AP42 Section:	11.7
Reference:	26
Title:	Emission Test Report--Plant A, Spray Dryer, October 1994, Document No. 4602-01-02, Confidential Business Information Files, Contract No 68-D2-0159, Assignment No. 2-01, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 8, 1995.

AP-42 Section 8.7
Reference 26
Report Sect. 4
Reference 24

EMISSIONS TEST REPORT

SPRAY DRYER

OCTOBER 13, 1994

Prepared For:

Prepared By:

NOVEMBER 3, 1994

TABLE OF CONTENTS

I. SUMMARY

On October 13, 1994,
Inc, conducted emissions tests for annual compliance certification at . The source tested was the spray dryer venturi scrubber in the body preparation plant operating under

The tests were conducted by John Wallace and Joe Bouchard of :. with the assistance and cooperation of Douglas Bauman and other employees of

A summary of the particulate test results is shown in Table 1. The average particulate emission rate was 3.11 lb/hr at an average production rate of 15.28 tons/hr. The allowable emission rate per specific condition of the permit is 3.6 lb/hr. The visible emission test average opacity was zero percent.

All emission rates were determined according to the procedures prescribed by the
and the tested source was found to be in compliance with all applicable emission standards.

I hereby certify that these results are true and correct and were obtained by the procedures and methods described herein.

Respectfully Submitted;

Byron T. Burrows, E.I.
Environmental Specialist II

John R. Wallace
Senior Environmental Technician

TABLE 1

TEST SUMMATION

PLANT:

SOURCE: Body Prep Spray Dryer

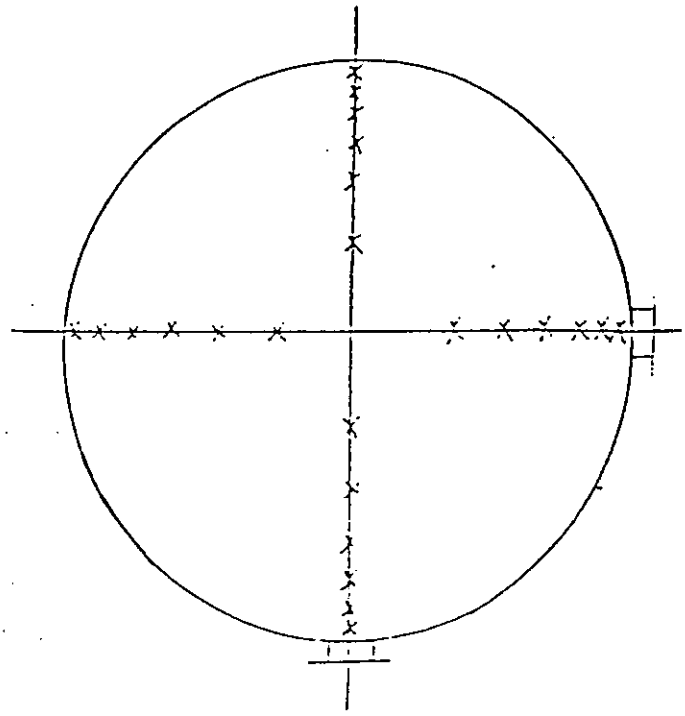
PARAMETER: Particulate

DATE: 10-13-94

RUN NO.	SAMPLE VOL. (DSCF)	FLOWRATE (ACFM)	FLOWRATE (DSCFM)	WATER CONTENT (%)	STACK TEMP. (deg F)	ISO KINETIC (%)	PARTICULATE EMISSIONS (gr/dscf)	PARTICULATE EMISSIONS (lb/hr)
1	38.433	24372	17211	18.70	148	103.3	0.0234	3.45
2	35.342	23631	15951	22.53	147	102.5	0.0265	3.62
3	36.080	23594	15886	23.77	146	105.1	0.0165	2.25
Average		23866	16349	21.67	147	103.6	0.0221	3.11

II. SOURCE DESCRIPTION

operates a ceramic body preparation plant containing a spray dryer with a venturi scrubber to control emissions. The emissions from the spray dryer are exhausted through a 41 inch diameter stack through the roof of the body preparation plant. The sampling port locations were 0.8 stack diameters upstream and approximately nine stack diameters downstream from disturbances in the exhaust flow. A diagram of the stack is shown in Figure 1.



41 inch Diameter Stack

Sampling Point	Distance From Stack Wall (Inches)
1	0.9 *
2	2.7
3	4.8
4	7.3
5	10.3
6	14.6
7	26.4
8	30.8
9	33.7
10	36.2
11	38.3
12	40.1 *

* Note: Points 1 & 12 Relocated to 1.0" From Stack Wall.

FIGURE 1

III. METHODS AND PROCEDURES

EPA Methods 1 and 2 were used to obtain the sampling port locations and determine stack velocity and volumetric flowrate respectively. Twenty-four points was determined as the proper number of sampling locations. Each point was sampled for 2.5 minutes, giving a total test time of 60 minutes per run. EPA Method 5 was followed for sampling and analysis of particulates.

The Method 5 sampling train was assembled as shown in Figure 2 for each particulate test. A five foot probe with a heated pyrex glass or stainless steel liner was used. The probe temperature was monitored continuously during the test runs. Stack temperature measurements were conducted at each point during the initial velocity traverse and during sampling.

The first and second impingers were each charged with 100 ml of distilled, deionized water; the third was dry; and the fourth was filled with known weight of indicator-grade silica gel. Crushed ice was placed around the impingers during sampling to maintain the temperature of the gas leaving the last impinger below 68°F.

A borosilicate glass fiber filter (maintained at a temperature between 225° and 275°F) was used for particulate matter collection. The filter temperature was monitored throughout the test.

Leak tests were performed before and after each sampling run by blocking the nozzle inlet. No leakage was observed at vacuum levels equal to or exceeding those experienced during the sampling run.

At the end of each run the volume of water collected in the first three impingers was measured and the silica gel in the fourth impinger was weighed to the nearest 0.5 gram to determine the volume of water collected. All impingers were then rinsed and charged for the next run.

The filter holder was removed and sealed for transport to the laboratory. The sample nozzle and probe liner were brushed and rinsed with acetone into a storage container. A new loaded filter holder was installed and the sampling train reassembled for the next run.

After returning to the laboratory, each filter and any loose particulate matter was removed to a clean dry petri dish for subsequent gravimetric analysis. The front half of the filter holder was brushed and rinsed into the appropriate probe wash container. The particulate filters for each run were oven dried for 2 hours at 105°C, desiccated for 24 hours and weighed to constant weight. The acetone wash volumes were measured and transferred to tared 400 ml beakers and evaporated to dryness at low heat and ambient pressure. The beakers were then cooled in a desiccator and weighed to a constant weight. A portion of the acetone used for component washing was analyzed by the same procedures to determine blank residue.

APPENDIX A

TEST DATA AND CALCULATIONS

SUMMARY OF TEST DATA

Plant:

Source: Body Prep Spray Dryer

Emission:Particulate

	RUN 1	RUN 2	RUN 3
Test Date:	10-13-94	10-13-94	10-13-94
Test Interval:	1136-1245	1338-1439	1528-1639
Test Time, min.:	60	60	60
Stack Area, sq. ft.:	9.164	9.164	9.164
Nozzle Diameter, in.:	0.246	0.246	0.246
Barometric Pressure, in. Hg.:	29.97	30.00	29.97
Absolute Stack Pressure, in. Hg.:	29.95	29.98	29.95
Volume Liquid Collected, ml.:	187.7	218.2	238.9
Stack Moisture (measured value), %	18.7	22.5	23.8
Stack Moisture (saturated value), %	23.9	23.2	22.8
Stack Gas Temperature, deg F:	148	147	146
Sample Volume, DSCF:	38.4332	35.3417	36.0796
Gas Velocity, FPS:	44.326	42.980	42.911
Gas Flowrate, ACFM:	24372	23631	23594
Gas Flowrate, DSCFM:	17211	15951	15886
Particulate Collected, mg:	0.058	0.061	0.039
Emission Rate, lb/hr:	3.45	3.62	2.25
Percent Isokinetic, %:	103.3	102.5	105.1

CALCULATIONS

PLANT:
SOURCE: Body Prep Spray Dryer
PARAMETER: Particulate
DATE: 10-13-94

RUN NO.	1		2		3	
Cp=	0.84		0.84		0.84	
Y=	1.012		0.968		1.012	
Dn=	0.246	inches	0.246	inches	0.246	inches
An=	3.301E-04	sq. ft.	3.301E-04	sq. ft.	3.301E-04	sq. ft.
Pb =	29.97	in Hg	30.00	in Hg	29.97	in Hg
Ps =	29.95	in Hg	29.98	in Hg	29.95	in Hg
As =	9.164	sq. ft.	9.164	sq. ft.	9.164	sq. ft.
Time=	60	min	60	min	60	min
Vm =	38.025	DCF	36.656	DCF	35.900	DCF
Vm(COR)=	38.025	DCF	36.656	DCF	35.900	DCF
dH=	1.44	in. H2O	1.23	in. H2O	1.26	in. H2O
Tm=	531	deg R	533	deg R	534	deg R
Ts=	608	deg R	607	deg R	606	deg R
Vlc=	187.7	ml.	218.2	ml.	238.9	ml.
SQRTdPavg=	0.7111		0.6852		0.6839	
Mn=	0.0583	mg	0.0606	mg	0.0386	mg
Vms=	38.4332	DSCF	35.3417	DSCF	36.0796	DSCF
Vw=	8.8407	SCF	10.2772	SCF	11.2522	SCF
Bws=	0.1870		0.2253		0.2377	
Bws(sat)=	0.24		0.23		0.23	
Md=	29	assumed	29	assumed	29	assumed
Ms=	26.9429		26.5219		26.4974	
Vs=	44.3264	FPS	42.9797	FPS	42.9108	FPS
Qs=	17211	DSCFM	15951	DSCFM	15886	DSCFM
Qa=	24372	ACFM	23631	ACFM	23594	ACFM
I=	103.3	%	102.5	%	105.1	%
Cs=	0.0234	gr/dscf	0.0265	gr/dscf	0.0165	gr/dscf
E=	3.453	lb/hr	3.617	lb/hr	2.248	lb/hr

Vms=17.64*Vm*Y*(Pb+dH/13.6)/Tm
Vw=.0471*Vlc
Bws=Vw/(Vw+Vms)
Md=0.44(%CO2)+0.32(%O2)+0.28(%CO+%N2)
Ms=Md(1-Bws)+18*Bws
Vs=85.49*Cp*SQRTdPavg*SQRT(Ts/Ps*Ms)
Qs=1058*(1-Bws)*Vs*As*(Ps/Ts)
Qa=60*As*Vs
I=100*Vm(std)*As/(Time*Qs*An)
Cs=15.43*Mn/Vms
E=Cs*Qs/116.67

SOURCE TESTING NOMENCLATURE AND DIMENSIONS

An:	Cross sectional area of nozzle, ft.^2
As:	Cross sectional area of stack, ft.^2
Bws:	Water vapor in the gas stream, proportional by volume
Ca:	Concentration of particulate matter in the stack gas at actual conditions, gr/acf
Cs:	Concentration of particulate matter in the stack gas at standard conditions, gr/dscf
Cs50:	Concentration corrected to 50% excess air
Cs12:	Concentration corrected to 12% carbon dioxide
C(X):	Concentration of X
Cp:	Pitot tube coefficient
Dn:	Diameter of nozzle, inches
E:	Source emission rate, lbs/hr
EA:	Excess air
Ef:	Ratio of pounds of particulate matter per unit of heat combustion (oxygen based), lb/MBTU
Fd:	Ratio of standard volume of gas produced per unit of heat combustion (oxygen based), dscf/MBTU
I:	Percent of isokinetic sampling
Md:	Molecular weight of stack gas, dry basis, lb/lb-mole
Ms:	Molecular weight of stack gas, wet basis, lb/lb-mole
Mn:	Total particulate collected, less acetone blank correction, grams
Pb:	Barometric pressure at test site, in. Hg
Ps:	Absolute stack gas pressure, in. Hg
Qa:	Volumetric flowrate, actual conditions, ACFM
Qs:	Volumetric flowrate, dry at standard conditions, DSCFM
R:	Beryllium emission rate, grams/day

SOURCE TESTING NOMENCLATURE AND DIMENSIONS

Time:	Duration of test, minutes
Tm:	Absolute average dry gas meter temperature, degrees R
Ts:	Absolute average stack gas temperature, degrees R
Vlc:	Total volume of liquid collected in impingers and silica gel, ml
Vm:	Volume of gas sampled under actual conditions, DCF
Vms:	Volume of gas sampled corrected to standard conditions, DSCF
Vs:	Stack gas velocity, ft/sec

FIELD DATA LOG

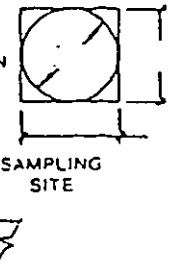
PLANT ___ SOURCE Spray Dryer

NOZZLE I.D. NO. 8A	
DIA 1	.246
DIA 2	.246
DIA 3	.245
AVERAGE	.246

RUN NO ONE
DATE 10-13-94
OPERATORS MA " to - hard
METER BOX NO ___
FILTER NO Isa

BAROMETRIC PRESSURE 29.97
STATIC PRESSURE -0.34
AMBIENT TEMPERATURE ~ 76°
PROBE LENGTH Pyrex 5' 12
PROBE LINER ___
PORT LENGTH ___
PORT DIAMETER 3"
METER SYSTEM LEAK-CHECK 0.00 @ 10"
ORSAT LEAK-CHECK ___
SAMPLE BAG LEAK-CHECK ___

SCHEMATIC OF STACK



FINAL VOLUME	581.525
INITIAL VOLUME	543.500
NET VOLUME	38.025

NOMOGRAPH VALUES			
ΔH@		C FACTOR	
Tm		AVG ΔP	
%H2O		T_s	
REFERENCE	2.82		

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	STACK TEMP (T_s) °F	VELOCITY HEAD (ΔPs)	VELOCITY HEAD ($\sqrt{\Delta Ps}$)	ORIFICE METER (ΔH)	GAS SAMPLE VOLUME (Vm) ft³	DRY GAS METER TEMP (Tm) °F	PROBE TEMP °F	SAMPLE BOX TEMP °F	TEMP OF GAS LEAVING LAST IMPINGER °F	PUMP VACUUM GAUGE in. Hg
	1136	0					543.500					
1-1		2.5	141	.34		.96	544.80	71	229	251	64	7.0
2		5	146	.32		.90	546.08	71	230	250	59	7.0
3		7.5	145	.38		1.07	547.65	71	234	249	55	8.5
4		10	144	.60		1.70	549.90	71	240	248	53	9.0
5		12.5	146	.38		1.07	551.30	71	258	244	53	9.0
6		15	147	.38		1.07	557.62	70	258	253	50	9.0
7		17.5	147	.42		1.18	554.06	71	253	254	50	10.0
8		20	150	.42		1.18	555.50	71	253	254	51	16.0
9		22.5	151	.60		1.70	557.21	71	245	252	51	12.0
10		25	151	.60		1.70	559.01	71	241	253	51	12.0
11		27.5	151	.62		1.75	660.62	72	241	253	52	13.0
12		30	151	.60		1.70	562.35	72	241	253	53	12.0
2-1		32.5	146	.35		.99	564.0	71	239	251	53	10.0
2		35	146	.42		1.18	565.48	71	241	250	51	10.0
3		37.5	144	.52		1.47	566.96	70	239	250	50	12.0
4		40	145	.57		1.61	568.64	70	245	252	50	13.0
5		42.5	147	.60		1.70	570.30	71	248	253	50	14.0
6		45	147	.60		1.70	572.00	71	239	247	52	14.0
7		47.5	147	.57		1.61	573.64	72	232	253	53	14.0
8		50	147	.57		1.61	575.30	72	232	248	54	14.0
9		52.5	147	.50		1.41	576.90	72	241	244	54	13.0
10		55	149	.50		1.41	578.51	72	238	247	54	13.0
11		57.5	150	.48		1.35	580.05	71	248	253	53	13.0
12	1245	60	150	.49		1.38	581.525	72	243	249	58 ~~59~~	13.0
TOTAL												
AVERAGE												

Lady to start testing @ 0945

STATIC PITOT LEAK-CHECK @ 15 sec	✓
IMPACT PITOT LEAK-CHECK @ 15 sec	✓
TRAIN LEAK RATE @ 60 sec 0.00 cf @ 17 in	

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHT (g) OR VOLUME (ml) 1	2	3	4
FINAL	272	104	0	264.2
INITIAL	100	100	0	252.5
LIQUID COLL.	172	4	0	11.7
TOTAL VOLUME		187.7		

GAS MEASUREMENTS					
	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

SIGNATURE John Wallace
TEST TEAM CHIEF

3-4

FIELD DATA LOG

PLANT _____ SOURCE Spray Dryer

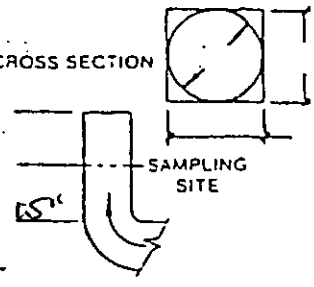
NOZZLE I.D. NO.	
DIA 1	
DIA 2	
DIA 3	
AVERAGE	.246

RUN NO Two
DATE 10-17-94
OPERATORS Walker / Bachand
METER BOX NO [redacted]-1
FILTER NO 139

NOMOGRAPH VALUES	
ΔH@ 1.822	C FACTOR
Tm	AVG ΔP
%H2O	Ts
REFERENCE 2.61	

BAROMETRIC PRESSURE 30.00
STATIC PRESSURE -0.29
AMBIENT TEMPERATURE ~80°
PROBE LENGTH 5'
PROBE LINER pyrex
PORT LENGTH -0-
PORT DIAMETER 3"
METER SYSTEM LEAK-CHECK 0.60 @ 15'
ORSAT LEAK-CHECK
SAMPLE BAG LEAK-CHECK

SCHEMATIC OF STACK



FINAL VOLUME	346.057
INITIAL VOLUME	309.401
NET VOLUME	36.656

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	STACK TEMP (T_s) °F	VELOCITY HEAD (ΔPs)	VELOCITY HEAD ($\sqrt{\Delta Ps}$)	ORIFICE METER (ΔH)	GAS SAMPLE VOLUME (Vm) ft³	DRY GAS METER TEMP (Tm) °F	PROBE TEMP °F	SAMPLE BOX TEMP °F	TEMP OF GAS LEAVING LAST IMPINGER °F	PUMP VACUUM GAUGE in. Hg
	1338	0					309.401					
1-1		2.5	141	.35		.91	310.75	71	229	256	58	9
2		5	142	.44		1.15	312.52	71	235	252	55	12
3		7.5	144	.44		1.15	313.82	71	234	258	44	12
4		10	144	.44		1.15	315.33	71	234	241	48	12
5		12.5	146	.48		1.25	316.90	71	236	239	50	12
6		15	147	.55		1.44	318.50	72	232	244	53	15
7		17.5	147	.52		1.36	320.08	72	236	242	56	15
8		20	147	.52		1.36	321.62	72	244	247	54	15
9		22.5	147	.48		1.25	323.31	72	246	248	58	13
10		25	148	.48		1.25	324.80	72	252	251	59	13
11		27.5	144	.52		1.36	326.35	72	254	250	59	15
12		30	148	.52		1.36	327.92	73	248	247	61	15
2-1		32.5	149	.37		.97	329.35	73	250	250	58	10
2		35	147	.40		1.04	330.85	73	253	256	60	11
3		37.5	146	.55		1.44	332.38	74	252	251	60	15
4		40	147	.52		1.36	333.94	74	249	254	59	15
5		42.5	148	.48		1.25	335.45	74	245	250	62	13
6		45	147	.48		1.25	336.97	74	245	251	62	13
7		47.5	147	.48		1.25	338.50	74	240	250	62	13
8		50	147	.44		1.15	339.98	74	240	250	63	12
9		52.5	148	.44		1.15	341.55	75	245	252	61	12
10		55	150	.44		1.15	343.08	75	245	250	59	12
11		57.5	150	.48		1.25	344.55	75	242	250	60	13
12	1439	60	150	.48		1.25	346.057	76	249	251	59	13
TOTAL												
AVERAGE												

STATIC PITOT LEAK-CHECK @ 15 sec	✓
IMPACT PITOT LEAK-CHECK @ 15 sec	✓
TRAIN LEAK RATE @ 60 sec	0.00 cf @ 17 in

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHT (g) OR VOLUME (ml) 1	2	3	4
FINAL	294	108	0	295.9
INITIAL	100	100	0	278.8
LIQUID COLL.	194	8	0	16.2
TOTAL VOLUME		218.2		

GAS MEASUREMENTS	TIME	CO₂	O₂	CO	N₂
1					
2					
3					
4					

SIGNATURE John Wallace
TEST TEAM CHIEF

FIELD DATA LOG

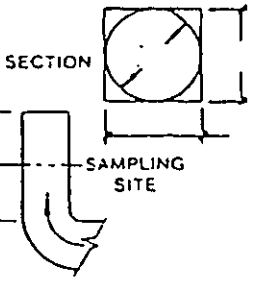
PLANT ___ SOURCE Spray Dryer

NOZZLE I.D. NO. ___
DIA 1
DIA 2
DIA 3
AVERAGE .246

RUN NO Three
DATE 10-13-94
OPERATORS Wallace / Coupland
METER BOX NO [redacted]-2
FILTER NO 140

BAROMETRIC PRESSURE 29.97
STATIC PRESSURE -0.30
AMBIENT TEMPERATURE ~80 °F
PROBE LENGTH 5'
PROBE LINER pyrex
PORT LENGTH 0
PORT DIAMETER 3"
METER SYSTEM LEAK-CHECK 0.00@15
ORSAT LEAK-CHECK ___
SAMPLE BAG LEAK-CHECK ___

SCHEMATIC OF STACK



FINAL VOLUME 617.900
INITIAL VOLUME 582.000
NET VOLUME 35.908

NOMOGRAPH VALUES	
ΔH@ ___	C FACTOR ___
Tm ___	AVG ΔP ___
%H2O ___	Ts ___
REFERENCE 2.68	

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	STACK TEMP (Ts) °F	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	ORIFICE METER (ΔH)	GAS SAMPLE VOLUME (Vm) ft³	DRY GAS METER TEMP (Tm) °F	PROBE TEMP °F	SAMPLE BOX TEMP °F	TEMP OF GAS LEAVING LAST IMPINGER °F	PUMP VACUUM GAUGE in. Hg
	1508	0					582.000					
* 1-1		2.5	131	.34		.91	583.30	71	232	252	54	10
2		5	144	.34		.91	584.51	71	239	256	55	10
3		7.5	144	.40		1.07	585.90	71	234	256	49	12
4		10	145	.48		1.29	587.40	71	252	256	44	14
5		12.5	145	.48		1.29	588.90	72	260	257	44	14
6		15	145	.48		1.29	590.40	72	262	256	45	14
7		17.5	146	.44		1.18	591.94	73	256	255	49	13
8		20	146	.50		1.34	593.51	73	241	254	50	14
9		22.5	148	.50		1.34	595.00	73	253	255	53	14
10		25	150	.50		1.34	596.55	73	265	254	53	14
11		27.5	150	.48		1.29	598.07	74	267	255	53	14
12		30	149	.48		1.29	599.59	74	262	256	53	14
2-1		32.5	149	.38		1.02	601.00	74	239	256	54	11
2		35	145	.48		1.29	602.50	74	252	255	52	14
3		37.5	144	.50		1.34	604.06	75	253	255	52	14
4		40	145	.50		1.34	605.60	75	255	254	52	14
5		42.5	146	.52		1.39	607.20	75	260	254	53	14
6		45	146	.52		1.39	608.76	76	245	256	54	14
7		47.5	145	.52		1.39	610.35	76	236	254	54	14
8		50	146	.48		1.29	611.90	76	253	254	54	14
9		52.5	146	.48		1.29	613.38	76	256	255	55	14
10		55	148	.48		1.29	614.90	77	259	255	55	14
11		57.5	149	.50		1.34	616.38	77	260	256	55	14
12	1639	60	149	.48		1.29	617.900	77	259	254	55	14
TOTAL												
AVERAGE												

STATIC PITOT LEAK-CHECK @ 15 sec ✓
IMPACT PITOT LEAK-CHECK @ 15 sec ✓
TRAIN LEAK RATE @ 60 sec 0.00 cf @ 18 in

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHT (g) OR VOLUME (ml) 1	2	3	4
FINAL	204	116	0	313.5
INITIAL	100	100	8	294.6
LIQUID COLL.	204	16	0	18.9
TOTAL VOLUME		238.9		

GAS MEASUREMENTS				
TIME	CO2	O2	CO	N2
1				
2				
3				
4				

* Stopped so visible emissions observer could relocate: 1330-1340

SIGNATURE John Wallace
TEST TEAM CHIEF

LABORATORY ANALYSIS

Client _____ Source Body Prep Spray Dryer Date 10/13/94

FILTER	Run 1	Run 2	Run 3	Blank
I.D. No.	138	139	140	157
Gross Weight, g	.3674	.3663	.3673	.3399
Gross Weight, g	.3671	.3661	.3673	.3399
Average Weight, g	.3673	.3662	.3673	.3399
Tare Weight, g	.3379	.3364	.3374	.3398
Net Weight, g	.0294	.0298	.0299	.0001

ACETONE RINSE	Run 1	Run 2	Run 3	Blank
I.D. No.	412	413	414	162
Volume, ml	145	170	185	100
Gross Weight, g	172.3582	164.0261	122.4261	68.6973
Gross Weight, g	172.3584	164.0258	122.4259	68.6974
Average Gross, g	172.3583	164.0260	122.4260	68.6974
Tare Weight, g	172.3288	163.9945	122.4166	68.6970
Acetone Residue, g	.0006	.0007	.0007	
Net Weight, g	.0289	.0308	.0087	.0004

TOTAL PARTICULATE, g	.0583	.0606	.0386	

Acetone Rinse Blank Residue=(blank weight)(rinse volume)/(blank volume)

Maximum Allowable Residue=(0.00001 of acetone weight)(0.7857 g/ml)

Each component was weighed to a constant weight, meaning a difference of no more than 0.5 mg or 1 percent of total weight less tare weight, whichever is greater, between two consecutive weighings, with no less than 6 hours of dessication time between weighings.

Comments:

Laboratory Analyst John Wallace

APPENDIX B

VISIBLE EMISSION TEST REPORT

EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number	9	4	0	0	5	Page 1	Of 2
Continued on VEO Form Number						9	4	0	B	5

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name

Facility Name

Street

City

over point ID 7

Process: Body Prep / Spray Dryer Scrubber | Unit #: 19 | Operating Mode: Slip drying (see attached)

Control Equipment: Source being tested is control eqp. | Operating Mode: N/A

Describe Emission Point: Stack 3.5 ft diameter, extending 3.5 ft above body prep bldg. roof, only one w/water vapor

Height of Emiss. Pt. — Start 100 ft End 100 ft | Height of Emiss. Pt. Rel. to Observer — Start 20 ft. End 20 ft.

Distance to Emiss. Pt. — Start 149 ft End 149 ft | Direction to Emiss. Pt. (Degrees) — Start N80°E End N80°E

Vertical Angle to Obs. Pt. — Start 16° End 16° | Direction to Obs. Pt. (Degrees) — Start N83°E End N80°E

Distance and Direction to Observation Point from Emission Point — Start 20 ft up and 8 ft SE End 20 ft up

Describe Emissions: Start water vapor; no other emissions visible | End water vapor; no other emiss. visible

Emission Color: Start white End white | Water Droplet Plume: Attached ☒ Detached ☐ None ☐

Describe Plume Background: Start Clouds End Clouds broken

Background Color: Start grey/wht End grey/wht/blu | Sky Conditions (cloud cover): Start ~80% End 25-35%

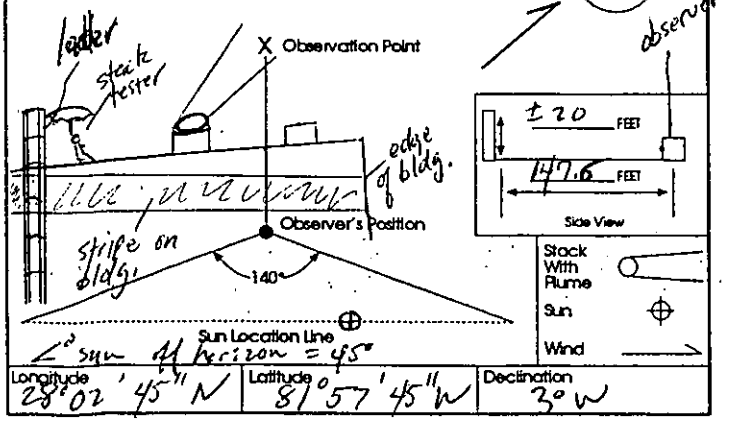
Wind Speed: Start 1-3 mph End 1 mph | Wind Direction from: Start NW End W

Ambient Temp.: Start 81°F End 82°F | Wet Bulb Temp.: 74°F | RH Percent: 76%

Time 3:40 PM

Source Layout Sketch

Draw North Arrow ☐TN ☒MN



∠ sun to horizon = 45°

Longitude 28°02'45" N | Latitude 81°57'45" W | Declination 3° W

Additional Information: Observing from top of Silo 9. No objectionable odors. Method 5 stack test coinciding. See attached sheet for prill production rate.

Observation Date	Time Zone	Start Time	End Time
10/13/94	East, Stnd.	3:40 PM	4:40 PM

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	~80% wht/grey
2	0	0	0	0	cloud cover
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	~50% wht/grey
10	0	0	0	0	cloud cover
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	windows of blue sky
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	Stack tester moving to perpendicular port
30	0	0	0	0	

Observer's Name (Print): Douglas Bauman

Observer's Signature: Douglas Bauman | Date 10/13/94

Date 8/24/94

VEOF1.1

EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number	9	4	0	8	5	Page 2	of 2
Continued on VEO Form Number N/A							

Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

Company Name: See sheet 1 of 2

Facility Name:

Street Address:

City | State | Zip

Process: See sheet 1 of 2 | Unit # | Operating Mode

Control Equipment | Operating Mode

Describe Emission Point: See sheet 1 of 2

Height of Emiss. Pt. Start | End | Height of Emiss. Pt. Rel. to Observer Start | End

Distance to Emiss. Pt. Start | End | Direction to Emiss. Pt. (Degrees) Start | End

Vertical Angle to Obs. Pt. Start 16° End 16° | Direction to Obs. Pt. (Degrees) Start N 80°E End N 80°E

Distance and Direction to Observation Point from Emission Point Start 20 ft. up End 20 ft. up

Describe Emissions Start See sheet 1 of 2 End

Emission Color Start End | Water Droplet Plume Attached ☐ Detached ☐ None ☐

Describe Plume Background Start Broken Clouds & Sky End Broken Clouds & Sky

Background Color Start wht/grey/blue End wht/grey/blue | Sky Conditions (cloud cover) Start 25-30% End 55%

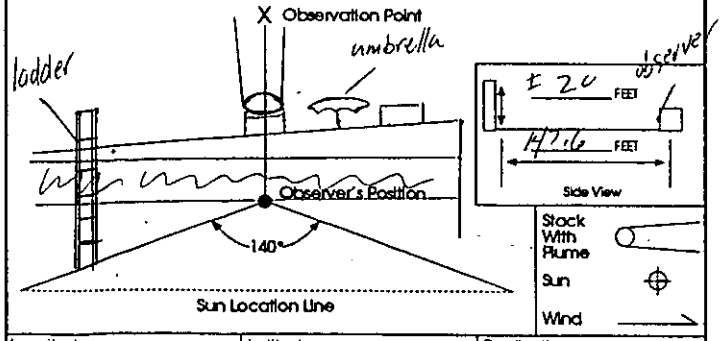
Wind Speed Start 1 mph End 1 mph | Wind Direction from Start W End W

Ambient Temp. Start same End as | Wet Bulb Temp. Start sheet 1 of 2 | RH Percent

Time 4:40 PM

Source Layout Sketch

Draw North Arrow ☐TN ☒MN



Longitude 28°02' 45" N | Latitude 81° 57' 45" W | Declination 3° W

Additional Information: Started on Form # 94005. No objectionable odors. & See attached for process rates.

Observation Date	Time Zone	Start Time	End Time
		3:40 PM	4:40 PM

Sec / Min	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	~ 1 mph wind out of North
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	~ 40% wht/grey cloud cover
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	85% wht/gry. cloud cover
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	Method 5 run complet.
30	0	0	0	0	

Observer's Name (Print): Douglas Bauman

Observer's Signature: Doug Bau | Date 10/13/94

Organization:

Date

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Doug Baumgardner

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by

This certificate is valid for six months from date of issue.

Thomas Rose
President

244557
Certificate Number

Vice President

David B. Savage, Jr.
Program Manager

August 24, 1994
Date of Issue

LITHO IN U.S.A.

VISIBLE EMISSIONS EVALUATION

This is to certify that

Doug Bauman

did complete a course in the methods of determining opacity of visible emissions from sources as specified by Federal Reference Method 9 conducted by

William H. Clarke
Course Moderator

Location

August 23, 1994
Date

LITHO IN U.S.A.

APPENDIX C

PROCESS WEIGHT STATEMENT

October 31,1994

RE: Prill Production Rate and VE Test During Stack Testing of The Body Prep. Spray Dryer Scrubber on October 13,1994

Mr. Wallace:

During the stack testing referenced above Prill production from the Slip Spray Dryer was measured to be 15.28 tons/hr. Attached is the original one hour VE test report (3 pages including the data collection sheet) and copies of my VE certification. If you have any questions, please contact me at x545.

Sincerely,

Douglas W. Bauman
Corporate Environmental Engineer

[redacted]

APPENDIX D

CALIBRATION DATA

SUMMARY OF EQUIPMENT CALIBRATION

Equipment	Calib. Date	Place	Method	Results
Nozzle #8A	10/13/94	On-Site	3 measurements w/vernier caliper	Dn=0.246
Pitot Tube P-1	03/25/94		EPA Method	Cp=0.84
Pitot Tube P-3	03/25/94		EPA Method	Cp=0.84
Console [redacted]	01/17/94		Wet Test Meter	Y=1.012 H@=1.929
Post-Test Check	10/31/94			Y=0.996
Thermocouples (Console [redacted])	03/18/94		Comparison to ASTM Thermometer	Diff.<±1% ±1%

TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? X yes _____ no

Pitot tube openings damaged? _____ yes (explain below) X no

P_A .529 cm (in.) P_B .519 cm (in.)

D_t = .375 cm (in.) $A = P_A + P_B$ = 1.048 cm (in.)

α_1 = 10 ° (<10°), α_2 = 0 ° (<10°), β_1 = 0.5 ° (<5°),

β_2 = ~~4.5~~ ° (<5°)

γ = 2 °, θ = 1 °

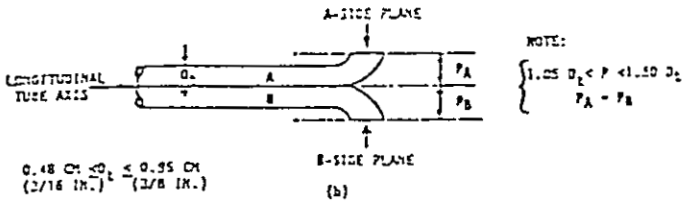
$z = A \sin \gamma$ = 0.0365 cm (in.); <0.32 cm (<1/8 in.),

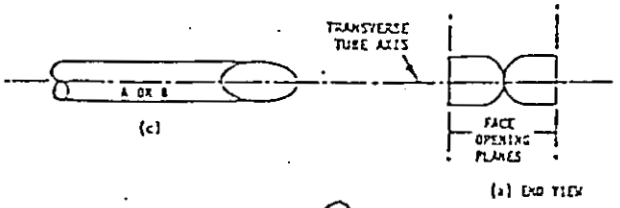
$w = A \sin \theta$ = 0.0183 cm (in.); <.08 cm (<1/32 in.)

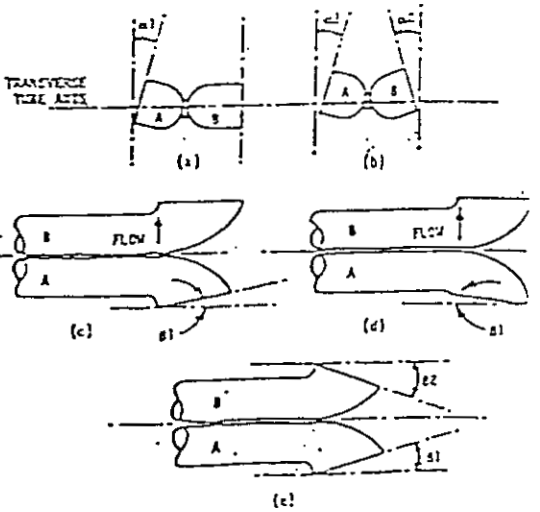
Comments: Meets Specifications

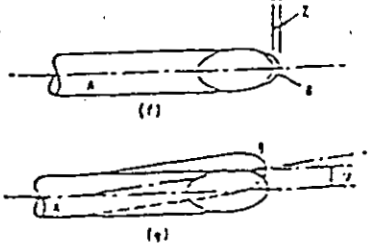
C_p = 0.84

Calibration required? _____ yes X no









Pitot tube I.D. Number: P-1

Inspection Date: 3/25/94

Inspected By: John Wallace

TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? X yes _____ no

Pitot tube openings damaged? _____ yes (explain below) X no

P_A .560 cm (in.) P_B .485 cm (in.)

D_t = .376 cm (in.) $A = P_A + P_B$ = 1.045 cm (in.)

α_1 = 1 ° (<10°), α_2 = 1 ° (<10°), β_1 = 2 ° (<5°),

β_2 = 2 ° (<5°)

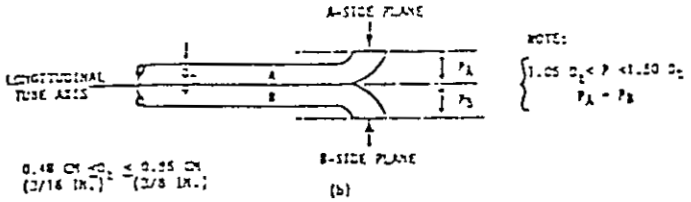
γ = 1 °, θ = 2 °

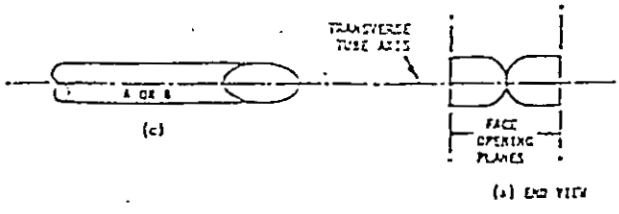
$z = A \sin \gamma$ = .0182 cm (in.); <0.32 cm (<1/8 in.)

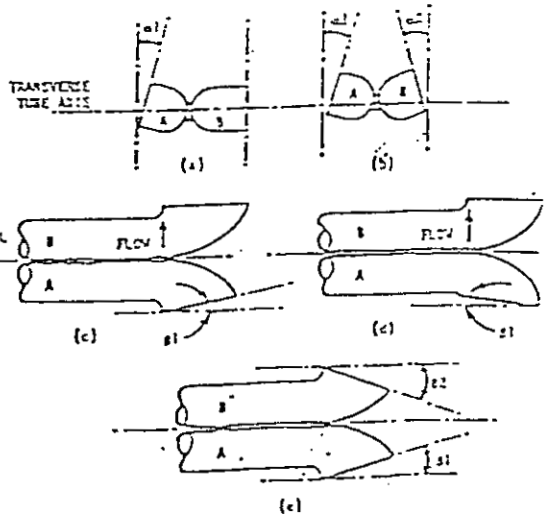
$w = A \sin \theta$ = .0365 cm (in.); <.08 cm (<1/32 in.)

Comments: Meets Spec, $C_p = 0.84$

Calibration required? _____ yes X no



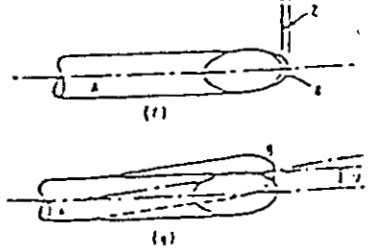




Pitot tube I.D. Number: P-3

Inspection Date: 3/25/94

Inspected By: H. Johnson



DGM Calibration

Technician: HARRY JOHNSON DATE:1/17/94

Control Box No.: SDGM:6835447

Barometer ("Hg): 29.990 Ys: 0.9980

^Hd ("H2O) [dHd]	Net SDGM Volume (ft3) [Vs]	Net DGM Volume (ft3) [Vd]	SDGM Temp (F) [ts]	DGM In (F)	DGM Out (F)	DGM Avg. (F) [td]	Time (min)	Vacuum Setting ("Hg)	Y	dHa ("H2O)
0.50	5.706	5.634	67.0	67	67	67.0	15	3	1.010	1.9247
1.00	8.115	8.000	68.0	68	70	69.0	15	3	1.012	1.9068
1.50	10.591	10.424	68.0	72	76	74.0	16	3	1.022	1.8962
2.00	12.896	12.829	68.0	73	77	75.0	17	3	1.012	1.9215
2.50	12.596	12.555	68.0	74	78	76.0	15	3	1.010	1.9564
3.00	13.765	13.714	68.0	74	78	76.0	15	3	1.009	1.9658
									1.012	1.929

dHd RANGE	CRITERIA
0.069	<0.15"H20

Thermocouple Check

75 F = 535 R

ASTM: 68 F = 528 R

DIFFERENCE % : 0.09

Calibration Performed By

HARRY JOHNSON

Y=[Vs*Ys*Pbar*(td+460)]/[Vd*(Pbar+(dHd/13.6))*(ts+460)]

dHa=[Pb(0.0317*dH/(td+460)[(tw*460)*Time/Vw]^2

SDGM= Standard Dry Gas Meter

Recheck of Orifice and DGM Calibration

Technician: Joseph Bouchard

Date: 10-31-94

Control Box No.:

SDGM: 30598

Barometer ("Hg): 30.070

Ys: 0.9990

Plant:

^Hd ("H2O) [dHd]	Net SDGM Volume (ft3) [Vs]	Net DGM Volume (ft3) [Vd]	SDGM Temp (F) [ts]	DGM In (F)	DGM Out (F)	DGM Avg. (F) [td]	Time (min)	Vacuum Setting ("Hg)
2.00	10.920	10.900	76.0	75	75	75.0	15	7
2.00	10.890	10.900	75.0	78	76	77.0	15	7
2.00	10.990	11.000	76.0	80	77	78.5	15	7

Y(1)=	0.994
Y(2)=	0.997
Y(3)=	0.998
Y(avg)=	0.996
Prior Y =	1.012
Diff.=	1.6%

Thermocouple Check

75 F = 535 R

ASTM: 79.5 F = 539. R

DIFFERENCE: 0.02

Calibration Performed By

Joseph Bouchard

Y=[Vs*Ys*Pbar*(td+460)]/[Vd*(Pbar+(dHd/13.6))*(ts+460)]

SDGM= Standard Dry Gas Meter

PYROMETER/THERMOMETER CALIBRATION

IDENTIFICATION	DATE	REFERENCE TEMP. °F(ASTM-Hg)	INDICATION TEMP.°F	REFERENCE MEDIUM	CORRECTION
1	3/18/94	538°	539°	Ambient	0.19%
		502°	499°	Ice Water	0.60%
		674°	674°	Boiling Water	0%
		840°	842°	Hot Oil	0.24%
	3/18/94	538°	537°	Ambient	0.19%
		502°	500°	Ice Water	0.40%
		674°	673°	Boiling Water	0.15%
		840°	842°	Hot Oil	0.24%
3	3/18/94	538°	539°	Ambient	0.19%
		502°	502°	Ice Water	0%
		674°	674°	Boiling Water	0%
		840°	843°	Hot Oil	0.35%
Fluke	3/18/94	538°	539°	Ambient	0.19%
		502°	499.2	Ice Water	0.56%
		674°	675°	Boiling Water	0.15%
		850°	849°	Hot Oil	0.12%
UGM Dial	3/18/94	538°	536°	Ambient	0.37%

APPENDIX E

CHAIN OF CUSTODY

SAMPLE CHAIN OF CUSTODY

	RECOVERED BY:	DATE:	TIME:	PLACE OF RECOVERY:
FILTER 138 Run 1	Joseph Bouchard	10-13	1250	Field
ACETONE RINSE	Joseph Bouchard	10-13	1250	FIELD
FILTER 139 Run 2	Joseph Bouchard	10-13	1440	FIELD
ACETONE RINSE	Joseph Bouchard	10-13	1440	FIELD
FILTER 140 Run 3	Joseph Bouchard	10-13	1640	FIELD
ACETONE RINSE	Joseph Bouchard	10-13	1640	FIELD
FILTER 159 Blank	Joseph Bouchard	10-13	1640	FIELD
ACETONE RINSE	Joseph Bouchard	10-13	1640	FIELD
FILTER				
ACETONE RINSE				
FILTER				
ACETONE RINSE				
FILTER				
ACETONE RINSE				
FILTER				
ACETONE RINSE				
FILTER				
ACETONE RINSE				

TRANSFERRED TO Joseph Bouchard FOR LABORATORY ANALYSIS

APPENDIX F

OPERATING PERMIT

APPLICANT:

PERMIT/CERTIFICATION

Expiration Date: 03/16/95
Project: Body Preparation Plant

This permit is issued under the provisions of Chapter 403, , and Code Rules 17-2 & 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the approved drawings(s), plans, and other documents, attached hereto or on file with the department and made a part hereof and specifically described as follows:

For the operation of a 7.7 TPH ceramic body preparation plant consisting of raw material storage (6 storage silos for clay, talc, silica, calcium metasilicate, and whiting, with emissions controlled by a baghouse on each silo); 2 ball mills; 4 SLIP (liquefied ceramic body mix) vessels; 2 header tanks; 3 SLIP pump tanks; 1 spray dryer controlled by a multiclone and a venturi scrubber; 6 prill storage tanks; 2 blungers along with a rework SLIP storage tank to reclaim scrap; associated pneumatic or belt conveyor systems; a central vacuum system containing a baghouse with 51 square feet of filter (air discharge of baghouse is within the body prep building); a material handling dust ventilation baghouse with 3;296 square feet of filter; and other associated equipment. The equipment, with the exception of the raw material storage silos, is located within the body prep building with ceiling exhaust fans and open doorways. The emissions from the spray dryer stack and the materials handling dust ventilation baghouse exhaust outside of the body prep building.

Location:

UTM: 17-405.2 E 3102.4 N NEDS No.: 0009

Point ID: 19-spray dryer
22-material handling system
23-central vacuum system
24-(6) raw material storage silos

PERMITTEE:

PERMIT NO.: [redacted]
PROJECT: Body Prep. Plant

SPECIFIC CONDITIONS:

1. A part of this permit is the attached 15 General Conditions.

2. Prill production by the body preparation plant shall not exceed 7.7 TPH.

3. As requested by the permittee, the maximum particulate emissions from the spray dryer venturi scrubber shall not exceed 3.6 lbs/hr (10.5 TPY) and 20% opacity. This source shall be tested for particulates and opacity at intervals of 12 months from the date November 14, 1989. Submit the test data to the Air Section of the Southwest District Office within 45 days of such testing (Subsection 17-2.700(2), Florida Administrative Code). The pressure drop across the scrubber shall be at least 7 inches of water, gauge.

4. As requested by the permittee, the maximum particulate emissions from the material handling dust ventilation baghouse shall not exceed 1.7 lbs/hr (5.0 TPY) and the maximum particulate emissions from the central vacuum system baghouse shall not exceed 0.04 lbs/hr (0.10 TPY). Because of the expense and complexity of conducting a stack test on minor sources of particulate matter, the Department waives the requirement for a stack test. The alternative standard set forth by this provision establishes a visible emission limitation not to exceed an opacity of 5%. Test these sources for opacity at intervals of 12 months from the date November 14, 1989. Submit the test data to the Air Section of the [redacted] District Office within 45 days of such testing (Subsection 17-2.700(2),

5. There shall be no visible emissions (5% opacity) from the raw material storage silos. A visible emissions test shall be performed annually on the talc silo during loading. Submit the test data to the Air Section of the [redacted] within 45 days of such testing

PERMITTEE:

PERMIT NO.:
PROJECT: Body Prep. Plant

SPECIFIC CONDITIONS (cont'd):

6. Compliance with the emission limitations of Specific Conditions Nos. 3, 4, and 5 shall be determined using EPA Methods 1, 2, 4, 5, and 9 contained in 40 CFR 60, Appendix A and adopted by reference in Section 17-2.700, F.A.C. The minimum requirements for stack sampling facilities, source sampling and reporting, shall be in accordance with Section 17-2.700, F.A.C. and 40 CFR 60, Appendix A.

7. Testing of emissions must be accomplished at the permitted plant capacity. Failure to submit the input rates or operation at conditions which do not reflect normal operating conditions may invalidate the data (Subsection 403.161(1)(c),

8. All reasonable precautions shall be taken to minimize the generation of unconfined emission of particulate matter in accordance with the provisions in F.A.C. Rule 17-2.610(3). These provisions are applicable to any source including, but not limited to, vehicular movement, transportation of materials, construction, demolition or wrecking, or industrial related activities such as loading, unloading, storing, handling, and processing of materials. Reasonable precautions shall include, but are not limited to, a building enclosure for the process equipment. To ensure that the precaution taken is adequate, no visible emissions (5% opacity) are allowed from the building.

9. As stated in the permit application, only natural gas fuel shall be used in the hot air generator. Maximum allowable heat input is 19.9 MMBtu/hr. Approximately 20,000 CFH of natural gas will produce the maximum allowable heat input.

10. The body preparation plant shall not operate more than 5880 hrs/yr.

11. The permittee shall maintain a log of this operation that will allow the Department to determine compliance with Specific Conditions Nos. 2, 9, and 10.

12. Pursuant to Rule 17-2.620(2), the permittee shall not allow the discharge of air pollutants which cause or contribute to an objectionable odor.

PERMITTEE: [redacted]

PERMIT NO.: ---
PROJECT: Body Prep. Plant

-- SPECIFIC CONDITIONS (cont'd):

13. The Office of the Department of Environmental Regulation shall be notified in writing 15 days prior to compliance testing.

14. Submit for this source, each calendar year, on or before March 1, an emission report for the preceding calendar year containing the following information:

(A) Annual amount of materials and/or fuels utilized.
(B) Annual emissions (note calculation basis).
(C) Any changes in the information contained in the permit application.

This report shall be submitted to the Air Section of the District of the Department of Environmental Regulation.

15. An application to renew this operating permit shall be submitted to the Department sixty (60) days prior to expiration date of this permit.

Issued this 14 day of March 1990.

Richard D. Garrity, Ph.D.
Deputy Assistant Secretary

GENERAL CONDITIONS

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and are binding and enforceable pursuant to the authority of Section 403.141, 403.727, or 403.859 through 403.861, ____ es. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the department.

3. As provided in Subsections 403.087(6) and 403.712(5), Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal or plant life or property caused by the construction or operation of this permitted source or from penalties therefore, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by any order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credential or other documents as maybe required by law and at reasonable times, access to the premises, where the permitted activity is located or conducted:

GENERAL CONDITIONS (con't):

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:
( ) Determination of Best Available Control Technology (BACT)

( ) Determination of Prevention of Significant Deterioration (PSD)

( ) Certification of Compliance with State Water Quality Standards (Section 401. PL 92-500)

( ) Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enfocement actions, the retention period for all records will be extended automatically, unless otherwise stipulated by the Department.

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

-the date, exact place, and time of sampling or measurement;
-the person responsible for performing the sampling or measurements;
-the date(s) analyses were performed;
-the person responsible for performing the analyses;
-the analytical techniques or methods used; and
-the results of such analyses.

15. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.