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

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

AP42 Section:	11.25
Background Chapter	4
Reference:	1
Title:	*Report on Particulate Emissions From No. 3 Spray Dryer, American Industrial Clay Company, Sandersonville, Georgia*, July 21, 1975.

SECTION 4 REFERENCE 1 PLANT J3 CALCINERS & DRYER

Americal Industrial Clay Company--09/27/74

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Average
1	Stack temperature	Deg F	201	195	199	
No. 3	Moisture	%	30.7	31.7	29.7	
Spray	Oxygen	%	17	17	17	
Dryer	Volumetric flow, actual	acfm	59740	59898	55353	
Baghouse	Volumetric flow, standard	dscfm	33048	32703	31032	
Outlet	Isokinetic variation	%	ok	ok	ok	
Feed rate: Capacity:		TPH	11.82	13.5	12.18	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.031	0.034	0.013	
	CO2	%	0.9	0.9	0.9	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	8.81	9.65	3.49	
	CO2	lb/hr	2050	2029	1925	
	Emission factors:					
	Filterable PM	lb/ton	0.75	0.71	0.29	0.58
	CO2	lb/ton	173	150	158	161

9/21/74

A-82-39
II - A - 23

KAOLIN

AMERICAN INDUSTRIAL CLAY COMPANY

SANDERSVILLE, GEORGIA

REPORT ON

RECEIVED
JUL 31 1975
AIR QUALITY EVALUATION SECTION

PARTICULATE EMISSIONS FROM NO. 3 SPRAY DRYER

by

E. R. Dotson

CC: A. H. Willis
W. L. Hartley
C. D. Anderson

7-21-75

AMERICAN INDUSTRIAL CLAY COMPANY

SANDERSVILLE, GEORGIA

July 21, 1975

INTRODUCTION

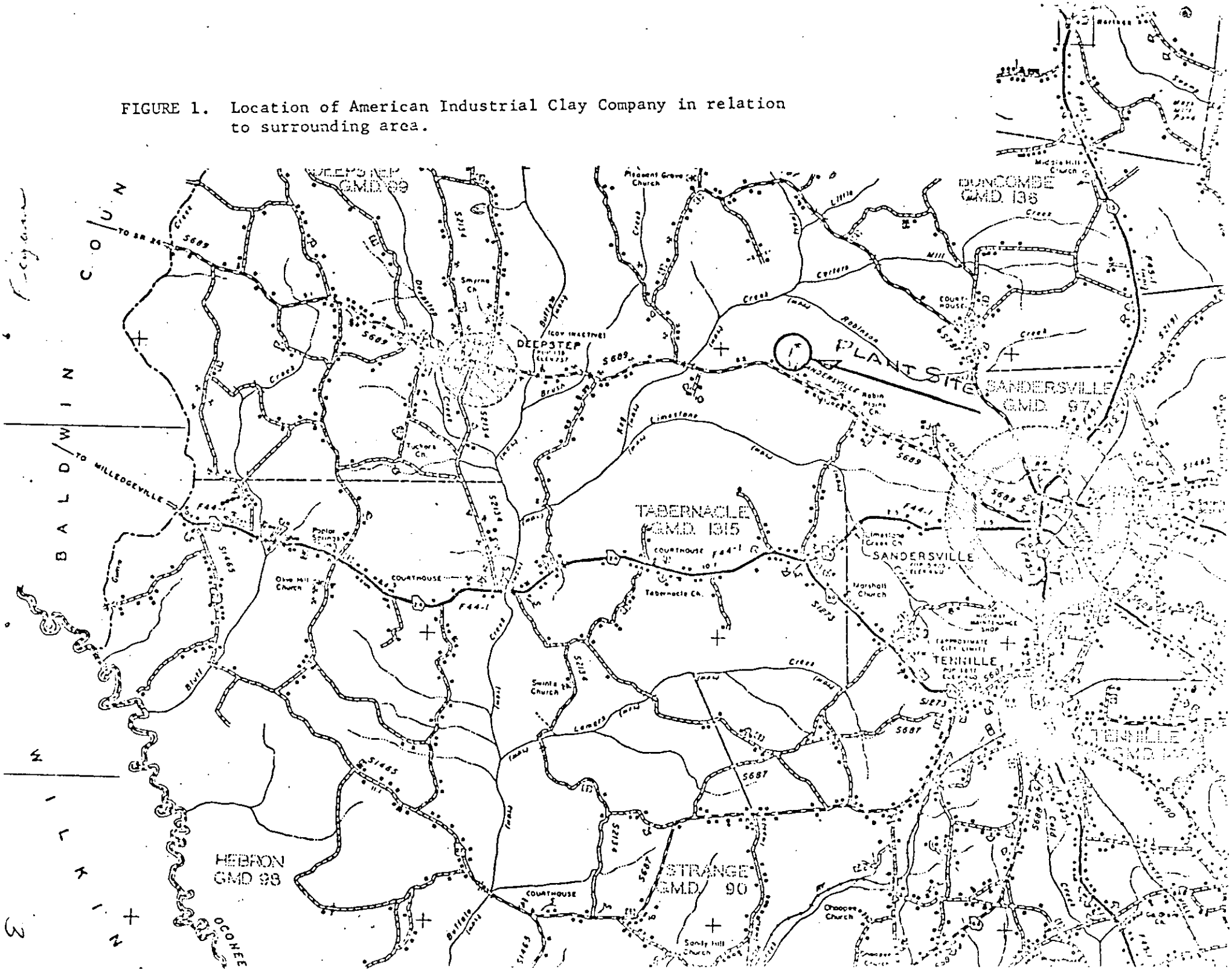
Particulate emissions from the (AICC) no. 3 spray dryer were performed and are reported here in accordance with the requirements and specifications presented in Rules and Regulations for Air Quality Control, chapter 270-5-24.

AICC is located approximately six miles from Sandersville, Georgia, on highway S689 and the mailing address is P. O. Box 617, Sandersville, Georgia. (See Figures 1 & 2).

Data presented in this report was collected on September 27, 28 and 30, 1974, by Georgia Kaolin Company process technicians, Wilton Lewis and Bob Hamilton.

The sampling station of AICC spray dryer #3 is located on the exhaust stack (4.5' X 93') approximately sixty feet above the exhaust fan (See figure 3).

FIGURE 1. Location of American Industrial Clay Company in relation to surrounding area.



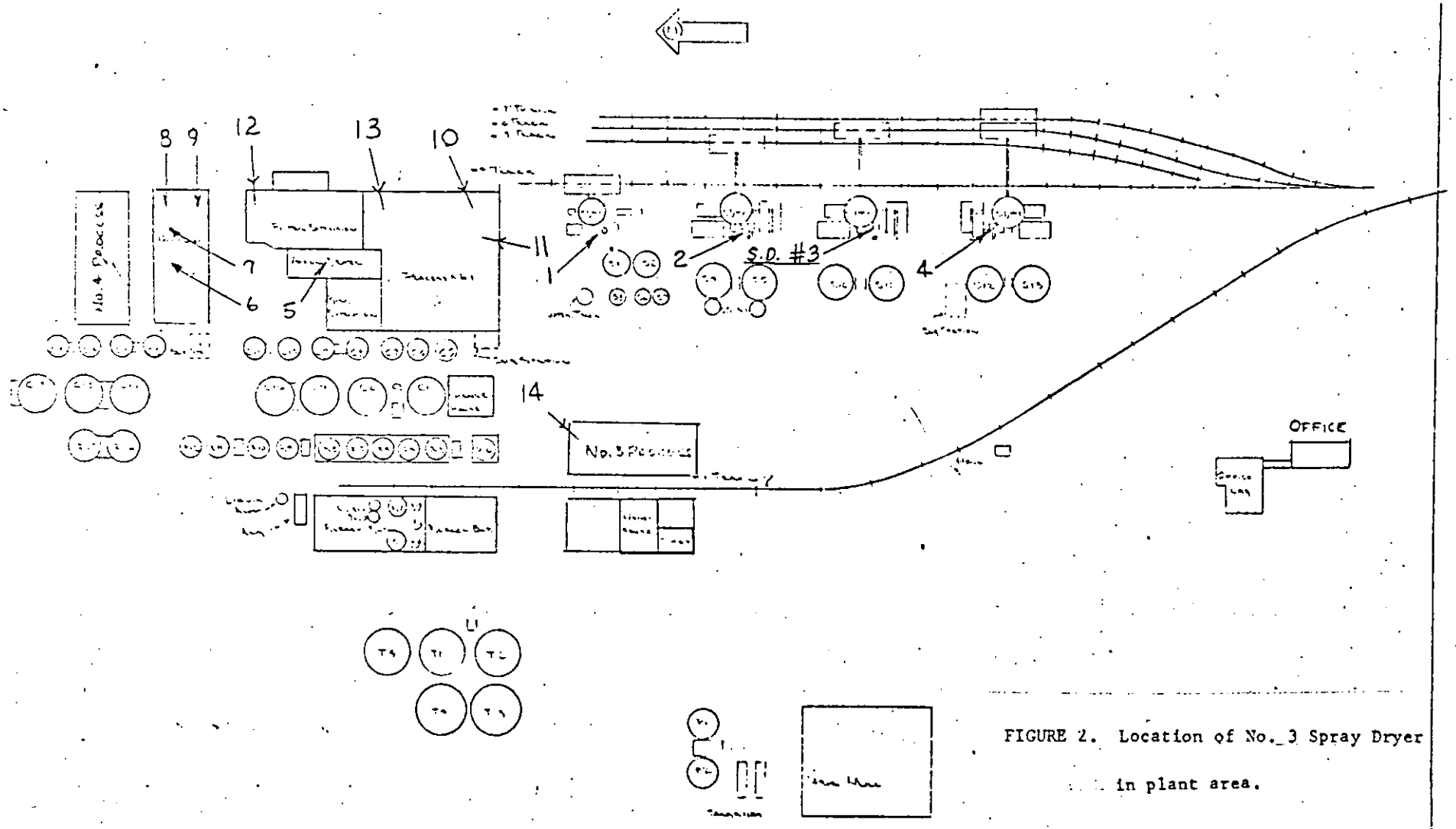


FIGURE 2. Location of No. 3 Spray Dryer in plant area.

SUMMARY OF RESULTS

A summary of emissions data collected on AICC no. 3 spray dryer is presented in TABLE I.

Examination of this data reveals that the unit was emitting 21.39 to 27.33 pounds per hour under allowable. The average of the three runs was 24.02 pounds per hour under allowable (76.6% under allowable).

These results were obtained by blanking off the bypass duct to prevent leakage through the bypass damper (See Figure 3).

The bypass system is designed to protect the fabric bags if the exhaust temperature goes higher than the bags can tolerate. This test showed that most of the particulate emissions were caused by leakage through the bypass damper, not by a faulty dust collector.

The blanking plate was removed after the test so that the bags would be protected. Other measures for bag protection are being considered.

TABLE I: SUMMARY OF EMISSION DATA FOR SEPT. 27, 28, and 30 TESTS ON #3 SPRAY DRYER

ATE TESTED	STACK DIA. X HEIGHT	FLOW @ STACK COND			EMISSIONS IN #/HR.	
		FT/MIN	CFM	RATE	ACTUAL	ALLOWABLE
ept. 27	4' - 5" X 93'	3,756	59,740	19.7 tons/hr.	8.81	30.20
ept. 28	4' - 5" X 93'	3,766	59,898	22.5 tons/hr.	9.65	33.0
ept. 30	4' - 5" X 93'	3,786	55,358	20.3 tons/hr.	3.49	30.82
VERAGES		3,769	58,332	20.83	7.32	31.34

DESCRIPTION OF PROCESS

A flow diagram of the AICC 32' X 14' Nichols spray dryer is presented in figure 3.

Basically this system receives a kaolin feed slurry containing approximately 60.0 wt. % kaolin, atomizes, and dries this slurry to a moisture content of less than 1.0%.

The dried slurry is separated from the exhaust gases in the drying chamber by utilization of the cyclonic air flows. This process is not 100% efficient, therefore, fabric bag collectors are used to remove remaining particulates.

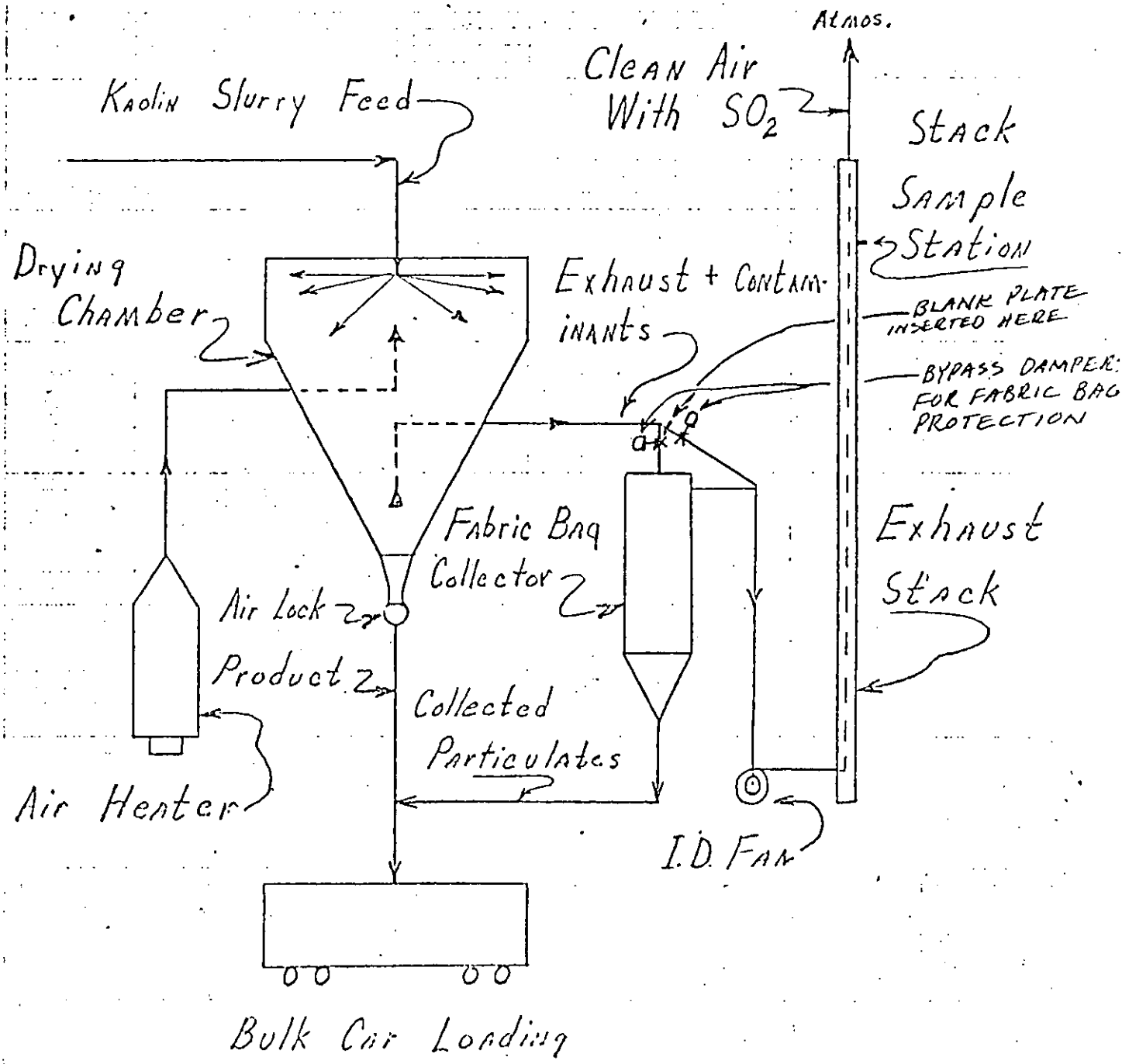
AICC bag collectors are Wheelabrator model 126-D units, which have 19,152 square feet of cloth area. Cyclic operation of compartments yields a net cloth area of 15,960 square feet.

Flow through this unit is approximately 60,000± 1,000 ACFM of dust laden air containing 13.5 ± .05 grains per cubic foot.

Under standard operating conditions, AICC maintains an air to cloth ratio of 3.8 to 1.0.

Principles of operation of the fabric bag collector are: Dust laden air enters the dust collector housing though the side and passes into a settling and equalizing compartment. Through expansion in the equalizing compartment, the air velocity drops and flow is distributed over the entire settling area. The air then flows over and away from the storage hoppers, causing the heavier dust particles to be thrown from the air stream and settled, the finer particles floating upward into the filter tubes where they are deposited on the inner surface of the tubes. The clean air passes through the tubes and into another equalizing chamber prior to discharge. At regular intervals, the damper valve and the shaker motor for each compartment are operated together, stopping the flow of air through the particular compartment and allowing the accumulated material to be shaken from the DUSTUBES, and mixed with product.

Figure 3. Flow Diagram of Nichols 32'x14' Spray Dryer System.



- ANALYTICAL PROCEDURE -

All data presented in the appendix was gathered with a Research Appliance Company Train Stachsampler model # 2343.

The R.A.C. Train stacksampler was developed by the Emissions Testing Branch of the Office of Air Programs, E.P.A. It is specified in Volume 36, Number 247 of the Federal Register under the topic "Standards of Performance for New Stationary Sources", "Method 5 Particulate Sampling". It is also specified in Volume 36, Number 234 of the Federal Register under the topic "National Emission Standards for Hazardous Air Pollutants, proposed standards for Asbestos, Beryllium and Mercury".

The sampling train has four major components: (1) The pitobe assembly includes the probe nozzle, a heated, glass lined (optional) probe, and an "S" type pitot tube for monitoring gas velocity during sampling. (2) The sample case has a heated portion for the filter, cyclone and flask and an ice bath portion for the impingers. (3) The umbilical cord connects the sample box with the meter box. It is a development of the aquanaut program called "Life Line". (4) The meter case consists of a dual inclined vertical manometer, an orifice meter, vacuum pump, dry gas meter, thermometers and electrical controls for sampling.

NO. 3 SPRAY DRYER

DUST EMISSION

AMERICAN INDUSTRIAL CLAY COMPANY
OCTOBER 2, 1974

October 2, 1974

AMERICAN INDUSTRIAL CLAY COMPANY
Sandersville, Georgia

No. 3 Spray Dryer

DUST EMISSION

Emission Rate

7.3#/hour	average of 3 checks

* Allowable Output

31.35#/hour	
24.05#/Hour	under allowable
76.7%	under allowable

All sampling was done within the ± 10% isokinetic range, with an overall average of 5.01%

* Based on an average of 20.83 TPH feed rate at 1.616 Sp. Gr.

Grady Askew
Wilmer Tanner

11

.55 / 10404 11/19

3 Dryer 9-27-74

Comments	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O ΔP	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp. °F	Stack Press. in. Hg	Stack Temp. °F
	0	030.13		2.2955	2.2955							
	3	032.01	.59 ✓	1.60	1.60	84°	84°	4.2		85°		198°
	6	034.20	.79 ✓	2.15	2.15	86°	84°	5.5		70°		198°
	9	036.51	.80 ✓	2.20	2.20	90°	84°	5.6		70°		200°
	12	038.77	.79 ✓	2.15	2.15	94°	85°	5.5		70°		200°
	15	041.00	.89 ✓	2.40	2.40	96°	86°	6.0		70°		200°
	18	043.49	.99 ✓	2.66	2.66	99°	88°	7.0		70°		200°
	21	045.99	.95 ✓	2.60	2.60	101°	88°	7.0		74°		200°
	24	[illegible]	.90 ✓	2.50	2.50	101°	89°	7.0		75°		198°
	27	050.01	.86 ✓	2.39	2.39	104°	90°	7.0		75°		198°
	30	053.16	.75 ✓	2.07	2.07	106°	90°	7.0		75°		198°
	33	055.47	.90 ✓	2.45	2.45	106°	91°	6.2		70°		200°
	36	057.89	.95 ✓	2.60	2.60	104°	92°	7.2		75°		200°
	39	060.34	.86 ✓	2.39	2.39	107	95°	7.2		75°		205°
	42	062.72	.82 ✓	2.26	2.26	109°	92°	7.2		75°		202°
	45	065.06	.85 ✓	2.32	2.32	109°	95°	7.3		75°		202°
	48	067.49	.89 ✓	2.40	2.40	109°	96°	7.8		75°		204
	51	070.00	.95 ✓	2.60	2.60	110°	96°	8.0		75°		202
	54	072.49	.95 ✓	2.60	2.60	111°	97°	8.0		75°		204°
	57	074.80	.75	2.07	2.07	111°	98°	7.0		75°		204°
	60	076.82	.54	1.50	1.50	111°	99°	6.0		75°		205°
		46.69				99°						201°
			$a_c\sqrt{\Delta P}$	.1688								

.9134

.256
.218
.037

1600

21

GEORGIA DEPARTMENT OF NATURAL RESOURCES
VELOCITY AND SAMPLING TRAVERSE DATA

COMPANY: American Industrial Clay Co.

ADDRESS: Sandersville, Georgia

DATE: 9-27-74 STACK SAMPLED: No. 3 Spray Dryer RUN NO. 1

1. Size of Duct L _____ W _____ D 4'-6"

Probe size used:

Diam., in.			Area, ft.^{2}
1/8	= .125	=	.000085 ft.^{2}
1/4	= .250	=	.000341 ft.^{2}
3/8	= .375	=	.000767 ft.^{2}
1/2	= .500	=	.001363 ft.^{2}

2. Orsat CO_2 = .9%
   CO = .3
   O_2 = 17.0

3. Total Time Sampled	60
4. Barometric Pressure	29.96
5. Meter Pressure	30.029
6. Meter Temperature	99°F
7. Stack Pressure	29.900
8. Wet Bulb Temperature of Stack	156°F
9. Dry Bulb Temperature of Stack	210°F
10. Average Stack Temperature	201°F
11. Psychrometric % H_2O 29.0, Calculated % H_2O	30.69
12. Weight of Particulates in Wash ——, Weight in Cyclone .0350, Weight in Filters .0375, Weight in Impingers .0166, Total Weight	.0891
13. H_2O Condensed 400, H_2O Absorbed on Silica Gel, 16 Total Ml. H_2O	416
14. Volume of Dry Gas Sampled 46.69, Volume of Gas Sampled at Stack Conditions, Vols	80.00
15. Average Velocity at Stack Conditions, V_s	3756
16. Volumetric Flow Rate at Stack Conditions, Q_s	59,740
17. Process Input Weight Rate	19.2 Tons/hr.
18. Actual Output	8.81
19. Allowable Output	30.20 #/hr.

13

No. 3 Spray Dryer 9-28-74 No 2 Run

.45
.0342 "Hg

Comments	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O ΔP	Orifice ΔH in H_2O Desired 2.255	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp. °F	Stack Press. in. Hg	Stack Temp. °F
	0	076.895	—									
	3	079.30	.84	2.30	2.30	79°	80°	5.0		75°		198°
	6	081.60	.95	2.62	2.62	81°	80°	6.2		68°		198°
	9	084.10	1.0	2.71	2.71	85°	80°	7.1		70°		198°
	12	086.67	1.1	3.00	3.00	88°	81°	7.2		75°		195°
	15	089.28	1.0	2.71	2.71	91°	81°	7.1		80°		195°
	18	091.74	.92	2.52	2.52	92°	82°	7.0		85°		192°
	21	094.03	.80	2.20	2.20	93°	82°	6.2		83°		192°
	24	096.32	.81	2.25	2.25	93°	83°	6.2		78°		190°
	27	098.49	.66	1.85	1.85	93°	84°	6.0		75°		194°
	30	100.46	.58	1.62	1.62	92°	84°	5.5		75°		194°
	33	102.33	.79	1.95	1.95	90°	84	6.2		75°		195°
	36	104.44	.80	1.99	1.99	88°	84°	7.0		80°		190°
	39	106.63	.94	2.30	2.30	91°	84°	7.2		75°		192°
	42	108.92	.94	2.30	2.30	92°	84°	7.2		75°		196°
	45	111.28	.99	2.42	2.42	94°	85°	7.9		75°		195°
	48	113.62	.95	2.33	2.33	95°	86°	8.0		75°		196°
	51	115.92	.93	2.30	2.30	97°	86°	8.0		75°		196°
	54	118.25	.95	2.33	2.33	98°	87°	8.0		75°		196°
	57	120.48	.82	2.01	2.01	98°	88°	7.7		75°		196°
	60	122.39	.56	1.39	1.39	98°	88°	6.2		75		196°
	—	—										
		45.495		.1658		88°						192°

.261
.215
.043

avg $\sqrt{\Delta P}$
.92

14.14

GEORGIA DEPARTMENT OF NATURAL RESOURCES
VELOCITY AND SAMPLING TRAVERSE DATA

COMPANY: American Industrial Clay Co.

ADDRESS: Sandersville, Georgia

DATE: 9. 28. 74 STACK SAMPLED: Bl. 3 Lime Dryer RUN NO. 7

1. Size of Duct L _____ W _____ D 4.6

2. Orsat CO_2 = .9 %
   CO = .3 %
   O_2 = 17.0 %

Probe size used: Diam., in.			Area, ft.^{2}
1/8	= .125	=	.000085 ft.^{2}
1/4	= .250	=	.000341 ft.^{2}
3/8	= .375	=	.000767 ft.^{2}
1/2	= .500	=	.001363 ft.^{2}

3.	Total Time Sampled	60
4.	Barometric Pressure	29.64
5.	Meter Pressure	29.8059
6.	Meter Temperature	88 °F
7.	Stack Pressure	29.6742
8.	Wet Bulb Temperature of Stack	154 °F
9.	Dry Bulb Temperature of Stack	200 °F
10.	Average Stack Temperature	195 °F
11.	Psychrometric % H_2O 27.0, Calculated % H_2O	31.6929
12.	Weight of Particulates in Wash —, Weight in Cyclone .0407, Weight in Filters .0437, Weight in Impingers .0136, Total Weight	.0980
13.	H_2O Condensed .1034, H_2O Absorbed on Silica Gel, 26 Total Ml. H_2O	130 ml.
14.	Volume of Dry Gas Sampled 45.495, Volume of Gas Sampled at Stack Conditions, Vols	79.9517
15.	Average Velocity at Stack Conditions, V_s	59.292
16.	Volumetric Flow Rate at Stack Conditions, Q_s	3766
17.	Process Input Weight Rate	22.5 T/h
18.	Actual Output	9.6460
19.	Allowable Output	33.0

15

No. 3 Spray dryer 9-30-74 Run No. 5

Comments	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O ΔP	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum in. Hg Gauge	Box Temp. °F	Impinger Temp. °F	Stack Press. in. Hg	Stack Temp. °F
	0	122.75		2.29								
	3	124.[illegible]	.75	1.92	1.92	72°	79°	7.0		70°		190°
	6	126.10	.8[illegible]	[illegible]	[illegible]	83	77°	7.5		70		170
	9	129.46	.97	2.[illegible]	[illegible]	91	79	10.5		75		190
	12	131.51	.92	2.5[illegible]	[illegible]	93	80°	10.5		[illegible]		[illegible]
	15	134.24	1.0	[illegible]	3.0	99	81°	11.[illegible]		85		200
	18	136.70	[illegible]	2.[illegible]	2.[illegible]	100	82	10.0		85		200
	21	139.0[illegible]	.85	2.2	2.2	101	83	10.0		85		[illegible]
	[illegible]	141.30	.92	2.12	2.12	103	84	9.0		80		200
	27	143.52	.97	2.02	2.02	103	85	8.5		80		[illegible]
	30	145.[illegible]	.97	1.92	1.92	103	85	6.5		75		190
	33	[illegible]	.85	2.2	2.2	94	86	9.0		74		[illegible]
	[illegible]	150.08	1.0	2.6	2.6	100	87	9.0		70		[illegible]
	39	152.50	1.0	2.6	2.6	103	88	10.5		68		200
	42	155.02	.97	2.[illegible]2	2.[illegible]2	105	89	10.5		68		[illegible]
	45	157.46	.95	2.[illegible]	2.[illegible]	107	89	10.0		70		200
	[illegible]	1[illegible].89	.97	2.[illegible]	2.[illegible]	104	89	10.2		70		200
	51	162.30	1.0	2.6	2.6	108	89	[illegible].5		70		200
	[illegible]	164.77	.90	2.32	2.32	109	89	10.0		72		190
	[illegible]	167.03	.88	2.3	2.3	109	90	10.0		75		190
	[illegible]	169.12	.65	1.70	1.70	108	91	[illegible]		75		[illegible]
		1463.7	avg Vap	1.[illegible]		92°F						[illegible]
												111
			.9355									

.0434

.0033

H2O-37

SG-18

16

GEORGIA DEPARTMENT OF NATURAL RESOURCES
VELOCITY AND SAMPLING TRAVERSE DATA

COMPANY: American Industrial Clay Co.

ADDRESS: Sandersville, Georgia

DATE: 7-[illegible] STACK SAMPLED: [illegible] RUN NO. [illegible]

1. Size of Duct L _____ W _____ D 4'6"

Probe size used:

Diam., in.				Area, ft.^{2}
1/8	=	.125	=	.000085 ft.^{2}
1/4	=	.250	=	.000341 ft.^{2}
3/8	=	.375	=	.000767 ft.^{2}
1/2	=	.500	=	.001363 ft.^{2}

2. Orsat CO_2 = .9
   CO = .3
   O_2 = 17.0

3. Total Time Sampled 60
4. Barometric Pressure 29.70
5. Meter Pressure [illegible]
6. Meter Temperature 92 °F
7. Stack Pressure [illegible]
8. Wet Bulb Temperature of Stack 150 °F
9. Dry Bulb Temperature of Stack 200 °F
10. Average Stack Temperature 199 °F
11. Psychrometric % H_2O 27.0, Calculated % H_2O [illegible]
12. Weight of Particulates in Wash —, Weight in Cyclone .0038, Weight in Filters .0433, Weight in Impingers .0062, Total Weight .0533
13. H_2O Condensed .378, H_2O Absorbed on Silica Gel, 18 Total Ml. H_2O 396
14. Volume of Dry Gas Sampled 46.37, Volume of Gas Sampled at Stack Conditions, Vols 83.5611
15. Average Velocity at Stack Conditions, V_s 37.85
16. Volumetric Flow Rate at Stack Conditions, Q_s 55.358
17. Process Input Weight Rate 20.3 T/h
18. Actual Output 3.49 T/h
19. Allowable Output 30.[illegible] T/h

17