoluble flourides (11.1 ml stock H_2O)
82 547	impinger contents, filter & washes	N/A	~~917~~ 795	" " " (6.1 ml stock H_2O)
* 548	Water Blank			" " "

COMMENTS: * SAMPLE CONTAINER SPLIT, AND ENTIRE SAMPLE LOST DURING SHIPPING.

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winston Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for licuid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initial

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

	Ident No. 83	Soluble Fluorides	Insoluble Fluorides									
X	546	X 0.8 mg	X < 0.01 mg									
X	547	X 1.4 mg	X 0.08 mg									
X	548	SAMPLE MISSING	SAMPLE MISSING									
Analyst		DMG+JM	DMG+JM									
Method		SPOONS	SPOONS									

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) 3 (MO) 23 (DAY)

FIRST IDENT. NO. USED: 5 73 000 559

LAST IDENT. NO. USED: 5 73 000 562

TEST NO: 73-FRT-1

RUN NO: FS

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

RECD. / RCRD.: 4-5-73

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft. Madison

FUEL USED: none

COPIES TO: P. O. / LAB.: 6-13-73

SAMPLING METHOD: EPA Flourides

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT³): 63,305

FILED:

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
573000559	cyclone contents + wash	N/A	263	Soluble + insoluble flourides (120 ml stock H_2O)
560	impinger contents, filter, + washes	N/A	759 635	" " " " (93 ml stock H_2O)
561	ammonia reagent blank	N/A	508	NH_3
562	filter blank	N/A	N/A	Soluble + insoluble flourides

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/8/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initials

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No. 85	Soluble fluoride	Insoluble fluoride	Ammonia									
559	X <0.01mg	X <0.06mg										
560	X 1.6mg	X <0.06mg										
561			X <0.3mg									
562	X <0.06mg	X <0.06mg										
Analyst	DMG + JM	DMG + JM	DMG + JM									
Method	SPADNS	SPADNS	KJELDAHL DISTILLATION									

Comments:

SOURCE SAMPLE REQUEST & REPORT

(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) 3 (MO) 21 (DAY)

FIRST IDENT. NO. USED: S 73-000501

LAST IDENT. NO. USED: S 73 000502

TEST NO: 73-FRT-1

RUN NO: A-1

RECD. / RCRD.: 4-5-73

INDUSTRY: PHOSPHATE FERTILIZER (USE TABLE A)

UNIT PROCESS OPERATION: DIAMMONIUM PHOSPHATE

COMPANY: ARCO CHEMICAL

AIR POLLUTION CONTROL: SCRUBBERS

COPIES TO

ADDRESS: FT. MADISON, IOWA

FUEL USED: NONE

P. O.

SAMPLING METHOD: NH_3 - EPA (H_2SO_4 collecting soln)

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT^3): 40.3

LAB.: 6-13-73

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S 73 000501	filter	N/A	N/A	storage
98 502	impinger contents + wash	N/A	293	NH_3 (60 ml stock H_2O collected)

COMMENTS:

SAMPLING CONTRACTOR: MIDWEST RESEARCH INSTITUTE (IF APPLICABLE)

PROJECT OFFICER: WINTON KELLY

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Page 1 of 2

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	08	ammonia										
501												
502	X	<0.3 mg										
Analyst		DMG + JMM										
Method		KJELDAHL	DISTILLATION									

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE 73 (YR) | 3 (MO) | 21 (DAY)

FIRST IDENT. NO. USED S73 000513

LAST IDENT. NO. USED S 73 000514

TEST NO 73-FRT-1

RUN NO A2

RECD. / RCRD. 4-5-73

INDUSTRY Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION diammonium phosphate

COMPANY Arcs Chemical

AIR POLLUTION CONTROL scrubber

ADDRESS Ft. Madison, Iowa

FUEL USED none

COPIES TO

P. O.

LAB. 6-13-73

SAMPLING METHOD EPA ammonia (H_2SO_4 absorbing soln)

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT^3) 43.67

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S 73 000513	filter	N/A	N/A	storage
514	impinger contents and wash	N/A	382	NH_3 (56 ml stock H_2O collected)

COMMENTS:

SAMPLING CONTRACTOR Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER Winton Kelly

REQUEST REVIEWED BY [signature] 4/3/73

DATE OF REQUEST 4/3/23

DATE ANALYSIS REQUESTED 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analysis Requested

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	Ammonia											
513												
514	X	<0.3 mg										
Analyst	DMG + JM											
Method	KJELDAHL	DISTILLATION										

Comments:

88

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) | 3 (MO) | 22 (DAY)

FIRST IDENT. NO. USED: S 73 000 525

LAST IDENT. NO. USED: S 73 000 526

TEST NO: 73-FRT-1

RUN NO: A 3

RECD. / RCRD.: 4-5-73

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft. Madison, Iowa.

FUEL USED: none

COPIES TO: P. O. / LAB: - 6-13-73

SAMPLING METHOD: NH_3 EPA (H_2SO_4 scrubbing soln)

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT^3): 44.935

FILED:

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S73000525	filter	N/A	N/A	storage
526	impinger contents + wash	N/A	662 513	NH_3 (56 ml stack H_2O collected)

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Wintow Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSI
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initials

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.		Ammonia											
91	525												
	526	X	<0.3 mg										
Analyst		DMG + JM											
Method		KJELDAHL DISTILLATION											

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) | 3 (MO) | 23 (DAY)

FIRST IDENT. NO. USED: S73 000 557

LAST IDENT. NO. USED: S73 000 558

TEST NO: 73 FRT 1

RUN NO: A4

RECD.

RCRD. 4-5-73

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

COPIES TO

ADDRESS: Ft. Madison, Iowa

FUEL USED: none

P. O.

☐ INLET ☒ OUTLET

LAB. 6-13-73

SAMPLING METHOD: EPA ammonia

GAS VOLUME SAMPLED (METER VOL IN FT^3): 42.686

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S73000 557	filter	N/A	N/A	storage
92 558	impinger contents, 4 washes	N/A	~~590~~ 496	ammonia (C2 ml stock H_2O collected)

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initial

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	93													
557		Ammonia												
558		X <0.3 mg												
Analyst		DMG+SVA												
Method		KJELDAHL	DISTILLATION											

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) | 3 (MO) | 21 (DAY)

FIRST IDENT. NO. USED: S 73 000503

LAST IDENT. NO. USED: S 73 000510

TEST NO. 73-FRT-1

RUN NO. 1

RECD. / RCRD. 4-5-73

INDUSTRY: PHOSPHATE FERTILIZER (USE TABLE A)

UNIT PROCESS OPERATION: DIAMMONIUM PHOSPHATE

COMPANY: ARCO CHEMICAL

AIR POLLUTION CONTROL: SCRUBBER

ADDRESS: FT. MADISON IOWA

FUEL USED: NONE

SAMPLING METHOD: Grab

☐ INLET ☒ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT³)

COPIES TO: P. O. 6-13-73; LAB.; FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S 73 000503	venturi scrubber inlet liquor } ~ 26% phosphoric acid	N/A	N/A	total flourides, pH
504	venturi scrubber outlet liquor }	N/A	N/A	total flourides, ammonia, pH
* 505	gypsum pond water	N/A	N/A	total flourides, pH, P_2O_5
506	Reactor-granulator afterscrubber outlet liquor	N/A	N/A	total flourides, ammonia
507	Cooler afterscrubber outlet liquor	N/A	N/A	total flourides, ammonia
+ 508	Dryer afterscrubber outlet liquor	N/A	N/A	total flourides, ammonia
509	Feed acid (54% phosphoric acid)	N/A	N/A	total fourides, P_2O_5
510	DAP product	N/A	N/A	total flourides, P_2O_5, NH_3
[illegible]				
[illegible]				

94

COMMENTS: * SAMPLE CONTAINER SPLIT, AND ENTIRE SAMPLE LOST DURING SHIPPING.
+ SAMPLE MISSING

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Wilton Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(CUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liqu d samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba	Analysis Method

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	Total Solids	P_2O_5	pH	ammonia						
503	X 17.3 g-/L		X 0.52							
504	X 13.3 g-/L		X 2.93	X 100.8 g-/L						
505	X SAMPLE GONE	X SAMPLE GONE	X SAMPLE GONE							
506	X 1.79-/L			X 592.6 mg/L						
507	X 1.8 g-/L			X 504.1 mg/L						
508	X SAMPLE GONE			X SAMPLE GONE						
509	X 12.1 g-/L	X 850 g-/L								
510	X 26.4 mg/g-	X 520 mg/g-		X 211.2 mg/g-						
Analyst	DMG + JM	DMG + JM	WILLIAMS	DMG + JM						
Method	SPADNS	AMMONIUM MOLYBDATE		KJELDAHL DISTILLATION						

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) | 3 (MO) | 21 (DAY)

FIRST IDENT. NO. USED: S-73-000515

LAST IDENT. NO. USED: S-73-000522

TEST NO: 73-FRT-1

RUN NO: 2

RECD. / RCRD.: 4-5-73

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft. Madison Iowa

FUEL USED: none

☐ INLET ☒ OUTLET

SAMPLING METHOD: [redacted]

GAS VOLUME SAMPLED (METER VOL IN FT³):

COPIES TO: P. O. / LAB: 6-13-73

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S 73 000515	venturi scrubber inlet liquor } 26% phosphoric	N/A	N/A	total flourides, pH
516	venturi scrubber outlet liquor } acid	N/A	N/A	" " , ammonia, pH
96 517	gypsum pond water	N/A	N/A	total flourides, pH, P_2O_5
518	Reactor granulator afterscrubber liquor out	N/A	N/A	total flourides, ammonia
519	cooler afterscrubber liquor out	N/A	N/A	" "
520	dryer afterscrubber liquor out	N/A	N/A	" "
521	feed acid (54%) phosphoric acid	N/A	N/A	total flourides, P_2O_5
522	DAP product (diammonium phosphate)	N/A	N/A	total flourides, P_2O_5, ammonia
	[redacted]			
	[redacted]			

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Wintsa Kelly

REQUEST REVIEWED BY: GK 4/5/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initial

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	tkd fluoride	P_2O_5	pH	ammonia						
515	X 26.6gm/L		X .033							
516	X 17.8gm/L		X 1.78	X 86gm/L						
517	X 1.8gm/L	X 2.7gm/L	X 1.65							
518	X 1.7gm/L			X 449.6mg/L						
519	X 1.9gm/L			X 463.0mg/L						
520	X 1.8gm/L			X 828.0mg/L						
521	X 15.2gm/L	X 800gm/L								
522	X 26.0mg/gm	X 470mg/gm		X 197.5mg/gm						
Analyst	DMG & JM	DMG & JM	gmunek	DMG & JM						
Method	SPADNS	AMMONIUM MOLYBDATE		KJELDAHL DISTILLATION						

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) 3 (MO) 22 (DAY)

FIRST IDENT. NO. USED: S 73 000 527

LAST IDENT. NO. USED: S 73 000 534

TEST NO: 73-FRT-1

RUN NO: 3

RECD. / RCRD.: 4-5-73

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: St. Madison, Iowa

FUEL USED: none

COPIES TO: P. O. 6-13-73; LAB.; FILED

☐ INLET ☒ OUTLET

SAMPLING METHOD: [redacted] Grab samples

GAS VOLUME SAMPLED (METER VOL IN FT³):

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S 73 000 527	venturi scrubber inlet liquor } 26% phosphoric	N/A	N/A	total flourides, pH
528	venturi scrubber outlet liquor } acid	N/A	N/A	total flourides, ammonia, pH
529	gypsum pond water	N/A	N/A	total flourides, pH, P_2O_5
530	reactor granulator afterscrubber liquor out	N/A	N/A	total flourides, ammonia
531	cooler afterscrubber liquor out	N/A	N/A	" " , "
532	dryer afterscrubber liquor out	N/A	N/A	" " , "
533	feed acid 54% phosphoric	N/A	N/A	total flourides, P_2O_5
534	DAP product	N/A	N/A	total flourides, P_2O_5, ammonia
[redacted]				
[redacted]				

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: [signature] 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

ent No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initials

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	total fluorides	P_2O_5	pH	ammonia						
527	X 25.6 gm/L		X 0.28							
528	X 6.0 gm/L		X 5.38	X 107.5 gm/L						
529	X 2.0 gm/L	X 2.8 gm/L	X 1.75							
530	X 1.6 gm/L			X 487.1 mg/L						
531	X 1.7 gm/L			X 1.3 gm/L						
532	X 1.7 gm/L			X 580 mg/L						
533	X 14.5 gm/L	X 790 gm/L								
534	X 24.4 mg/gm	X 500 mg/gm		X 228.2 mg/L	?					
Analyst	DMG & JM	DMG & JM	GMacK	DMG & JM						
Method	SPADNS	AMMONIUM MOLYBDATE		KJELDAHL	DISTILLATION					

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) 3 (MO) 22 (DAY)

FIRST IDENT. NO. USED: S73 0005 37

LAST IDENT. NO. USED: S 73 000545

TEST NO: 73 FRT 1

RUN NO: 4

RECD. / RCRD.: 4-5-73

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft Madison, Iowa

FUEL USED: none

☐ INLET ☐ OUTLET

SAMPLING METHOD: Grab

GAS VOLUME SAMPLED (METER VOL IN FT³):

COPIES TO: P. O. / LAB.: 6-13-73

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S73 000537	venturi scrubber inlet liquor } 21% phosphoric	N/A	N/A	total flourides, pH
* 538	venturi scrubber outlet liquor } acid			total flourides, ammonia, pH
539	gypsum pond water	N/A	N/A	total flourides, pH, P_2O_5
540	farm run-off water	N/A	N/A	" " " "
541	Reactor granulator afterscrubber outlet liquor	N/A	N/A	total flourides, ammonia
542	Cooler afterscrubber outlet liquor	N/A	N/A	" " "
543	dryer afterscrubber outlet liquor	N/A	N/A	" " "
544	fuid acid (54% phosphoric acid)	N/A	N/A	total flourides, P_2O_5
545	DAP product	N/A	N/A	total flourides, P_2O_5, ammonia

COMMENTS: * SAMPLE CONTAINER SPLIT, AND ENTIRE SAMPLE LOST DURING SHIPPING.

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: [signature] 4/4/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					Analyst's Initials

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	total fluorides	P_2O_5	pH	ammonia							
101 537	X 75.8 gm/L		X 0.37								
101 538	X SAMPLE GONE	X SAMPLE GONE	X SAMPLE GONE	X SAMPLE GONE							
539	X 1.8 gm/L	X 2.8 gm/L	X 1.72								
540	X 1.1 mg/L	X 14.5 mg/L	X								
541	X 1.7 gm/L			X 115.8 mg/L							
542	X 1.8 gm/L			X 599.5 mg/L							
543	X 1.7 gm/L			X 1.3 gm/L							
544	X 14.7 gm/L	X 750 gm/L									
545	X 26.0 mg/gm	X 480 mg/gm		X 201.0 mg/gm							
Analyst	DMG + JM	DMG + JM	Millack	DMG + JM							
Method	SPADNS	AMMONIUM MOLYBDATE		KJELDAHL DISTILLATION							

Comments:

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 73 (YR) 3 (MO) 23 (DAY)

FIRST IDENT. NO. USED: S 73 000549

LAST IDENT. NO. USED: S 73 000556

TEST NO: 73-FRT-1

RUN NO: 5

RECD.

RCRD: 1-5-73

INDUSTRY: Phosphate Fertilizer (USE TABLE A)

UNIT PROCESS OPERATION: diammonium phosphate

COMPANY: Arco Chemical

AIR POLLUTION CONTROL: scrubber

ADDRESS: Ft. Madison, Iowa

FUEL USED: none

☐ INLET ☐ OUTLET

SAMPLING METHOD: Grab

GAS VOLUME SAMPLED (METER VOL IN FT^3):

COPIES TO

P. O.

LAB: 6-13-73

FILED

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
S 73 000549	venturi scrubber ~~outlet~~ inlet liquor } ~26%	N/A	N/A	total flourides, pH
550	venturi scrubber outlet liquor } phosphoric	N/A	N/A	total flourides, ammonia, pH
102 551	pond water	N/A	N/A	total flourides, pH, P_2O_5
552	Reactor granulator afterscrubber outlet liquor	N/A	N/A	total flourides, ammonia
553	cooler afterscrubber outlet liquor	N/A	N/A	" " "
554	dryer afterscrubber outlet liquor	N/A	N/A	" " "
555	feed acid (54%)	N/A	N/A	total flourides, P_2O_5
556	DAP product	N/A	N/A	total flourides, P_2O_5, ammonia

COMMENTS:

SAMPLING CONTRACTOR: Midwest Research Institute (IF APPLICABLE)

PROJECT OFFICER: Winton Kelly

REQUEST REVIEWED BY: 4/3/73

DATE OF REQUEST: 4/3/73

DATE ANALYSIS REQUESTED: 4/18/73

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Ident No.	Total Solids	P_2O_5	pH	ammonia						
103 549	X 27.5gm/L		X 0.35							
550	X 7.2gm/L		X 5.18	X 111.3gm/L						
551	X 1.8gm/L	X 2.8gm/L	X 1.73							
552	X 1.8gm/L			X 910mg/L						
553	X 1.8gm/L			X 635mg/L						
554	X 1.7gm/L			X 630mg/L						
555	X 15.5gm/L	X 730gm/L								
556	X 25.7mg/gm	X 460mg/gm		X 204.4mg/gm						
Analyst	DMG + JM	DMG + JM	J Mach	DMG + JM						
Method	SPAGNS	AMMONIUM MOLYBDATE		KJELDAHL DISTILLATION						

Comments:

APPENDIX F

TEST LOG

Table F-I presents the actual time during which each sampling was done.

TABLE F-1

SAMPLING LOG

Run	Location	Port	Pollutant	Date	Time Began-Ended	Elapsed Time (min)
F-1A	Stack	1	Temperature and velocity	3-20-73	15:00-15:20	20
F-1	Stack	1	Fluoride	3-21-73	10:52-11:25	33
1	"	2	Fluoride	"	11:44-12:35	51
	"	3	CO, CO_2, O_2	"	11:50-12:20	30
	"	3	Fluoride	"	12:45-13:15	30
	"	4	Fluoride	"	13:25-13:55	30
NH_3-1	"	4	Ammonia	"	10:58-11:58	60
F-1,NH_3-1	Various	-	Liquid/Solid	"	11:00-13:45	165
F-2	Stack	1	Fluoride	"	16:04-16:34	30
F-2	"	2	Fluoride	"	16:45-17:15	30
F-2	"	3	CO, CO_2, O_2	"	16:20-16:50	30
F-2	"	3	Fluoride	"	17:23-17:53	30
F-2	"	4	Fluoride	"	18:00-18:30	30
NH_3-2	"	4	Ammonia	"	16:10-17:10	60
F-2,NH_3-2	Various	-	Liquid/Solid	"	16:10-18:10	120
F-3	Stack	1	Fluoride	3-22-73	10:04-10:34	30
F-3	"	2	Fluoride	"	10:44-11:14	30
F-3	"	1	CO, CO_2, O_2	"	11:08-11:38	30
F-3	"	3	Fluoride	"	11:24-11:54	30
F-3	"	4	Fluoride	"	12:13-12:43	30
NH_3-3	"	4	Ammonia	"	11:01-12:01	60
F-3,NH_3-3	Various	-	Liquid/Solid	"	10:10-12:10	120
F-4	Stack	1	Fluoride	"	15:20-15:50	30
F-4	"	2	Fluoride	"	15:58-16:28	30
F-4	"	3	Fluoride	"	16:38-17:08	30
F-4	"	4	CO, O_2, CO_2	"	15:34-16:04	30
F-4	"	4	Fluoride	"	17:16-17:46	30
F-4	Various	-	Solid/liquid	"	15:30-17:30	120
F-5	Stack	1	Fluoride	3-23-73	09:39-10:09	30
F-5	"	2	Fluoride	"	10:19-10:49	30
F-5	"	3	CO, CO_2, O_2	"	10:05-10:35	30
F-5	"	3	Fluoride	"	10:58-11:28	30
F-5	"	4	Fluoride	"	11:38-12:08	30
NH_3-4	"	4	Ammonia	"	09:48-10:48	60
F-5,NH_3-4	Various	-	Liquid/Solid	"	09:45-12:00	135

APPENDIX G

PROJECT PARTICIPANTS AND TITLES

Name	Title
Paul Constant	Program Manager
Pat Shea	Project Chief
Reid Flippin	Testing Engineer Laboratory Technician
Henry Moloney	Process Sampler
Bill Maxwell	Engineering Technician
Mike Bechtold	Testing Engineer and Engineering Technician
Bill Cunningham	Laboratory Technician Engineering Technician
Christine Guenther	Programmer