PARTICULATE EMISSIONS FROM MONTANA TALC COMPANY SAPPINGTON, MONTANA DECEMBER, 1986

STUDY CONDUCTED BY

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TEST DATES

11/5/86

11/6/86

1361

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1) Introduction

The Montana Talc Company (MTC) has constructed a talc plant at Sappington Junction, near Three Forks, Montana. Particulate emissions from this plant are required to meet the emission standard of 0.05 grams per dry standard cubic meter, adopted by the Montana State Air Quality Bureau (AQB). Drs. R. James, and K. Ganesan were employed as consultants to perform stack tests on two stacks in the plant to determine particulate emissions.

This report contains the results of the tests conducted 11/5/86, and 11/6/86, a process description, and all pertinent data.

2) Summary of Results

Particulate emission tests were performed on two stacks; an impact mill baghouse stack, and the pelletizing system baghouse stack. The sampling followed EPA reference method 5 except as noted under the section on test limitations. The tests were performed while the plant was operating under normal conditions. The particulate emissions from both tests were representative of normal emissions from the plant and much lower than the standard of 0.05 grams/dscm. The Summary of Results is presented in Table 1.

TABLE 1

PARTICULATE SAMPLING RESULTS FROM

MONTANA TALC COMPANY

SAPPINGTON JUNCTION, MONTANA

	DESCRIPTION	IMPACT MILL	PELLETIZER
1)	Stack Diameter (inches)	24	29.25
2)	Average Stack Velocity (ft/sec)	40.85	63.67
3)	Static Stack Pressure, (inches water)	+0.25	-5.75
4)	Barometric Pressure (in Hg)	25.36	25.36
5)	Average Stack Temperature (F)	132	84.6
6)	Stack Flow Rate (ACFM)	7696 6890	17816 17326
7)	Volume Sampled (DSCF)	34.52	19.37
8)	Sampling Duration (min)	60	72
9)	Sampling Rate (dscf/min)	0.5322	0.255
10)	Number of Traverse Points	20	24
11)	Wt of Particulates Collected (gms)	0.0123	0.0081
12)	Test Particulate Conc (gms/dscm)	0.0126	0.0155
	(Standard)	(0.05)	(0.05)
13)	Stack Moisture (%)	0.0094	0.0649
14)	Percent Isokinetic	91.9	103.8
15)	Test Date	11/5/86	11/6/86

3) Process Description

The raw talc is delivered to the plant by truck, where it is purified by hand sorting. The talc is reduced to the desired size in two separate impact mills. The talc from the impact mills is collected in baghouses and stored in bins until packaged for shipment. Some of the talc is pelletized for shipment in a pelletizing circuit.

On 11/5/86, when the emissions test was conducted on one of the impact mill circuits, the mill was producing approximately 3 tons per hour of minus 2 micron talc. On 11/6/86, during testing, the pelletizing system was producing approximately 7.75 tons per hour of pelletized product from the minus 2 micron talc produced 11/5/86.

4) Stack Testing and Methodology

4.1) Stack Particulars and Number of Traverse Points

The emissions from the impact mill circuit baghouse are vented through a 24 inch diameter circular duct. The duct makes a 90 degree turn as it exits the baghouse and passes horizontally to the outside of the building where it discharges to the atmosphere. The particulate emissions were measured through a single port located 10 feet downstream from the 90 degree elbow and 5 feet upstream from the duct discharge. This location is 5 duct diameters downstream and 2.5 duct diameters upstream from any flow disturbances. Based on the measurements and the EPA Reference Method 1, 20 traverse points were selected. Because the duct was horizontal, it was not physically practical to sample through two ports at 90 degrees to each other.

The only practical location to sample the emissions from the pelletizer circuit was the 29.25 inch circular duct on the suction side of the blower. The sample location was 1.5 duct diameters upstream from a flow disturbance so the EPA reference method dictated that 24 traverse points were used. The physical location of the duct, blower, and structural components of the building made it impractical to sample from two ports at right angles to each other.

At both sampling locations physical constraints made it impractical to sample from two ports at right angles to each other. However a person familiar with fluid flow will understand that the large number of traverse points used will adequately represent the dust loadings and flows in the system.

4.2) Description of the Sampling Train

The stack sampling equipment used was a Lear Siegler Model PM100. This sampling train consists of a sampling probe-pitot tube assembly, and impinger box, and a meter console. The sampling probe is a three foot long heated glass probe protected by a steel outer probe. A calibrated S type pitot tube was attached in place as per EPA specifications to measure the velocity pressure. A thermocouple also was attached to the probe to monitor the stack temperature.

The front portion of the sample box is a heated filter box, which accommodates a 4 inch diameter glass fiber filter and a cyclone precollector. The rear box is an ice box where the impingers are kept in ice to collect moisture. An umbilical cord connects the sample box to the meter console.

The meter console consists of a leak free pump to pull the sample gas from the stack. The delivery of this pump is connected to a dry gas meter and the flow is measured through an orifice meter connected to an inclined manometer. The second inclined manometer in the meter console is connected to the pitot tube.

4.3) Particulate Sampling

4.3.1) Filter Preparation

Nine Whatman 10 cm filters were desiccated for 24 hours then weighed, to the nearest 0.0001 gram, every six hours until the readings were within 0.0005 grams. Six of the filters were used for sampling, one of the filters was used as a control, and two filters were extras in case a sample filter was damaged. For each test four filter holders were prepared in the lab, and carried to the field where three were used for sampling.

4.3.2) Impinger Train Preparation

Four impingers were connected in series to trap moisture. Adequate ice was used to keep the temperature below 50 degrees F. The impinger train consisted of:

Impinger I - modified Greenburg Smith - 200 ml distilled water

Impinger II - Greenburg Smith - 200 ml distilled water

Impinger III - modified Greenburg Smith - dry

Impinger IV - modified Greenburg Smith - 200 ml silica gel

4.3.3) Leak Test

A leak test, as specified in the EPA reference method for glass probes with string packing, was performed before and after each sampling run. The presampling leak test is optional but was conducted before each run to make sure the train was leak free before drawing the

samples. One of the six presampling leak checks indicated a leak and the probe connections were repaired before sampling. All of the mandatory postsampling leak tests were below the 0.02 cubic feet per minute specified in the EPA reference method.

4.4) Particulate Sampling in the Field

The impact mill operated steadily under normal operation, during the emission testing, except for a short period at the end of sampling run 3 when full storage bins caused a temporary shutdown. Emissions sampling was suspended during the plant shutdown and not resumed until the mill was back to normal operation.

The pelletizing circuit operations were not as steady as the impact mill operations but fluctuated due to plugging that occurred in the circuit. The plant operators told the testers that these fluctuations were part of the normal operation of the pelletizer circuit.

Prior to sampling each stack a velocity run was made to determine the nozzle size necessary for isokinetic sampling. A 0.25 inch diameter nozzle was used for sampling the impact mill emissions and a 0.125 inch diameter nozzle was used to measure the pelletizer circuit emissions. The smaller nozzle was used for the pelletizer circuit because the velocity in the pelletizer stack was approximately 50 % higher than the velocity in the impact mill stack.

After sampling, the filters used for sampling were saved in the filter holders by plugging both ends of the filter holders with parafilm and transporting them back to the laboratory for analysis. Acetone was used to recover the particulates collected in the front half of the sampling train including the nozzle, glass probe, cyclone,

and connectors. The acetone was stored in glass bottles that were transported to the laboratory. The acetone was evaporated under the hood in clean preweighed beakers. A sample volume of blank acetone was evaporated as a control. The beakers, after complete evaporation, were desiccated for 24 hours before their final weights were recorded.

5) Test Limitations

The primary objective of source testing is to obtain a sample that accurately represents the emissions from the source being tested. The EPA reference method was developed as the ideal procedure for conducting emissions testing. Under actual field conditions it is often impractical to follow the EPA reference method exactly due to physical constraints established by the location of the stacks being sampled. Under non-ideal conditions engineering judgement should be used to obtain the highest possible accuracy in sampling.

The stacks sampled at the Sappington plant did not contain any straight sections of sufficient length to allow the testers to exactly follow EPA reference method. The only straight section of duct exiting from the impact mill circuit was horizontal. The stack sampling equipment is designed to operate horizontally not vertically, and there was not enough room to sample the stack from the top or bottom. The impact mill circuit was with a single horizontal port that was located to balance the distances up and down stream from flow disturbances. The only place that the distances up and down stream from a flow disturbance could be balanced on the pelletizer stack was on the blower platform immediately under the building roof. Space and safety considerations made [redacted].

Under turbulent flow conditions instantaneous flow velocities in all directions keep particulates evenly distributed throughout the gas phase. Under turbulent conditions sampling from one direction instead of two will have little or no effect on the accuracy of the results of the test results.

6) Results

The particulate emissions measured from both stacks were much below the emission standard of 0.05 grams per dry standard cubic meter (gms/dscm). The average particulate concentration measured in the impact mill stack was 0.0126 gms/dscm which is about 25 % of the standard. The average particulate concentration measured in the pelletizer circuit stack was 0.0155 gms/dscm which is 31 % of the standard.

The detailed results from each run on the impact mill baghouse stack are given in Table 2. The duct velocities measured during all three test runs were very close to each other. The maximum variation between the 40.85 fps average duct velocity and the individual test velocities was 0.76 %. A duct velocity of 40.85 fps in a 24 inch duct gives fully developed turbulent flow, and the low variability between test velocities indicates that the flow was consistent. All this data supports the reliability of the [redacted] The moisture contents measured for all three runs were consistent; 0.0097, 0.0092, and 0.0093 respectively. The average isokinetic percentage was 92 % which is within the acceptable level of 100 ± 10 %.

TABLE 2

TEST RESULTS OF IMPACT MILL BAGHOUSE STACK

11/5/86

Parameter	Run 1	Run 2	Run 3
ΔP	0.6137	0.6301	0.6571
ΔH	1.352	1.355	1.353
Ts	616.8	601.3	558.0
Tm	547.5	547.6	549.9
Pm	25.46	25.46	25.46
Ps	25.378	25.378	25.378
Vm	41.275	42.615	44.445
Bws	0.0097 .01	0.0092	0.0093
Vm,std	33.36 33.35	34.44	35.77
Vs	40.42	40.97	41.16
Ms	28.9	28.9	28.9
%I	93.6	92.9	89.1

The detailed results from the three sampling runs on the pelletizer circuit are given in Table 3. The duct velocities from the three runs were 61.3, 63.5, and 66.2 fps, for an average of 63.7 fps. The maximum difference between the average and a run was 4 %. Again the small variation in the duct velocities and the magnitude of those velocities, in the fully turbulent flow range, support the reliability of the [redacted].

The pelletizer operation fluctuated more than the impact mill operations. This was evident by the fluctuations observed in the stack temperatures during each run. When questioned about this, the plant operators indicated that these fluctuations were due to circuit plugging and a part of the normal operations. The average percent isokinetic for the three runs was 103.8 %. Which is within the limits of 100 ± 10 %.

The results of these tests show that the particulate emissions from the Montana Talc Plant at Sappington Junction are much below the particulate emissions standard of 0.05 gms/dscm.

TABLE 3

TEST RESULTS OF PELLETIZER BAGHOUSE STACK TESTS

11/6/86

Parameter	Run 1	Run 2	Run 3
ΔP	1.1009	1.0187	1.0633
ΔH	0.2654	0.2592	0.2767
Ts	530.2	552.3	551.3
Tm	531.1	537.9	540.4
Pm	25.38	25.38	25.38
Ps	24.94	24.94	24.94
Vm	21.96	22.30	22.78
Bws	.0489	.0744	.0713
Vm,std	18.24	18.28	18.60
Vs	61.30	63.50	66.20
Ms	29.70	29.40	29.40
%I	102.4	106.1	103.0
Md	30.3	30.3	30.3

APPENDIX - A

MODEL CALCULATIONS

Calculation of Isokinetic ΔH

Date: 11-5-86

Source: Montana Talc Company; Impact Mill
Bag House Stack

Run #: 1

By: K. Ganesan

$Cp = 0.84$

$\Delta H@ = 1.85$

$Dn = 0.25"$ ID

$Pb = 25.36"$ Hg

$Ps = Pb$ + static pressure in stack $= 25.36 + \frac{0.25}{13.6}$

$= 25.378"$ Hg

$Ts = 160^oF = 620^oR$

$Md = 29$ lb/lb-mole (assumed)

$Ms = 28.78$ lb/lb-mole

$Bws = 0.02$ (assumed for obtaining ΔH)

$Pm = 25.36 + \frac{\Delta H}{13.6} = 25.40$

$Tm = tm + 460 = 520^oR$

Sample Calculation

$$\Delta H = K \Delta P$$

$$K = 849.8\, C_p^2\, \Delta H@\, D_n^4\, \frac{Md}{Ms}\, (1-Bws)^2\, \frac{Tm\ Ps}{Ts\ Pm}$$

$$K = 849.8 \times .84^2 \times 1.85 \times 0.25^4\, \frac{29}{28.78}\, (1-0.02)^2\, \frac{520\ 25.378}{620\ 25.40}$$

$$K = 3.5143$$

$$H = 3.5143\, \Delta P$$

for a ΔP of 0.26"; $\Delta H = 1.4"$

Calculation of Volume Sampled

Montana Talc Company 11-5-86

$$Vm, std. = Vm \times Yi \left(\frac{Pm}{Pstd} \frac{Tstd}{Tm}\right)$$

where Vm, std. = volume sampled in std. conditions

Vm = volume from the meter box dry gas meter in ft^3

Tm, Pm = Absolute temperature and pressure in the meter box

Tstd, Pstd = Absolute temperature and pressure under standard conditions, 528°R and 29.92" Hg

Model Calculation — Data from Run #1 of 11-5-86
Impact Mill Stack

Yi = 0.985

Vm = 41.275 ft^3

Tm = 460 + 87.5 = 547.5°R

$$Pm = Pb + \frac{\Delta H}{13.6} = 25.36 + \frac{1.352}{13.6} = 25.46" \text{ Hg}$$

$$Vm, std. = 41.275\ (.985) \left(\frac{25.46}{29.92} \times \frac{528}{547.5}\right)$$

$$= \underline{\underline{33.36}} \text{ dscf}$$

Moisture Determination Calculations

$$Bws = \frac{Vwc}{Vwc + Vstd}$$

Bws = Fraction of water

Vwc = Volume of water present in the sampled gas

Vstd = Volume of gas sampled at std.

Model calculation for Run #1, on 11-5-86

Impact Mill Stack

Amount of moisture collected = 6.92 gms

$$Vwc = 0.04715 \frac{cft}{gm} \times 6.92 gm = 0.3263 \text{ SCF}$$

$$Bwc = \frac{0.3263}{0.3263 + 33.36} = 0.0097$$

$$= 0.97\%$$

Percent Isokinetic Calculation

$$\%I = \frac{Ts\ Vm,std\ Pstd\ 100}{\Theta\ Vs\ An\ Ps\ Tstd\ 60\ (1-Bws)}$$

Calculation for Run #1 on 11-5-86

Impact Mill Stack

Ts = 616.8°R

Vm,std = 33.36 dscf

Pstd = 29.92" Hg

Θ = 60 min

Vs = 40.42

$An = \frac{0.25^2}{144} \times 0.785 = 340.71 \times 10^{-6}\ ft^2$

Ps = 25.378" Hg

Tstd = 528°R

Bws = 0.0097

$$\%I = \frac{616.8 \times 33.36 \times 29.92 \times 100}{60 \times 40.42 \times 340.71 \times 10^{-6} \times 25.378 \times 528 \times 60\ (0.9903)}$$

= 93.6%

APPENDIX - B

CALIBRATION DATA

PRE-SAMPLING.

Meter Box Calibration

Barometric Pressure: 24.69

Temperature: 20°C

Meter Box #D382 46'

Date: 11-1-86.

ΔH in H_2O	Dry Gas Meter V_d	Dry Gas Meter P_d "Hg	Dry Gas Meter $t_d + 460$ °R	Meter Box Vm	Meter Box $P_{meter\ box}$ in Hg	Meter Box tm + 460	Y_i	ΔH@
0.25	2	24.69 − .233 = 24.455	528	2.06	24.69 − .018 = 24.709	536.5	$\frac{2 \times 1.0196 \times 24.455 \times 536.5}{2.06 \times 24.709 \times 528} = .995$	$\frac{0.0317 \times 0.25}{24.7 \times 536.5}\left(\frac{528 \times 6.92}{2 \times 1.0196}\right)^2 = 1.7$
0.5	4	24.69 − .419 = 24.271	528	4.14	24.727	540.5	$\frac{4 \times 1.0196 \times 24.271 \times 540.5}{4.14 \times 24.727 \times 528} = .990$	$\frac{.0317 \times .5}{24.72 \times 540.5}\left(\frac{528 \times 9.51}{4 \times 1.0196}\right)^2 = 1.80$
0.74	4.5	24.690 − .588 = 24.102	528	4.645	24.74	543.0	$\frac{4.5 \times 1.0196 \times 24.102 \times 543}{4.645 \times 24.74 \times 528} = .990$	$\frac{.0317 \times .74}{24.74 \times 543}\left(\frac{528 \times 9.79}{4.5 \times 1.0196}\right)^2 = 1.80$
~~1~~ 0.995	5.0	24.690 − .765 = 23.925	528	5.16	24.763	544.5	$\frac{5 \times 1.0196 \times 23.925 \times 544.5}{5.16 \times 24.763 \times 528.0} = .984$	$\frac{.0317 \times .995}{24.76 \times 544.5}\left(\frac{528 \times 8.62}{5 \times 1.0196}\right)^2 = 1.9$
2.0	5.0	24.690 − 1.477 = 23.213	528	5.10	24.84	546.0	$\frac{5 \times 1.0196 \times 23.213 \times 546}{5.10 \times 24.84 \times 528} = 0.966$	$\frac{.0317 \times 2}{24.8 \times 546}\left(\frac{528 \times 6.07}{5 \times 1.0196}\right)^2 = 1.85$
~~3.0~~					Ave.		0.985	Ave = 1.85
~~4.0~~								
~~5.0~~								

METER BOX CALIBRATION DATA

DATE: 11-1-86
METER BOX NO: D461
CALIBRATED BY: K. Ganesan
BAROMETRIC PRESSURE: 24.69
DRY GAS METER NO: 426323
CORRECTION FACTOR: 1.0196

TEMPERATURE 20°C
PREVIOUS CALI. DATE 6-27-
OLD CORRECTION

Orifice Manometer ΔH, "H2O	DRY GAS METER Pressure drop "H2O ("Hg)	DRY GAS METER Vol (ft³) Initial/Final	DRY GAS METER ft³ Total	METER BOX DGM Gas Vol (ft³) Initial/Final	METER BOX DGM Total	METER BOX °F TEMPERATURE IN	OUT	AVE.	TIME θ MIN.	Yi	ΔH@ "H2O	Vac "Hg
0.25	3.2 (.2353)	830.4 / 828.4	2.0	59.420 / 57.360	2.06	85	68	76.5	6'55" (6.92)	.9946	1.920	2
0.50	5.7 (.4191)	836.0 / 832.0	4.0	65.12 / 60.98	4.14	92	69	80.5	9'30.5" (9.51)	.9904	1.80	3
0.74	8.0 (.5882)	843.5 / 839.0	4.5	72.900 / 68.255	4.645	96	70	83	8'47.5" (8.79)	.990	1.80	3
.995	10.4" (.7647)	850.5 / 845.5 / 5	5.0	80.145 / 74.985	5.16	98	71	82.5	8'37" (8.62)	.984	1.86	3.5
2.0	20.1" (1.4779)	857.8 / 852.8 / 5	5.0	87.665 / 82.565	5.10	100	72	86.0	6'4" 6.07	.966	1.85	6
									Ave.	0.985	1.85	

Post-Sampling

Meter Box Calibration

Barometric Pressure: 24.56

Temperature: 21°C

Meter Box #D38 ~~2~~ 46)

Date 12-9-82

ΔH in H_2O	Dry Gas Meter V_d	Dry Gas Meter P_d "Hg	Dry Gas Meter t_d + 460	Meter Box Vm	Meter Box $P_{meter\ box}$ in Hg	Meter Box tm + 460	Y_i	ΔH@
~~0.25~~ 1.4	4	23.49	530	4.18	24.66	542	$\frac{4.1 \times 1.0196 \times 23.49 \times 542}{4.18 \times 24.66 \times 530} = .975$	$\frac{.0317 \times 1.4}{24.66 \times 542} \left(\frac{530 \times 5.1}{4 \times 1.0196}\right)^2 = 1.82$
~~0.5~~ 1.4	6	23.49	530	6.14	24.66	543	$\frac{6 \times 1.0196 \times 23.49 \times 543}{6.14 \times 24.66 \times 530} = 0.973$	$\frac{.0317 \times 1.4}{24.66 \times 543} \left(\frac{530 \times 8.5833}{6.14 \times 1.049}\right)^2 = 1.75$
~~0.75~~ 1.4	3.5	23.49	530	3.6	24.66	543	$\frac{3.5 \times 1.0196 \times 23.49 \times 543}{3.6 \times 24.66 \times 530} = 0.970$	$\frac{.0317 \times 1.4}{24.66 \times 543} \left(\frac{530 \times 5.0167}{3.6 \times 1.0196}\right)^2 = 1.79$
1.0							Ave 0.973	Ave = 1.77
2.0								
3.0								
4.0								
6.0								

METER BOX CALIBRATION DATA

DATE: 12-9-86
METER BOX NO: D461
CALIBRATED BY: H. GANESAN
BARO METRIC PRESSURE: 24.56" Hg
DRY GAS METER NO: 426323
CORRECTION FACTOR: 1.0196.

TEMPERATURE 21°C

PREVIOUS CALI. DATE
11-1-86.
OLD CORRECTION

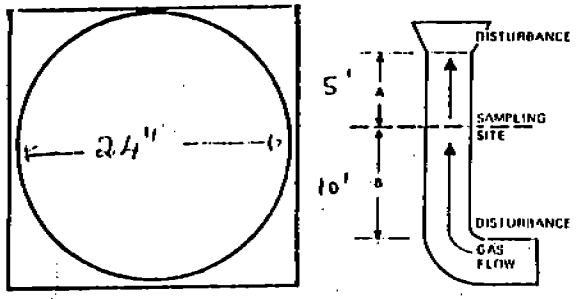
Orifice Meter Manometer ΔH, "H2O	DRY GAS METER Pressure Drop "H2O (" Hg)	DRY GAS METER Vd (ft3) Initial/final	DRY GAS METER ft3 Total	METER BOX DRY GAS METER Gas Vol (ft3) Initial/final	METER BOX DRY GAS METER (ft3) Total	METER BOX TEMP °F IN	METER BOX TEMP °F OUT	METER BOX TEMP °F AVE	TIME θ MIN	Yi -	ΔH@ "H2O	Vac "Hg
1.4	14.4"	100295 J 998.5 J 4.0	4.0	~~366.78~~ J 364.26 ~~354.58~~ J 360.10	4.18	93	68	82	~~6'7"~~ 5'42 (5.7)	.975		
1.4	14.4	11.0 J 5.0 J 6.0	6.0	372.885 J 366.745 J	6.14	97	69	83	8'35" (8.55)	.973		
1.4	14.4	16.0 J 12.5 J 3.5	3.5	378.054 J 374.44 J	3.6	97	69	83	5'01" 5'.0167	.970		

APPENDIX - C

FIELD DATA

5761' 3:20 PM

SCHEMATIC OF STACK



CROSS SECTION

PLANT Montana Tole Company
DATE 11-5-86
LOCATION Scppington, MT.
OPERATOR M. GANCSAN
STACK NO. Impact mill stack
RUN NO. # 1
SAMPLE BOX NO.
METER BOX NO. D 461

AMBIENT TEMPERATURE 70°F
BAROMETRIC PRESSURE 25.36"Hg
ASSUMED MOISTURE, % 2
PROBE LENGTH, in. 3'
NOZZLE DIAMETER, in. 0.25
STACK DIAMETER, in. 24"
PROBE HEATER SETTING 7
HEATER BOX SETTING 230°F

METER $\Delta H_@$ 1.85
C FACTOR
PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg

SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT	.5526	39.8657
TARE WEIGHT	.5500	37.5552
WEIGHT GAIN	.0026	0.0135
.0026	TOTAL	.0026

Blank Heaters = .0026. (0.0135)

TRAVERSE POINT NUMBER	SAMPLING TIME (Θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °F	OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
1	3		136	0.04	.2	0.14	0.14	157.765	84	76	180	55	2.1	
2	3		142	.36	.6	1.26	1.26		88	76			2.5	
3	3		145	4.0	.6325	1.4	1.4		92	76	190	50	3.5	
4	3		150	.4144	.6433	1.5	1.55	158.12	94	76		50	4.5	
5	3		153	.46	.6782	1.6	1.62		98	76	225	48	6.5	
6	3		156	.47	.6856	1.65	1.65	162.65	99	75	225	45	7.2	
7	3		152	.47	.6856	1.65	1.65		100	75	225	↓	7.2	
8	3		157	.45	.6705	1.60	1.60		100	75	↓	↓	7.2	
9	3		158	.45	.6705	1.60	1.60		101	75	↓	45	7.2	
10	3		155	.47	.6856	1.65	1.65	167	102	75		45		
11	3		155	.46	.6782	1.6	1.6		102	75			7.2	
12	3		155	.40	.6325	1.4	1.4	176.5	102	75		45	7.2	
13	3		160	.4	.6325	1.4	1.4	175.4	102	75			1.2	
14	3		164°	0.36	.60	1.3	1.3		102	75		↓	7.2	
15	3		164	0.36	.60	1.3	1.3		103	75	↓	↓	7.2	
16 TOTAL														
17 AVERAGE			164.7											

18
19
20

CONTINUE ON NEXT SHEET.

Acetone bottle (D) 9010

Leak check: Pre - @15"Hg <0.002 cfm

VOLUME OF LIQUID WATER COLLECTED

	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL	205	205	17		631.3
INITIAL	200	200	0		622.4
LIQUID COLLECTED					8.96 gm.
TOTAL VOLUME COLLECTED					

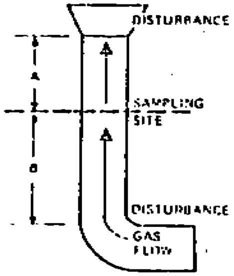
-2 — 1.98 = 6.92 gms

ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

COMMENTS:
3 run 3 Post test leak <0.02 cfm
FILTER #4.
Silicagel #1.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

Run (1) Cont

PLANT Montana Tool Company

DATE 11-5-86

LOCATION Seppington

OPERATOR K. GANESAN

STACK NO. Impact mill

RUN NO. CONT # 1

SAMPLE BOX NO.

METER BOX NO.

AMBIENT TEMPERATURE 70°F

BAROMETRIC PRESSURE ~~27.44~~ 0.2536

ASSUMED MOISTURE, %

PROBE LENGTH, in.

NOZZLE DIAMETER, in.

STACK DIAMETER, in.

PROBE HEATER SETTING

HEATER BOX SETTING

METER $\Delta H_@$ 1.85

C FACTOR

PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg		
SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT		
TARE WEIGHT		
WEIGHT GAIN		
TOTAL		

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY ft/s
16	16.3	0.25	155	.36	0.60	1.3	1.26	184.44	104	76	245	45	7.2	
17	3		167	0.35	.5916	1.2	1.23		104	76.	↓	45	7.2	
18	3	↓	166	0.35	.5916	1.2	1.23	188.44	104	76	220	45	7.2	
19	3		166	0.35	.5916	1.2	1.17		104	77				
20	3	↓	166.	0.34	.5831	1.2	1.17	192.44	104	77	↓	↓		
								192.440						
								151.165						
								41.275 cft.						
TOTAL														
AVERAGE		616.8°R	~~164.7~~ 156.8	☒	0.6137	Ave. 1.352			87.53					

547.5°R

1.925440 / 4.315

41.275 cft

VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL					
INITIAL					
LIQUID COLLECTED					
TOTAL VOLUME COLLECTED					

ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

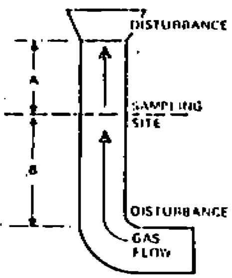
COMMENTS:

PARTICULATE FIELD DATA

SHEET 5320

SCHEMATIC OF STACK

CROSS SECTION



PLANT: MTC
DATE: 11-5-86
LOCATION: Sappington
OPERATOR: B. GANESAN
STACK NO.: #1 Impact mill
RUN NO.: 2
SAMPLE BOX NO.:
METER BOX NO.: D46 1

AMBIENT TEMPERATURE: 70°F
BAROMETRIC PRESSURE: 28.36
ASSUMED MOISTURE, %: 2%
PROBE LENGTH, in.: 3'
NOZZLE DIAMETER, in.: 1/4" (0.25")
STACK DIAMETER, in.: 20"
PROBE HEATER SETTING: 7
HEATER BOX SETTING:

METER $\Delta H_@$: 1.55
C FACTOR:
PROCESS WEIGHT RATE:

WEIGHT OF PARTICULATE COLLECTED, mg

SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT	.5512	35.4465
TARE WEIGHT	.5505	35.4340
WEIGHT GAIN	.0007	0.0125
	TOTAL	-.0026 / .0102 (0.0109)

Acetone Blank .0026

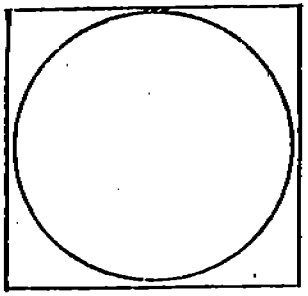
TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °F	OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY ft/s
(1)	3	0.25	130	0.16	.4243	0.65		192.85	90	78	175	50	5.0	
(2)	3		132	0.37	.6083	1.3	1.34		93	78	200		6.0	
(3)	3		132	0.40	.6325	1.4	1.45	198.38	96	78	220	52	6.0	
(4)	3		132	.45	.6708	1.6	1.63	200.78	97	78	220	46	6.0	
(5)	3		135	.47	.6856	1.7	1.7		97	76	↓			
6	3		142	.45	.6708	1.6	1.6	205.5	99	75	220	46	6.0	
7	3		143	.45	.6108	1.6	1.6		99	75				
8	3		144	.47	.6856	1.7	1.7		100	75	220		6	
9	3		145	.47	.6856	1.7	1.7	211.90	100	75			6.0	
10	3		145	0.47	.6856	1.7	1.7		100	75				
11	3		145	0.47	.6856	1.7	1.7		100	75				
12	3		145	.42	.6481	1.6	1.5	218.56	100	76				
13	3		145	0.40	.6325	1.45	1.45		100	76				
14	3		145	0.38	.6164	1.4	1.4		101	76	↓	↓	↓	
15	3	↓	145	.38	.6164	1.4	1.4	225.20	102	76				
TOTAL														
AVERAGE														

VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL	197	202	0		642.3
INITIAL	200	200	0		634.5
LIQUID COLLECTED					7.8 gms.
TOTAL VOLUME COLLECTED					

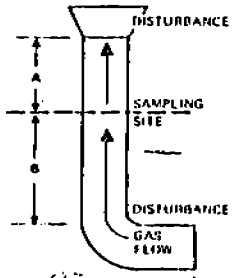
ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

COMMENTS:
~~3.692~~ 3.62
Pre-Test Leak – <0.02
Post Leak at 8" <0.02
Silica gel # 2
Filter # 3
Acetone # B

SCHEMATIC OF STACK



CROSS SECTION



Run (2) cont'

PLANT MIT C

DATE 11-5-56

LOCATION Sappington

OPERATOR H. GRONEMAN

STACK NO. Impact Mill Stack

RUN NO. 2 & 3 CONTINUATION

SAMPLE BOX NO.

METER BOX NO.

AMBIENT TEMPERATURE 70°F

BAROMETRIC PRESSURE 29.36

ASSUMED MOISTURE, % 2

NOZZLE DIAMETER, in. 0.25"

STACK DIAMETER, in.

PROBE HEATER SETTING

HEATER BOX SETTING

METER $\Delta H_@$ 1.85

C FACTOR

PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg		
SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT		
TARE WEIGHT		
WEIGHT GAIN		
TOTAL		

RUN #2 CONT.

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD ($\sqrt{P_s}$)	($\sqrt{P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY
16	3 min	10.25	145	0.38	.6164	1.4	1.4		102	76	225	40	6	
17	3 min		145	0.38	.6164	1.3	1.3		102	76	225	48	6	
18	3 min		145	.34	.5831	1.3	1.3		102	76	220	40	6	
19	3 min		145	.34	.5831	1.3	1.3	232.44	102	75	220	40	6	
20	3 min		145	0.34	.5831	1.3	1.3	235.46	102	75	220	40	6	
Average			144.3 Avg.		.6301	1.355		42.615	87.6					
Total	60 min		601.3°R						547.6°R					
						N/A	#3	CONT						
15	3		71	.38	.6164	1.3	1.3		100	76	230	45	5.5	
16	3		75	.36	.6	1.3	1.3		100	76			5.5	
17	3		75	.36	.6	1.3	1.3		100	76				
18	3		79	0.36	.6	1.3	1.3	276.25	100	76				
19	3		80	.34	.5831	1.2	1.2		100	76				
20	3		84	.33	.574	1.2	1.2	280.04	100	76			5.5	
TOTAL														
AVERAGE			98 558°R		.6571	1.3533		(44.445)	89.85 549.9°R					

235.465
-192.550
42.615

COMMENTS:

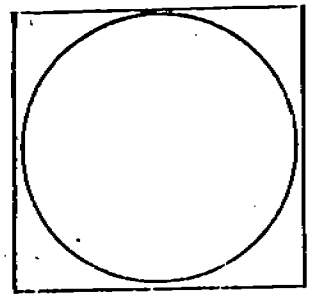
VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL					
INITIAL					
LIQUID COLLECTED					
TOTAL VOLUME COLLECTED					

ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

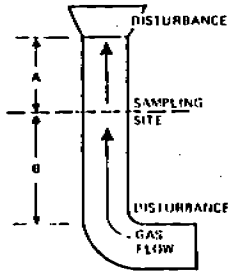
[redacted]: [redacted]

STOP:

SCHEMATIC OF STACK



CROSS SECTION



PLANT MTC

DATE 11-5-85

LOCATION Sappington

OPERATOR K. GANESAN

STACK NO. IMPACT MILL STACK

RUN NO. #3

SAMPLE BOX NO. [redacted]

METER BOX NO. DGM

AMBIENT TEMPERATURE 70°F

BAROMETRIC PRESSURE 25.36" Hg

ASSUMED MOISTURE, % 2

PROBE LENGTH, in. 3'

NOZZLE DIAMETER, in. 0.25"

STACK DIAMETER, in. 24"

PROBE HEATER SETTING 7

HEATER BOX SETTING 230°F

METER ΔH_g 1.85

C FACTOR [redacted]

PROCESS WEIGHT RATE [redacted]

WEIGHT OF PARTICULATE COLLECTED, mg

SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT	.5693	37.9058
TARE WEIGHT	.5614	37.5925
WEIGHT GAIN	.0079	.0133
TOTAL	= .0212	

Acetone Blank 0.0026 (0126)

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER: INLET ($T_{m_{IN}}$), °F	OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
1	3	.25	85	0.25	.50	0.90	.9	235.595	90	70	190	45	4.5	
2	3	.25	90	.37	.6082	1.3	1.3		94	76	230	↓	5	
3	3		96	.43	.6557	1.6	1.62	242.38	96	76	230	↓	5.5	
4	3		98	.43	.6557	1.6	1.62		98	76	↓	↓	5.5	
5	3		113	.45	.6708	1.6	1.62		102	76	230	45	5.5	
6	3		114	.47	.6856	1.7	1.1	248.3	102	76	↓	↓	6.0	
7	3		127	.49	.70	1.8	1.8		100	76	↓	↓		
8	3		122	.49	.70	1.8	1.8	253.0	100	76	230	45	6.0	
9	3		130	.49	.70	1.8	1.8	255.	102	76		45		
10	3		131	.50	.7211	1.8	1.8	257.8	102	76	230	45	6.0	
11			122	.75	.8661	2.7	2.7		102	76	↓	↓	8.0	
12		Start	122 2 min	.9	.9487	3.25	3.2	263	98	76			↓	
13		A: 256.4	1 min	.47	.6768	1.8	1.8		95	76				
14			74	.40	.6325	1.4	1.4		100	76			6.0	
TOTAL			67	.38	.6164	1.2	1.3		100	76	↓	↓	6.0	
AVERAGE														

2.77 (ave)

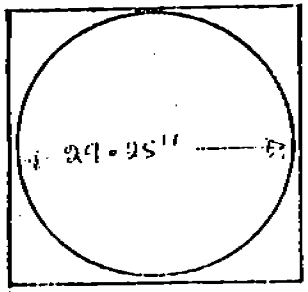
Silica gel #3
Filter #2
COMMENTS: Acetone #E

Pre-Test-leak
<0.02 12" Vac

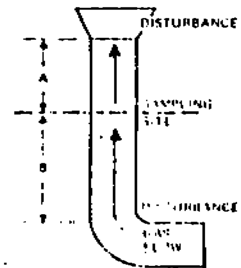
VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL	198	200	C		631.3
INITIAL	216	200	C		622.2
LIQUID COLLECTED					9.1
TOTAL VOLUME COLLECTED					

ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

SCHEMATIC OF STACK



CROSS SECTION



PLANT Montana Talc Company
DATE 11-6-86
LOCATION SAPPINGTON
OPERATOR K. GANESAN
STACK NO. PELLETIZER STACK
RUN NO. (1)
SAMPLE BOX NO.
METER BOX NO. D 4-61

AMBIENT TEMPERATURE 61°F
BAROMETRIC PRESSURE 25.36"
ASSUMED MOISTURE, % 10%
PROBE LENGTH, in. 3'
NOZZLE DIAMETER, in. 1/8"
STACK DIAMETER, in. 29.25"
PROBE HEATER SETTING 6
HEATER BOX SETTING 230

METER ΔH@ 1.85
C FACTOR 0.985
PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg

SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT	.5604	37.8145
TARE WEIGHT	.5600	37.8024
WEIGHT GAIN	.0004	0.0121
	TOTAL	(0.0099 g)

.0004
.0095
.0099

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H₂O)	STACK TEMPERATURE (Tₛ) °F	VELOCITY HEAD (Δpₛ)	($\sqrt{\Delta p}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
1	3	-5.75"	59	.93	.9644	0.2	0.2	280.26	70	60	170°	45	3	
2	3	↓	61	.93	.9644	0.2	0.2	281.3	72	60	180	45	3	
3	3		63	1.1	1.0488	.24	.2421		76	60	190		3.0	
4	3		65	1.1	1.0488	.24	.24		78	60	200	45	3	
5	3		90	1.2	1.0954	.26	.264		80	60	200	↓	3.5	
6	3		87	1.2	↓	.26	.264	284.80	80	60.	200	↓	1	
7	3		79	1.2		.26	.264	at 16 min 286.29	82	60	↓		3.5	
8	3		71	1.2		.26	.264	287.20	82	60	↓	↓	1	
9	3		67	1.2		.26	.264	288.13	84	60	200	45	3.5	
10	3		62	1.2		.26	.264		84	60	↓		1	
11	3		61	1.2		.26	.264		84	60	↓	↓	1	
12	3	↓	61	1.2	↓	.26	.264	290.8	84	60	200	45	3.5	
TOTAL			✓						71					
AVERAGE	65.2 / 530.2		70.2	☒					.22					

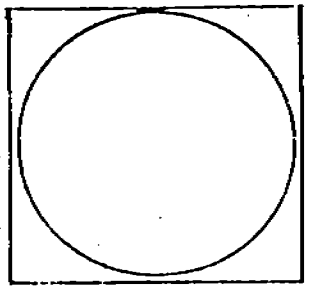
VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL	211	200	0		638.3
INITIAL	200	200	0		629.4
LIQUID COLLECTED					8.9
TOTAL VOLUME COLLECTED					

ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

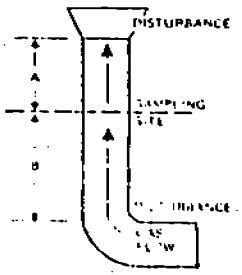
COMMENTS: Pre Test - Leak Test - Post Test Leak Test @ 15" Vac. (< 0.02 cfm below 0.02 cfm)
Silica Gel #4
Filter #1.

RUN #1 CONT. C

SCHEMATIC OF STACK



CROSS SECTION



PLANT Montana Talc Company
DATE 11-6-86
LOCATION Sappington, Junction
OPERATOR McGANESAN
STACK NO. PELLETIZER STACK
RUN NO. (1) CONTINUATION
SAMPLE BOX NO.
METER BOX NO. D 431

AMBIENT TEMPERATURE 61°F
BAROMETRIC PRESSURE 25.36
ASSUMED MOISTURE, % 10%
PROBE LENGTH, in. 3'
NOZZLE DIAMETER, in. 0.125
STACK DIAMETER, in.
PROBE HEATER SETTING
HEATER BOX SETTING

METER $\Delta H_@$ 1.85
C FACTOR 0.955
PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg		
SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT		
TARE WEIGHT		
WEIGHT GAIN		
TOTAL		

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in H₂O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)		PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in Hg gauge	VELOCITY fps
13	3	-5.75"	60	1.2	1.0954	.26	.264	291.7	84	60	200	45	3.5	
14	3	-5.75	60	1.2		.26	.264	292.6	82	60			3.5	
15	3	-5.75	60	1.2		.26	.264	293.5	84	60	200		3.5	
16	3	—	59	1.2		.26	.264		84	60			3.5	
17	3		59	1.3	1.1402	.29	.291	295.34	84	60	200		3.5	
18	3		58	1.35	1.1619	.30	.30	296.33	86	60				
19	3		59	1.35	1.1619	.30	.30		85	60	200		3.5	
20	3		79	1.40	1.1832	.31	.31	298.30	85	60				
21	3		85	1.4	1.1832	.31	.31	299.31	85	60			3.5	
22	3		90	1.4	1.1832	.31	.31	300.30	86	60				
23	3		93	1.3	1.1402	.29	.29		86	60				
24	3		96	1.2	1.0954	.26	.26	302.22	86	62	200	45	3.5	
			71.5											
TOTAL					1.100				82.2	60.08				
AVERAGE			530.2				0.2654	21.96 cfm	71.1	531.1°R				

302.22
280.26
21.96 cfm

VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL	211	200	0		638.3
INITIAL	200	200	0		629.4
LIQUID COLLECTED	11	0	0		8.9
TOTAL VOLUME COLLECTED					

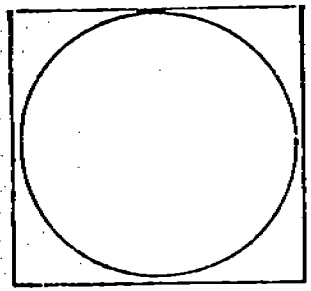
ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

COMMENTS:

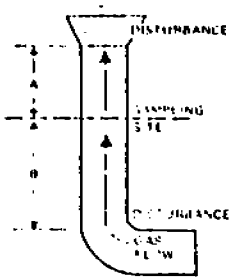
START: 2:40 PM STOP: 4:40 PM

PARTICULATE EMISSION DATA

SCHEMATIC OF STACK



CROSS SECTION



PLANT MONTANA TALC COMPANY
DATE 11-6-86
LOCATION SAPPINGTON, MT.
OPERATOR J. GAVESAN
STACK NO PELLET DRIER
RUN NO. 2
SAMPLE BOX NO.
METER BOX NO. D-461

AMBIENT TEMPERATURE 65°F
BAROMETRIC PRESSURE 25.36
ASSUMED MOISTURE, % 10%
PROBE LENGTH, in. 36
NOZZLE DIAMETER, in. 0.125
STACK DIAMETER, in. 29.25
PROBE HEATER SETTING 250°F
HEATER BOX SETTING 230°F

METER $\Delta H_@$ 1.85
C FACTOR 0.985
PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg

SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT	.5357	36.3319
TARE WEIGHT	.5345	35.3265
WEIGHT GAIN	.0012	.0054
TOTAL		.0066

.0025
.0012
.0037 g

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in H_2O)	STACK TEMPERATURE (T_s) F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{in}}$), F	OUTLET ($T_{m_{out}}$), F	SAMPLE BOX TEMPERATURE F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in Hg gauge	VELOCITY fps
1	3	-.575	58	.7	.836	1.7	.17	302.315	82	60	260	50	3	
2	3		62	.45	.6708	1.2	.12		83	60	205	52	3.0	
3	3		62	.80	.8944	2.0	.20		83	60	210		3.5	
4	3		77	1.0	1.0	0.25	.25		84	60	210			
5	3		89	1.1	1.0488	.27	.27		86	60	210		3.5	
6	3		90	1.2	1.0954	.29	.295	305.45	86	60	210		3.5	
7	3		91	1.2	1.0954	.29	.295		88	64	214			
8	3		91	1.2	1.0954	.29	.295	309.34	90	66			4.0	
9	3		90	1.1	1.0488	.25	.270		90	68				
10	3		90	1.1	1.0488	.27	.270	311.24	90	68	220			
11	3		92	1.0	1	.25	.25		92	68	220			
12	3		94	.95	.9746	.25	.25	313.10	92	68	225		4.0	
			82.17		.9841	0.2433			75.3					
TOTAL														
AVERAGE			552.3°R / 92.3		1.0187	.2592			K = .2453 77.9 537.9°R					

VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL	225	203			629.6
INITIAL	200	200			626.4
LIQUID COLLECTED	25	3			3.2
TOTAL VOLUME COLLECTED					

ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

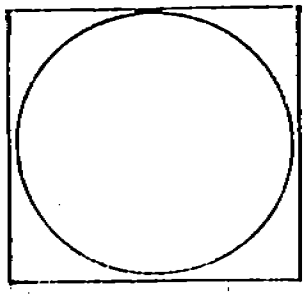
623.6
620.4
3.2

COMMENTS:

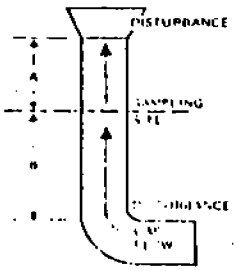
Pre Test - Leak test - 18" Vac < 0.02 cfm ✓
filter # 4
Silica gel # 1
Post - Leak test < 0.02 cfm.

RUN 2 CONT

SCHEMATIC OF STACK



CROSS SECTION



PLANT MTC

DATE 11-6-86

LOCATION SHIPPINGTON

OPERATOR K.C

STACK NO.

RUN NO. 11 2

SAMPLE BOX NO.

METER BOX NO.

AMBIENT TEMPERATURE

BAROMETRIC PRESSURE

ASSUMED MOISTURE, %

PROBE LENGTH, in.

NOZZLE DIAMETER, in.

STACK DIAMETER, in.

PROBE HEATER SETTING

HEATER BOX SETTING

METER $\Delta H_@$

C FACTOR

PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg		
SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT		
TARE WEIGHT		
WEIGHT GAIN		
TOTAL		

TRAVERSE POINT NUMBER	SAMPLING TIME (Δθ), min.	STATIC PRESSURE (in H_2O)	STACK TEMPERATURE (T_s) F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{in}}$), F	OUTLET ($T_{m_{out}}$), F	SAMPLE BOX TEMPERATURE F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in H_g gauge	VELOCITY fps
13	3	-5.15	94.	.98	.9899	.24	.24		92	68	225	45	4.0	
14	3		94	.98	.9899	.24	.24	314.99	92	68	215	45		
15	3		94	.98	.9899	.24	.24	315.80	92	68	215			
16	3		110	1.05	1.0247	.26	.258		92	68	215			
17	3		104	1.1	1.0488	.27	.27	317.78	92		210			
18	3		101	1.1	1.0488	.27	.27	318.65	92		210			
19	3		92	1.3	1.1402	.32	.32		92		210		4.0	
20	3		111	1.2	1.0954	.30	.30	320.78	94		200			
21	3		115	1.2	1.0954	.30	.30		94		175		4.0	
22	3		107	1.2	1.0954	.30	.30	322.68	94	68	175			
23	3		104	1.2	1.0954	.30	.30	323.775	94	69	175			
24	3		103	1.05	1.0247	.26	.30	324.61	94	69	175			
			102.4							80.5				
TOTAL														
AVERAGE			ave 92.3		1.053	0.275			ave = 77.92					

VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL					
INITIAL					
LIQUID COLLECTED					
TOTAL VOLUME COLLECTED					

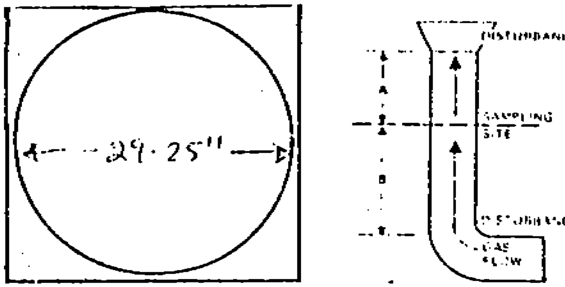
ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

COMMENTS:

324·610
302·315
22·295

SMT : [redacted]

SCHEMATIC OF STACK



CROSS SECTION

PLANT MONTANA TALC COM. AMBIENT TEMPERATURE 65°F. METER ΔH@ 1.85

DATE 11-6-86 BAROMETRIC PRESSURE 25.36 C FACTOR

LOCATION SAPPINGTON, MT. ASSUMED MOISTURE, % 5% PROCESS WEIGHT RATE -

OPERATOR K. GANESAN PROBE LENGTH, in. 36"

STACK NO. PELLET DRIER NOZZLE DIAMETER, in. 0.125"

RUN NO. #3 STACK DIAMETER, in. 29.25"

SAMPLE BOX NO. PROBE HEATER SETTING 7

METER BOX NO. D461 HEATER BOX SETTING 230

WEIGHT OF PARTICULATE COLLECTED, mg		
SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT	.5500	35.4395
TARE WEIGHT	.5496	35.4267
WEIGHT GAIN	.0004	0.0128
0.0102	~~TOTAL~~	- 0.0026
.0004		(0.0106)
.0106		

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in H₂O)	STACK TEMPERATURE (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔP)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tm in), °F	OUTLET (Tm out), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
1	3	-5.75	61	.9	.9487	.22	.225	324.765	85	73	200	45	3	
2	3	↓	62	.88	.9381	.22	.225	325.750	85	73	200	↓	3.5	
3	3		65	.96	.9798	.24	.24		86	73	210		4	
4	3		77	1.10	1.0488	.26	.26		88	73	220		4	
5	3		93	1.20	1.0954	.29	.295		88	73	220		4	
6	3		94	1.2	1.0924	.29	.295	330.47	88	73	225		4.5	
7	3		94	1.2	1.0924	.29	.295		88	73	225			
8	3		95	1.2	1.0924	.29	.295	332.30	90	70	↓	↓	↓	
9	3		95	1.2	1.0924	.29	.295		90	70				
10	3		95	1.1	1.0488	.26	.26		90	70				
11	3		95	1.1	1.0488	.26	.26		90	70				
12	3	↓	95	1.05	1.048	.25	.25	336.0	90	70	↓	↓	↓	
			85.08		1.04	.25 .2633			79.95					
TOTAL														
AVERAGE														

VOLUME OF LIQUID WATER COLLECTED	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL	223	205	0		636.4
INITIAL	200	200	0		634.1
LIQUID COLLECTED	23	5			2.3
TOTAL VOLUME COLLECTED					

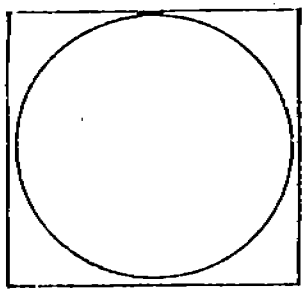
ORSAT MEASUREMENT	TIME	CO₂	O₂	CO	N₂
1					
2					
3					
4					

COMMENTS:
Pre test-Leak Test <0.07 gfn
Post test leak <0.02 gfn
Silica Gel #2
Filter #2
Leak test Post-

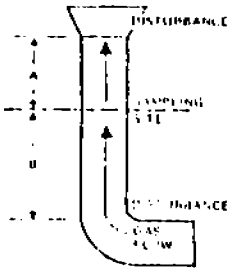
SEC. 6 - 10MM RUN #3 CONT.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION



PLANT MTC
DATE 11-6-86
LOCATION Sappington
OPERATOR B. GILLESPIE IV
STACK NO SELECT DRIER
RUN NO. #3 CONTINUATION
SAMPLE BOX NO.
METER BOX NO.

AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
ASSUMED MOISTURE, %
PROBE LENGTH, in.
NOZZLE DIAMETER, in.
STACK DIAMETER, in.
PROBE HEATER SETTING
HEATER BOX SETTING

METER $\Delta H_@$
C FACTOR
PROCESS WEIGHT RATE

WEIGHT OF PARTICULATE COLLECTED, mg

SAMPLE	FILTER	PROBE WASH
FINAL WEIGHT		
TARE WEIGHT		
WEIGHT GAIN		
TOTAL		

TRAVERSE POINT NUMBER	SAMPLING TIME (Δθ), min.	STATIC PRESSURE (P_s), in. H_2O	STACK TEMPERATURE (T_s), F	VELOCITY HEAD (ΔP), in. H_2O	$\sqrt{\Delta P}$	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH), in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER: INLET ($T_{m_{in}}$), F	OUTLET ($T_{m_{out}}$), F	SAMPLE BOX TEMPERATURE, F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, F	PUMP VACUUM, in. H_g gauge	VELOCITY, fps
13	3	-5.75	95	1.05	1.024	.25	.25		90	70	228	50	4.5	
14	3	-5.75	95	1.0	1.0	.25	.25		90	70	228			
15	3	-5.75	95	1.10	1.048	.26	.265	338.65	90	70	228			
16	3	-5.75	96	1.1	1.048	.26	.265		90	70	229			
17	3		96	1.2	1.095	.29	.295	340.57	90	70			5.0	
18	3		96	1.2	1.095	.29	.295		90	70				
19	3		92	1.3	1.140	.32	.32		92	70	230			
20	3		92	1.3	1.140	.32	.32		92	70	225			
21	3		102	1.3	1.140	.32	.32		92	70	230			
22	3		104	1.3	1.140	.32	.32		93	71				
23	3		104	1.2	1.095	.29	.295		93	71				
24	3		102	1.05	1.024	.25	.25	347.535	93	71				
			97.42		1.063		.2850		80.75					
TOTAL														
AVERAGE			551.25°R 91.25		1.0633		.2767		80.35 540.35°R					

VOLUME OF LIQUID WATER COLLECTED

	IMPINGER VOLUME ml 1	2	3	4	SILICA GEL WEIGHT, g
FINAL					
INITIAL					
LIQUID COLLECTED					
TOTAL VOLUME COLLECTED					

ORSAT MEASUREMENT	TIME	CO_2	O_2	CO	N_2
1					
2					
3					
4					

COMMENTS:

347.535
324.755
22.780 cf.

Source category : Talc
Plant name : Montana Talc
Test date : 11/5-6/86
Process : talc processing
Filename : TALC_R1.wq1

Date: 09/27/94
Location: Sappington Jxn., MT
Ref. No.: 1/
Process rate basis: production

Source	Type of control	Pollutant	Run No.	Emission rate, lb/hr	Proces rate, ton/hr	Emission factor kg/Mg	Emission factor lb/ton	Volumetri flow rate, DSCFM	Concen. g/DSCM
Impact mill	FF	filt. PM	1-3	0.325	3.0	0.054	0.11	6,872	0.0126
Pelletizer	FF	filt. PM	1-3	0.990	7.8	0.064	0.13	17,028	0.0155

Notes:
1. Data rated D because only average emission concentrations and process rates provided, and testing procedures deviated from standard (sampled along one traverse only due to inaccessibility of stack).

EMISSION TEST CALCULATIONS

Volumetric flowrate at standard conditions

Qsd = (60/144) * Mfd * vs * A * (Tstd/(ts+460)) * (Ps/Pstd)
where

Qsd = flow in DSCFM.
Mfd = dry mole fraction of stack gas.
= 1 - mc/100, where mc = moisture co
vs = stack gas velocity in ft/sec.
A = stack area in sq. in.
Tstd = standard temperature
= 528 in degrees Rankine.
ts = stack temperature in degree F.
Ps = absolute stack pressure in in. Hg.
Pstd = standard pressure
= 29.92 in. Hg.

Montana Talc Co.
11/5/86 test

IMPACT MILL

Qsd	=	6,872
Mfd	=	0.9999
mc	=	0.0094
vs	=	40.85
A	=	452.4
Tstd	=	528
ts	=	132
Ps	=	29.94
Pstd	=	29.92

PELLETIZER

Qsd	=	17,028
Mfd	=	0.9994
mc	=	0.0649
vs	=	63.67
A	=	672.0
Tstd	=	528
ts	=	84.6
Ps	=	29.50
Pstd	=	29.92