State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: October 3, 1990 FILE REF: 4530

TO: Foremost Whey - Rothschild Casefile

FROM: Rhonda O'Leary, Wausau Rhonda

SUBJECT: Review of Stack Test conducted at Foremost Whey's Rothschild Plant on July 24, 1990

Received: 8/31/90

RECEIVED
OCT 08 1990
BUREAU OF
AIR MANAGEMENT

I. Source

Foremost Whey Products
Business Highway 51, South
P.O. Box 98
Rothschild, WI 54474

FID # 737009900
Stack #04, Process #02

Plant Contact: Pat Giese, (715)359-0534

II. Source Description

The stack test was performed on a centrifuge dryer and mill for production of edible lactose. The dryer is fired with natural gas.

Product from the centrifuge dryer is captured in a cyclone in series with a baghouse. The baghouse exhausts to the ambient air. The material collected in the cyclone goes through a mill prior to being packaged for sale. The mill exhaust passes through a baghouse prior to being exhausted to the ambient air. These two baghouse exhausts were stack tested.

The maximum thru-put is 2,500#/hr. At the times of the test, average dryer thru-put was approximately 1,800 pounds per hour and the average mill thru-put was approximately 1,240 pounds per hour.

There are no pressure gauges on the baghouses.

III. Sampling Operation

A. Purpose of Test

The stack test on P02 was required by permit #737009900-NO1.

B. Sampling Firm

Swanson Environmental, Inc.
24156 Haggerty Road
Farmington Hills, Michigan 48024

Crew Chief: Tom Wilk (313)478-2700

C. Date of Test

The test was performed on July 24, 1990. On this date the weather was partly cloudy (50% clouds) with temperatures in the 70's and 80's.

D. Test Method

The test method used was EPA Method 17 as stated in the Federal Register, Vol. 43, #37, February 23, 1978. The method was modified to include the back-half (condensible particulate) analysis.

The mill exhaust stack had a diameter of 9.25 inches. Two ports were used with a total of 16 sampling points. The dryer exhaust stack had a diameter of 18.00 inches. Two ports were used with a total of 12 sampling points. Both stacks exited the side of the building about 6 feet below the roof line and extended horizontally out from the building.

E. Test Witness

Neal Baudhuin was the Department representative at this test.

IV. Summary of Results

The results include both the front-half and the back-half particulate catch. The back-half accounted for 35% of the dryer total catch and 25% of the mill total catch.

MILL EMISSION

RUN NUMBER	PARTICULATE EMISSIONS (POUNDS PER HOUR)	ISOKINETIC RATIO (%)
1	1.086	87.7
2	0.251	92.7
3	1.135	94.6
AVERAGE	0.824	91.7

DRYER EMISSIONS

RUN NUMBER	PARTICULATE EMISSIONS (#/HOUR)	ISOKINETIC RATIO (%)
1	0.112	91.1
2	0.190	90.0
3	0.370	90.3
AVERAGE	0.224	90.5

V. Applicable Emission Limit

The particulate emission limit that applies to the mill and dryer combined is 2.00 pounds per hour as stated in permit #737009900-N01. This limit was set under sec. 144.394(3), Wis. Stats., to protect the total suspended particulate (TSP) Ambient Air Quality Standard.

VI. Discussion of Results

The lactose dryer and mill were operating normally during the test. The process thru-put was approximately 72% of full capacity.

The average emission rate was 1.048 pounds per hour with an average percent isokinetics of 91.1%. This meets the permit condition of 2.00 pounds per hour. The opacity was 0% during all test runs.

RUN 1 on the mill exhaust had an isokinetic rate of 87.7% which is outside the limits of 90% to 110% required by the Department. Since this lower isokinetic rate means that the actual emissions would have been lower than the measured rate, this run will not be thrown out.

RUN 2 on the mill exhaust had an emission rate that was 22.6% of the rate for runs 1 and 3 when the production rate for run 2 was 95% that of the rate for runs 1 and 3. The 2.00 pounds per hour limitation would still be met even if run 2 was thrown out.

The initial stack test submittal was incomplete. Production data was requested from Foremost Whey and submitted on September 10, 1990. Lab sheets and equations used for stack test computer calculations were requested from Swanson Environmental, Inc. and submitted on September 14, 1990.

Swanson Environmental did not correctly analyze the back-half catch. Organic extractions using methylene chloride are required as part of the back-half analysis and Swanson Environmental did not do this step in the analysis. The organic extraction typically contains a small fraction of the total back-half for a source such as a lactose dryer so the test will be accepted for this source. A September 10, 1990 letter to Swanson noted the back-half analysis deficiency and stated that in future tests the organic extractions must be done.

The data for run 1 on the mill exhaust was input into the air management stack test computer program. The results agreed with the numbers calculated by Swanson Environmental.

RO:rp

~~cc:~~ Joe Perez, AM/3, Madison
US EPA Region V

NAME OF SOURCE: foremost whey

LOCATION OF SOURCE: rothschild

PROCESS TESTED: p02 — Mill Exhaust

DATE OF TEST: 0724 90

RUN NUMBER: 1

N NUMBER OF SAMPLING POINTS- 16

VM DGM VOL,METER COND DRY- 31.52 CFD

PB BAR PRESS,STATION- 29.25 IN HG

VL TOTAL VOL OF WATER COLLECTED- 11.6 ML

%CO2 % CARBON DIOXIDE BY VOL,DRY BASIS- 0 %

%O2 % OXYGEN BY VOL,DRY BASIS- 20.9 %

%CO % CARBON MONOXIDE BY VOL, DRY BASIS- 0 %

%N2 % NITROGEN BY VOL,DRY BASIS- 79.1 %

CP PITOT TUBE COEFFICIENT- .808

PS STACK PRESS- 29.47 IN HG

AS AREA OF THE SAMPLING SITE- .467 SQ FEET

MT TOTAL DRY PARTICULATE- .0721 GM

T TOTAL SAMPLING TIME- 60 MIN

AN AREA OF THE NOZZLE- .0000772 SQ FEET

foremost whey,p02,RUN: 1

PARTICULATE FIELD DATA

SAMPLING POINT NUMBER	STACK TEMP DEG F	VELOCITY PRESS IN H2O	SQ ROOT VEL PRESS	ORIFICE METER PRESS DROP IN H2O	DRY GAS METER TEMP DEG F INLET	OUTLET
1	165.0	7.100	2.66458	1.130	96.0	96.0
2	160.0	7.400	2.72029	1.190	97.0	97.0
3	156.0	7.300	2.70185	1.180	97.0	97.0
4	154.0	6.700	2.58844	1.090	97.0	97.0
5	157.0	4.200	2.04939	0.680	97.0	97.0
6	154.0	3.800	1.94936	0.620	97.0	97.0
7	154.0	4.200	2.04939	0.680	96.0	96.0
8	155.0	5.300	2.30217	0.860	96.0	96.0
9	155.0	8.000	2.82843	1.300	96.0	96.0
10	157.0	6.600	2.56905	1.070	97.0	97.0
11	158.0	7.200	2.68328	1.160	98.0	98.0
12	157.0	7.700	2.77489	1.250	98.0	98.0
13	158.0	5.900	2.42899	0.960	99.0	99.0
14	160.0	5.100	2.25832	0.820	99.0	99.0
15	160.0	5.100	2.25832	0.820	99.0	99.0
16	160.0	5.800	2.40832	0.940	99.0	99.0
AVERAGE	TS=		SR(VP)=	OP=	TM=	
VALUES	617.5 DEG R		2.452191	.9843749 IN H2O	557.375 DEG R	

foremost whey,p02,RUN: 1

CALCULATED RESULTS

TS STACK TEMPERATURE = 157.5 DEG F

VMSTD DGM VOL,STD COND DRY= 29.26242 SCFD

VWSTD VOL OF WATER VAPOR,STD COND= .546012 SCF

%M % MOISTURE IN STACK GAS BY VOL,STD COND= 1.831737 %

MD MOLE FRACTION OF DRY GAS= .9816827

MWD MOLECULAR WT OF STACK GAS,DRY BASIS= 28.836 LB/LB-MOLE

MWS MOLECULAR WT OF STACK GAS,WET BASIS= 28.63751 LB/LB-MOLE

VS AVE STACK GAS VELOCITY,STACK COND= 144.8911 FPS

QACT ACTUAL STACK GAS FLOW RATE= 4059.85 CFM

QSTD AVE STACK GAS FLOW RATE,STD COND DRY= 3356.577 SCFMD

%EA AVE % EXCESS AIR=-118743.2 %

PMRA AVE PMR BY RATIO OF AREAS METHOD= .961549 LB/HR

PMRC AVE PMR BY CONC METHOD= 1.09398 LB/HR

PMR(AVE) AVE PMR,STD COND DRY= 1.027764 LB/HR

C EMISSION CONC,STD COND DRY= 3.801815E-02 GR/SCFD

DGR AVE STACK GAS RATE,STD COND DRY= 15061.18 LB/HR

LB/MLB EMISSION CONC,STD COND DRY= 6.823929E-02 LB/MLB OF DRY GAS

WGR AVE STACK GAS RATE,STD COND WET= 15236.61 LB/HR

LB/MLB EMISSION CONC,STD COND WET= 6.745364E-02 LB/MLB OF WET GAS

%ISR % ISOKINETIC RATIO= 87.89457 %

SWANSON ENVIRONMENTAL, INC.
PARTICULATE SAMPLING DATA AND CALCULATIONS

PLANT: WHEY
DATE: 7-24-90

SOURCE: MILL EXH. FRONT HALF

CLOCK TIME:	60.000	60.000	60.000
1.000 NUMBER	P-1	P-2	P-3
B. STACK DIAMETER, In	9.250	9.250	9.250
C. STACK AREA, Sq.Ft	0.467	0.467	0.467
D. No. SAMPLE POINTS	16.000	16.000	16.000
E. TOTAL SAMPLE TIME, MIN.	60.000	60.000	60.000
F. NOZZLE DIAMETER, In.	0.119	0.119	0.119
G. NOZZLE AREA, Sq.Ft.	0.00008	0.00008	0.00008
H. CALIBRATION FACTORS:			
PITOT TUBE, Cp	0.8080	0.8080	0.8080
GAS METER, y	1.008	1.008	1.008
I. BAROMETRIC PRESSURE, In.Hg.	29.250	29.200	29.200
J. STACK STATIC PRESSURE In.H20	3.050	3.050	3.050
K. STACK GAS TEMP.	157.50	160.44	155.63
L. AVG. Sq. Rt. VEL. HEAD	2.45	2.41	2.42
M. AVG. METER TEMP.	97.38	99.81	101.13
N. AVG. METER PRESS., H2O	0.98	0.95	0.97
O. METER VOL., ACTUAL Cu. Ft.	31.27	32.810	33.820
P. METER VOL., @STP	29.378	30.636	31.507
Q. LIQUID VOL., H20 COND., Ml.	11.600	7.000	8.900
R. VAPOR VOL., H20 COND., @STP, Cu.Ft.	0.550	0.332	0.422
S. TOTAL GAS SAMPLED, @ STP, Cu.Ft.	29.928	30.968	31.928
T. %MOISTURE IN EXHAUST GAS			
1) AT TEST LOCATION	1.837	1.071	1.321
2) BEFORE COLLECTOR	0.000	0.000	0.000
U. DRY GAS COMP. %O2	20.9	20.9	20.9
%CO2	0.0	0.0	0.0
%CO	0.0	0.0	0.0
%N2	79.1	79.1	79.1
V. DENSITY & MOL. Wt. -STACK GAS			
1)DRY, @ STP,Lbs/Cu.Ft.	0.0746	0.0746	0.0746
2)WET, @ STP,Lbs/Cu.Ft.	0.0740	0.0743	0.0742
3)WET @ STACK,Lbs/Cu.Ft.	0.0621	0.0619	0.0623
4)MOL.Wt., @ STP,Lb/MOLE	28.844	28.844	28.844
W. WEIGHT OF GAS SAMPLED:			
1)DRY GAS,Lbs	2.190	2.284	2.349
2)WET GAS,Lbs	2.216	2.299	2.369
X. TOTAL PARTICULATE COLLECTED (GRAMS)	0.0630	0.0070	0.0789

Y. AVERAGE GAS VELOCITY, FPM	8713	8585	8599
Z. STACK GAS FLOW RATE			
1)AT STACK, Qa, ACFM	4066	4007	4013
2)AT Std.,Qstd, SCFM	3412	3340	3372
3)Std. DRY,Qdg, SCFM	3349	3304	3327
AA. PERCENT EXCESS AIR	**********		
BB. CONCENTRATION CONVERSION FACTORS:			
1)50% E.A.,AFTER COLLECTOR	49.653	65.145	59.137
2)50% E.A.,BEFORE COLLECTOR	116.344	115.778	115.962
3)MOISTURE BEFORE COLLECTOR	1.012	1.007	1.008
CC. PARTICULATE CONCENTRATION:			
1)Lbs/1000 Lbs., ACTUAL	0.063	0.007	0.073
2)Lbs/1000 Lbs., DRY	0.063	0.007	0.074
3)Lbs/1000 Lbs., WET @ 50%E.A	3.110	0.437	4.337
4)Lbs/1000 Lbs., DRY @ 50%E.A	7.287	0.776	8.505
5)GRAINS / DSCF	0.033	0.004	0.039
6)POUNDS / HOUR	0.949	0.100	1.101
DD. PERCENT ISOKINETIC	87.7	92.7	94.6

SWANSON ENVIRONMENTAL, INC.
PARTICULATE SAMPLING DATA AND CALCULATIONS

PLANT: WHEY SOURCE: DRYER EXH. FRONT HAL
DATE: 7-24-90

	CLOCK TIME:	60.000	60.000	60.000
	1.000 NUMBER	P-1	P-2	P-3
B.	STACK DIAMETER, In	18.000	18.000	18.000
C.	STACK AREA, Sq.Ft	1.767	1.767	1.767
D.	No. SAMPLE POINTS	12.000	12.000	12.000
E.	TOTAL SAMPLE TIME, MIN.	60.000	60.000	60.000
F.	NOZZLE DIAMETER, In.	0.243	0.243	0.243
G.	NOZZLE AREA, Sq.Ft.	0.00032	0.00032	0.00032
H.	CALIBRATION FACTORS:			
	PITOT TUBE, Cp	0.7970	0.7970	0.7970
	GAS METER, y	1.012	1.012	1.012
I.	BAROMETRIC PRESSURE, In.Hg.	29.250	29.200	29.200
J.	STACK STATIC PRESSURE In.H20	0.970	0.970	0.970
K.	STACK GAS TEMP.	129.25	118.17	118.33
L.	AVG. Sq. Rt. VEL. HEAD	1.14	1.08	1.03
M.	AVG. METER TEMP.	95.83	101.33	100.92
N.	AVG. METER PRESS., H2O	3.75	3.35	3.08
O.	METER VOL., ACTUAL Cu. Ft.	62.80	59.670	57.410
P.	METER VOL., @STP	59.811	56.123	54.000
Q.	LIQUID VOL., H20 COND., Ml.	13.600	17.700	18.500
R.	VAPOR VOL., H20 COND., @STP, Cu.Ft.	0.645	0.839	0.877
S.	TOTAL GAS SAMPLED, @ STP, Cu.Ft.	60.456	56.962	54.877
T.	%MOISTURE IN EXHAUST GAS			
	1) AT TEST LOCATION	1.066	1.473	1.598
	2) BEFORE COLLECTOR	0.000	0.000	0.000
U.	DRY GAS COMP. %O2	20.9	20.9	20.9
	%CO2	0.0	0.0	0.0
	%CO	0.0	0.0	0.0
	%N2	79.1	79.1	79.1
V.	DENSITY & MOL. Wt. -STACK GAS			
	1)DRY, @ STP,Lbs/Cu.Ft.	0.0746	0.0746	0.0746
	2)WET, @ STP,Lbs/Cu.Ft.	0.0743	0.0741	0.0741
	3)WET @ STACK,Lbs/Cu.Ft.	0.0653	0.0663	0.0663
	4)MOL.Wt., @ STP,Lb/MOLE	28.844	28.844	28.844
W.	WEIGHT OF GAS SAMPLED:			
	1)DRY GAS,Lbs	4.459	4.184	4.026
	2)WET GAS,Lbs	4.489	4.223	4.067
X.	TOTAL PARTICULATE COLLECTED (GRAMS)	0.0044	0.0094	0.0212

Y. AVERAGE GAS VELOCITY, FPM	3897	3653	3507
Z. STACK GAS FLOW RATE			
1)AT STACK, Qa, ACFM	6886	6455	6197
2)AT Std.,Qstd, SCFM	6055	5774	5542
3)Std. DRY,Qdg, SCFM	5990	5689	5454
AA. PERCENT EXCESS AIR	**********		
BB. CONCENTRATION CONVERSION FACTORS:			
1)50% E.A.,AFTER COLLECTOR	65.281	55.998	53.647
2)50% E.A.,BEFORE COLLECTOR	115.774	116.074	116.166
3)MOISTURE BEFORE COLLECTOR	1.007	1.009	1.010
CC. PARTICULATE CONCENTRATION:			
1)Lbs/1000 Lbs., ACTUAL	0.002	0.005	0.011
2)Lbs/1000 Lbs., DRY	0.002	0.005	0.012
3)Lbs/1000 Lbs., WET @ 50%E.A	0.142	0.274	0.616
4)Lbs/1000 Lbs., DRY @ 50%E.A	0.252	0.568	1.333
5)GRAINS / DSCF	0.001	0.003	0.006
6)POUNDS / HOUR	0.059	0.126	0.283
DD. PERCENT ISOKINETIC	91.1	90.0	90.3

R PERMIT REVIEW CALCULATION SHEET
RM 4500-89 1-82

DEPARTMENT OF NATURAL RESOURCES

PAGE _____ OF _____

MADE BY: R. O'Leary DATE: 9-11-90

DISCUSSED WITH & CHECKED BY: _____

DATE: _____

APPROVED: _____ DATE: _____

DATE: _____

Foremost stack test

_____

Mill Exhaust — Process Thru-put

Run 1:	1:33 - 2:37	~ 1300 #/hr (26 bags/hr)
Run 2:	3:55 - 4:59	~ 1200 #/hr (24 bags/hr)
Run 3:	5:32 - 6:36	~ 1225 #/hr (24.5 bags/hr)

Dryer Exhaust

Run 1:	1:33 - 2:37	~1800 #/hr (9 drums/hr)
Run 2:	3:55 - 4:59	~1800 #/hr (9 drums/hr)
Run 3:	5:32 - 6:37	~1900 #/hr (9.5 drums/hr)

$E = 3.59\ P^{0.62}$ or 2#/hr from dryer + mill combined per permit #73780900-001

Mill Exhaust

	Allowable
Run 1	2.75 #/hr
Run 2	2.61 #/hr
Run 3	2.65 #/hr

Dryer Exhaust

	allowable
Run 1	3.36 #/hr
Run 2	3.36 #/hr
Run 3	3.48 #/hr

OTNOTES/REFERENCES:

Therefore the permit condition of 2#/hr for PO2 (mill exhaust + Dryer Exhaust) is more restrictive than the emission equation at the process thru-puts ran on the day of the tests.

Visual Emissions results are as follows:

MILL EXHAUST

	AVERAGE OPACITY%
SET 1	0.58
SET 2	0.13
SET 3	0.38

DRYER EXHAUST

Since no plume was observed from the dryer exhaust at any time, the average opacity for all three sets is zero.

AUG 27 1990
Wausau DNR Office

EMISSION TESTING
FOREMOST WHEY
ROTHSCHILD, WISCONSIN

RECEIVED
AUG 31 1990
BUREAU OF
AIR MANAGEMENT

Report Prepared for:

Patrick Merrick
Foremost Whey
Foremost Drive P.O. Box 98
Rothschild, WI 54474

August 20, 1990
WA-1010

SWANSON ENVIRONMENTAL INC.

[illegible] Road • Farmington Hills, Michigan 48024
[illegible] Fax (313) 478-3819

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APPENDIX

EMISSION TESTING
FOREMOST WHEY
ROTHSCHILD, WISCONSIN
AUGUST 20, 1990
WA 1010

1.0 EXECUTIVE SUMMARY

Swanson Environmental, Inc. (SEI) was retained by Foremost Whey, to conduct air emissions testing and visual emissions at the Foremost Whey Plant, located in Rothschild, Wisconsin. The testing was conducted on the mill exhaust and dryer exhaust in accordance with Wisconsin Department of Natural Resources (WDNR) Permit Requirements. The results can be found in Tables 1 through 5. The particulate emission data is summarized here as follows:

TOTAL MILL PARTICULATE EMISSIONS

	grams per test	grains per DSCF	lbs/1000 lbs dry gas	lbs/hr
P-1:	0.0721	0.038	0.072	1.086
P-2:	0.0176	0.009	0.017	0.251
P-3:	0.0813	0.040	0.076	1.135
TOT.	0.1710	0.087	0.165	2.472
AVE.	0.0570	0.029	0.055	0.824

TOTAL DRYER PARTICULATE EMISSIONS

	grams per test	grains per DSCF	lbs/1000 lbs dry gas	lbs/hr
P-1:	0.0084	0.002	0.004	0.112
P-2:	0.0142	0.004	0.008	0.190
P-3:	0.0277	0.008	0.016	0.370
TOT.	0.0503	0.014	0.028	0.672
AVE.	0.0168	0.005	0.009	0.224

Visual Emissions results are as follows:

MILL EXHAUST

	AVERAGE OPACITY%
SET 1	0.58
SET 2	0.13
SET 3	0.38

DRYER EXHAUST

Since no plume was observed from the dryer exhaust at any time, the average opacity for all three sets is zero.

2.0 INTRODUCTION

Swanson Environmental, Inc. (SEI) was retained to conduct an emission study at the Foremost Whey Plant located in Rothschild, Wisconsin. The testing was conducted on the mill exhaust and the dryer exhaust.

The testing plan included sampling and analytical procedures to measure the following:

1. Total particulate matter of the front half of the sampling train, total particulate matter captured in the impingers (or back half); and
2. Visual emissions.

All procedures are in accordance with the Sampling Protocol approved by the State of Wisconsin Department of Natural Resources (WDNR).

The testing was conducted on July 24, 1990, by Mark Byers Dave Snyder, Tim Young, and Tom Wilk of SEI. The testing was observed by Mr. Neal Baudhuin of the WDNR. Process operators and Mr. Carl Bellohlazek of Foremost Whey assisted in coordinating testing efforts with SEI personnel. SEI would like to take this opportunity to extend its appreciation to all personnel whose efforts facilitated the completion of testing.

3.0 PROCESS DESCRIPTION

Foremost Whey manufactures lactose for the pharmaceutical industry. The wet product is sent through a flash dryer to remove the moisture, then through a mill grinder before final packaging. The exhausts of these two processes were tested per the WDNR Permit Requirements.

4.0 TESTING PROCEDURES/OPERATING CONDITIONS DURING TESTING

4.1 Total Particulate Matter

Particulate emissions were sampled in accordance with U.S. EPA Methods 1, 2, 4, and 17. An initial pitot traverse was conducted in accordance with U.S. EPA Methods 1 and 2 to determine nozzle size and meter factor. A wet bulb/dry bulb thermometer was employed to measure moisture content of each emission point prior to testing. U.S. EPA Methods 4 and 17 were conducted with the following sampling train components:

a. Appropriately sized stainless steel nozzle;

b. Alundum thimble and thimble holder;

c. Type "AE" 47 mm diameter fiberglass filter and filter holder;

d. Stainless steel probe with attached thermocouple and pitot tube;

e. Flexible PVC sample line;

f. Four impingers placed in an insulted ice bath in the following configuration:

   1. Long stem modified Greenburg-Smith impinger with 100 mls of deionized water,
   2. Long stem modified Greenburg-Smith impinger with 100 mls of deionized water,
   3. A dry long stem Greenburg-Smith impinger, and
   4. Long Stem Greenburg-Smith impinger with approximately 200 grams of silica gel;

g. Umbilical sampling line from impingers to meter rig; and

h. Meter rig with calibrated gas metering system and calibrated orifice.

A pre-test leak check was conducted on the pitot tube at a height of 3" Hg. A pre-test leak check of the sampling train was conducted at a vacuum of 15" Hg. A post-test leak check of the sampling train was conducted at a vacuum equal to or greater than the highest vacuum reached during testing.

Directly following each test run, the nozzles were removed, and brushed and rinsed with acetone. These rinsings were stored in Container #2. The thimble and filter assemblies were capped for transportation to the lab. These were placed in Container #1.

The spent silica gel impinger was also capped for re-weighing at the lab. This was marked Container #3. The de-prep of the impingers involved measuring the volume of the impinger catch with a graduated cylinder and placing the fluid in Container #4. The impingers, u-bends, and graduated cylinders were then rinsed with DI, and these rinsings were added to Container #4. A final rinse with acetone was done on the impingers and u-bends, and placed in Container #5. All containers were sealed and marked for liquid level.

Upon arrival at the lab, the thimbles and filters were removed from the assemblies and desiccated to constant weight. All liquids were evaporated in pre-weighed aluminum dishes under an enclosed, dust free hood. Blanks were employed for the thimbles, filters, and evaporating containers, as well as for the water and acetone rinses.

The weight gains of Container #1 and the residue of evaporation from Container #2 were combined to yield total front half particulate emissions for each run. The weight gain of Container #3 was added to the volume increases of the impingers to give total moisture for each test run. The residue of evaporation for Container #4 and Container #5 were combined to yield total particulate captured in the impingers, or back half of the sampling train.

4.2 Visual Emissions

Visual emissions from both stacks were determined using EPA Method 9, "Visual Determination of the Opacity of Emission from Stationary Sources." Since both stacks were within 15 feet of each other, it was possible to observe the opacity of both plumes simultaneously. Both stacks exited the side of the building about 6 feet below the roof line and extended about 6 feet horizontally out from the building. The southernmost stack (mill exhaust) was round and ended in a rectangular louvered cover. The northernmost stack (dryer exhaust) was also round, but had no cover or screen on the end. The point of observation was located south of both stacks. This allowed observation of both plumes with no overlap, at a point roughly perpendicular to the plumes. Because the stacks exited a wall horizontally, it was not 140 degree sector. Set number 1 could be read in this position, but 2 and 3 could not.

The mill exhaust plume was white and observed 6 feet straight out from the end of the stack against a contrasting dark background through a doorway. The dryer exhaust showed no visible plume at any time. Observations were made at a point 3 feet straight out from the end of the stack, with the sky as background.

During testing, opacities were observed at 15 second intervals. A total of 240 observations were recorded for each stack during each of three 1-hour sampling runs. Observations were recorded to the nearest 5 percent on Wisconsin DNR Smoke Forms, along with field records of date, times, estimated distances, and ambient conditions. Average opacities for each set of 240 observations were calculated by summing the opacity of the set and dividing this sum by 240.

5.0 RESULTS

5.1 Visual Emissions

Mill exhaust opacities ranged from zero to 25 percent, with calculated averages as follows:

	Average Opacity %
Set 1	0.58
Set 2	0.13
Set 3	0.38

Since no plume was observed from the dryer exhaust at any time, the average opacity for all three sets is zero.

5.2 Particulate Emissions

The average total pounds per hour for the mill is .824 lbs/hr and the dryer exhaust is 0.224 lbs/hr. The average total weight in grams collected for dryer is 0.0168 grams and mill exhaust averaged 0.0570 grams.

Field data, calculation sheets, and chain of custodies are located in the Appendix.

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SWANSON ENVIRONMENTAL, INC.

TABLE 1

MILL FRONT HALF
PLANT: WHEY
LOCATION: ROTHSCHOLD
DATE: 7-24-90

PARTICULATE EMISSION RATE

TEST No.	TEST DATE	STACK GAS FLOW RATE (DSCFM)	EMISSION CONC. RATE GRAIN PER DSCF	EMISSION CONC. RATE LBS/1000 LBS DRY-GAS	EMISSION CONC. RATE LBS/1000 LBS DRY 50%E A*	EMISSION RATE LBS/ HOUR
P-1	7-24-90	3349	0.033	0.063	7.287	0.949
P-2	7-24-90	3304	0.004	0.007	0.776	0.100
P-3	7-24-90	3327	0.039	0.074	8.505	1.101
AVERAGE		3327	0.025	0.048	5.523	0.717

* E A = EXCESS AIR

SWANSON ENVIRONMENTAL, INC.

TABLE 2

MILL BACK HALF
PLANT: WHEY
LOCATION: ROTHSCHOLD
DATE: 7-24-90

PARTICULATE EMISSION RATE

TEST No.	TEST DATE	STACK GAS FLOW RATE (DSCFM)	EMISSION CONC. RATE GRAIN PER DSCF	EMISSION CONC. RATE LBS/1000 LBS DRY-GAS	EMISSION CONC. RATE LBS/1000 LBS DRY 50%E A*	EMISSION RATE LBS/ HOUR
P-1	7-24-90	3349	0.005	0.009	1.053	0.137
P-2	7-24-90	3304	0.005	0.010	1.178	0.151
P-3	7-24-90	3327	0.001	0.002	0.261	0.034
AVERAGE		3327	0.004	0.007	0.831	0.107

* E A = EXCESS AIR

SWANSON ENVIRONMENTAL, INC.

TABLE 3

DRYER FRONT HALF
PLANT: WHEY
LOCATION: ROTHSCHOLD
DATE: 7-24-90

PARTICULATE EMISSION RATE

TEST No.	TEST DATE	STACK GAS FLOW RATE (DSCFM)	EMISSION CONC. RATE GRAIN PER DSCF	EMISSION CONC. RATE LBS/1000 LBS DRY-GAS	EMISSION CONC. RATE LBS/1000 LBS DRY 50%E A*	EMISSION RATE LBS/ HOUR
P-1	7-24-90	5990	0.001	0.002	0.252	0.059
P-2	7-24-90	5689	0.003	0.005	0.568	0.126
P-3	7-24-90	5454	0.006	0.012	1.333	0.283
AVERAGE		5711	0.003	0.006	0.718	0.156

* E A = EXCESS AIR

SWANSON ENVIRONMENTAL, INC.

TABLE 4

DRYER BACK HALF
PLANT: WHEY
LOCATION: ROTHSCHOLD
DATE: 7-24-90

PARTICULATE EMISSION RATE

TEST No.	TEST DATE	STACK GAS FLOW RATE (DSCFM)	EMISSION RATE GRAIN PER DSCF	CONC. LBS/1000 LBS DRY-GAS	CONC. LBS/1000 LBS DRY 50%E A*	EMISSION RATE LBS/ HOUR
P-1	7-24-90	5990	0.001	0.002	0.226	0.053
P-2	7-24-90	5689	0.001	0.003	0.289	0.064
P-3	7-24-90	5454	0.002	0.004	0.408	0.087
AVERAGE		5711	0.001	0.003	0.308	0.068

* E A = EXCESS AIR

SWANSON ENVIRONMENTAL INC.

TABLE 5

GRAMS PER TEST

SOURCE	MILL EXHAUST front	MILL EXHAUST back	Total	DRYER EXHAUST front	DRYER EXHAUST back	Total
P-1	.0630	.0091	.0721	.0044	.0040	.0084
P-2	.0070	.0106	.0176	.0094	.0048	.0142
P-3	.0789	.0024	.0813	.0212	.0065	.0277
TOTAL	.1489	.0221		.0350	.0153	

APPENDIX A

SWANSON ENVIRONMENTAL, INC.

PITOT TRAVERSE DATA
MILL EXHAUST

PLANT:	FOREMOST WHEY	PITOT No.	5.000	STACK PRES. In. H20	0.290
DATE:	7-24-90	STACK DIA.	9.250	STACK TEMP. F.	171.375
TIME:	745.000	B.P. In.Hg.	29.870	STACK AREA Sq.Ft.	0.467
WB. TEMP	0.000	DB. TEMP.	0.000	SAMPLE POINTS	16.000
% H2O VOL	1.305	Cp :	0.808	Ps:	29.891

SAMPLE POINTS	SQRT PITOT DELTA	PITOT DELTA	STACK TEMP
1	1.746	3.050	175.000
2	2.480	6.150	174.000
3	2.665	7.100	171.000
4	2.579	6.650	171.000
5	2.408	5.800	171.000
6	2.828	8.000	170.000
7	3.082	9.500	170.000
8	3.606	13.000	170.000
9	2.324	5.400	171.000
10	2.470	6.100	172.000
11	2.490	6.200	172.000
12	2.470	6.100	172.000
13	2.168	4.700	172.000
14	2.214	4.900	171.000
15	2.408	5.800	170.000
16	3.391	11.500	170.000
17	0.000	0.000	0.000
18	0.000	0.000	0.000
19	0.000	0.000	0.000
20	0.000	0.000	0.000
21	0.000	0.000	0.000
22	0.000	0.000	0.000
23	0.000	0.000	0.000
24	0.000	0.000	0.000
AVERAGES:	2.58		171.38

****

1). Vs= 9151.19 (Gs= 0.995)
2). Qs= 4270.60
3). Qscfm= 3581.46 SCFM DRY= 3534.74

Vs = 2.9 Cp 60 SQRT(Ts,ave+460)*AVE.SQRT(DELTA-P)*SQRT(29.92/Ps*1/Gs)
Qs = Vs*As AND Qscfm=Qs*530/(Ts+460)*Ps/29.92

==========

SWANSON ENVIRONMENTAL INC.

TEST No.: P-1

PLANT:	FOREMOST WHEY	PITOT No:	5.000	CALIBRATION PITOT:	0.8080
DATE:	7-24-90	METER BOX:	N-1	NOZ. DIA. Inches :	0.1190
LOCATION:	ROTHSCHOLD	AMB TEMP F.	73.000	STACK DIA. Inches :	9.2500
OPERATOR:	TGW	B.P. In.Hg.	29.250	STACK PRESS In. H2O:	3.0500
SOURCE:	MILL EXH.	ASSUMED %M:	6.0	H20 VOL. Ml. :	11.600
LEAK TST:	0.011	METER DEL-H	1.815	METER f:	0.179
Hg INT.:	16.000	Kiso:	1549.591	Yd:	1.008
LEAK TST:	0.006	PROBE LEN:	72.000	SAMPLE PTS:	16
Hg FIN.:	20.000	W.B.TEMP F.	0.000	TOT.TIME:	60.000

****

SAMPLE POINTS	PITOT SQRT	ORIFICE No.	DRY GAS	METER TEMP F	STACK TEMP F	PITOT DELTA
1	2.665	1.130	747.190	96.000	165.000	7.100
2	2.720	1.190	748.760	97.000	160.000	7.400
3	2.702	1.180	751.550	97.000	156.000	7.300
4	2.588	1.090	753.680	97.000	154.000	6.700
5	2.049	0.680	755.870	97.000	157.000	4.200
6	1.949	0.620	757.820	97.000	154.000	3.800
7	2.049	0.680	759.490	96.000	154.000	4.200
8	2.302	0.860	761.230	96.000	155.000	5.300
9	2.828	1.300	763.120	96.000	155.000	8.000
10	2.569	1.070	765.340	97.000	157.000	6.600
11	2.683	1.160	767.510	98.000	158.000	7.200
12	2.775	1.250	769.680	98.000	157.000	7.700
13	2.429	0.960	771.850	99.000	158.000	5.900
14	2.258	0.820	774.040	99.000	160.000	5.100
15	2.258	0.820	776.020	99.000	160.000	5.100
16	2.408	0.940	778.000	99.000	160.000	5.800
17	0.000	0.000	778.460	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000
FINAL #	2.452	0.984	31.270	97.375	157.500	

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SWANSON ENVIRONMENTAL INC.

TEST No.: P-2

PLANT:	FOREMOST WHEY	PITOT No:	5.000	CALIBRATION PITOT:	0.8080
DATE:	7-24-90	METER BOX:	N-1	NOZ. DIA. Inches :	0.1190
LOCATION:	ROTHSCHOLD	AMB TEMP F.	75.000	STACK DIA. Inches :	9.2500
OPERATOR:	TGW	B.P. In.Hg.	29.200	STACK PRESS In. H2O:	3.0500
SOURCE:	MILL EXH.	ASSUMED %M:	6.000	H20 VOL. Ml. :	7.000
LEAK TST:	0.006	METER DEL-H	1.815	METER f:	0.179
Hg INT.:	16.000	Kiso:	1549.591	Yd:	1.008
LEAK TST:	0.004	PROBE LEN:	72.000	SAMPLE PTS:	16
Hg FIN.:	15.000	W.B.TEMP F.	0.000	TOT. TIME:	60.000

****

SAMPLE POINTS	PITOT SQRT	ORIFICE No.	DRY GAS	METER TEMP	STACK TEMP	PITOT DELTA
1	2.258	0.800	780.160	97.000	176.000	5.100
2	2.280	0.830	781.880	98.000	165.000	5.200
3	2.588	1.080	784.070	98.000	162.000	6.700
4	2.530	1.030	786.120	98.000	162.000	6.400
5	2.530	1.030	788.250	98.000	163.000	6.400
6	2.280	0.840	790.400	99.000	161.000	5.200
7	2.258	0.820	792.440	100.000	162.000	5.100
8	2.236	0.810	794.450	100.000	162.000	5.000
9	2.757	1.230	796.410	100.000	162.000	7.600
10	2.757	1.230	798.620	100.000	161.000	7.600
11	2.739	1.220	800.830	101.000	158.000	7.500
12	2.646	1.140	803.040	101.000	156.000	7.000
13	2.121	0.740	805.350	101.000	155.000	4.500
14	1.949	0.620	807.200	102.000	157.000	3.800
15	2.214	0.810	808.960	102.000	152.000	4.900
16	2.449	0.990	810.890	102.000	153.000	6.000
17	0.000	0.000	812.970	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000
				0.000		
FINAL #	2.41	0.95	32.81	99.81	160.44	

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SWANSON ENVIRONMENTAL INC.

TEST No.: P-3

PLANT:	FOREMOST WHEY	PITOT No:	5.000	CALIBRATION PITOT:	0.8080
DATE:	7-24-90	METER BOX:	N-1	NOZ. DIA. Inches :	0.1190
LOCATION:	ROTHSCHOLD	AMB TEMP F.	77.000	STACK DIA. Inches :	9.2500
OPERATOR:	TGW	B.P. In.Hg.	29.200	STACK PRESS In. H2O:	3.0500
SOURCE:	MILL EXH.	ASSUMED %M:	6.000	H20 VOL. Ml. :	8.900
LEAK TST:	0.000	METER DEL-H	1.815	METER f:	0.179
Hg INT.:	15.000	Kiso:	1549.591	Yd:	1.008
LEAK TST:	0.000	PROBE LEN:	72.000	SAMPLE PTS:	16
Hg FIN.:	8.000	W.B.TEMP F.	0.000	TOT. TIME:	60.00

SAMPLE POINTS	PITOT SQRT	ORIFICE No.	DRY GAS	METER TEMP	STACK TEMP	PITOT DELTA
1	2.702	1.190	813.290	100.000	156.000	7.300
2	2.739	1.210	816.610	100.000	162.000	7.500
3	2.683	1.170	818.410	100.000	159.000	7.200
4	2.345	0.890	820.310	100.000	156.000	5.500
5	2.121	0.730	822.120	100.000	154.000	4.500
6	2.000	0.650	824.450	101.000	153.000	4.000
7	1.924	0.610	826.250	101.000	152.000	3.700
8	2.025	0.670	827.450	101.000	154.000	4.100
9	2.775	1.260	829.760	101.000	155.000	7.700
10	2.588	1.090	831.990	101.000	157.000	6.700
11	2.665	1.160	834.390	102.000	156.000	7.100
12	2.739	1.230	836.710	102.000	153.000	7.500
13	2.470	1.000	839.000	102.000	156.000	6.100
14	2.387	0.930	841.110	102.000	158.000	5.700
15	2.258	0.830	843.130	102.000	156.000	5.100
16	2.366	0.920	845.210	103.000	153.000	5.600
17	0.000	0.000	847.110	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000
		0.000				
FINAL #	2.42	0.97	33.82	101.13	155.63	

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No.:P-1
SOURCE: MILL EXH. WTS. DATE: 8-13-90
FRONT HALF

****

FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 20.243

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	71.00	30.00		0.00
CONT. No.	00131-13	00131-10	00131-12	0
FIN. WTS.	1557.90	1546.40	1585.20	0.00
INT. WTS.	1535.20	1544.90	1584.40	0.00
NET WTS.	22.70	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	21.90	0.70 mg		-0.80
ACE CORR.	1.66			0.00
FINAL WTS	20.24 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = 0.24

	TEST FILTER	BLANK FILTER
FILTER No	820-30	820-36
FINAL WT.	52.07	51.30
INT. WT.	51.35	50.83
NET WT.	0.72	0.47 mg
BLK. CORR	0.48	
FINAL WT.	0.24 mg	

FRACTION C BACK UP FILTER FRACTION C TOTAL WTS (mg) = 42.52

FILTER No	00703-13	BLANK 00703-4
FINAL WT.	55833.60	50076.50
INT. WT.	55791.30	50076.70
NET WT.	42.30	-0.20 mg
BLK. CORR	-0.22	
FINAL WT.	42.52 mg	

TOTAL WEIGHTS (mg) = 63.00
TOTAL WEIGHTS (g) = 0.0630

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-2
SOURCE: MILL EXH. WTS. DATE: 8-13-90
FRONT HALF

****

FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 3.53

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINSE (mg)
LIQUID VL	76.00	30.00		0.00
CONT. No.	00131-16	00131-10	00131-12	0
FIN. WTS.	1600.90	1546.40	1585.20	0.00
INT. WTS.	1594.80	1544.90	1584.40	0.00
NET WTS.	6.10	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	5.30	0.70 mg		-0.80
ACE CORR.	1.77			0.00
FINAL WTS	3.53 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = 0.95

	TEST FILTER	BLANK FILTER
FILTER No	820-34	820-36
FINAL WT.	46.80	51.30
INT. WT.	45.42	50.83
NET WT.	1.38	0.47 mg
BLK. CORR	0.43	
FINAL WT.	0.95 mg	

FRACTION C BACK UP FILTER FRACTION C TOTAL WTS (mg) = 2.53

FILTER No	00703-6	BLANK00703-4
FINAL WT.	56660.90	50076.50
INT. WT.	56658.60	50076.70
NET WT.	2.30	-0.20 mg
BLK. CORR	-0.23	
FINAL WT.	2.53 mg	

TOTAL WEIGHTS (mg) = 7.00
TOTAL WEIGHTS (g) = 0.0070

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-3
SOURCE: MILL EXH. WTS. DATE: 8-13-90
FRONT HALF

****

FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 4.97

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	40.00	30.00		0.00
CONT. No.	00131-20	00131-10	00131-12	0
FIN. WTS.	1580.00	1546.40	1585.20	0.00
INT. WTS.	1573.30	1544.90	1584.40	0.00
NET WTS.	6.70	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	5.90	0.70 mg		-0.80
ACE CORR.	0.93			0.00
FINAL WTS	4.97 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = -0.71

	TEST FILTER	BLANK FILTER
FILTER No	820-33	820-36
FINAL WT.	44.70	51.30
INT. WT.	45.00	50.83
NET WT.	-0.30	0.47 mg
BLK. CORR	0.41	
FINAL WT.	-0.71 mg	

FRACTION C BACK UP FILTER FRACTION C TOTAL WTS (mg) = 74.62

FILTER No	00703-2	BLANK00703-4
FINAL WT.	54080.70	50076.50
INT. WT.	54006.30	50076.70
NET WT.	74.40	-0.20 mg
BLK. CORR	-0.22	
FINAL WT.	74.62 mg	

TOTAL WEIGHTS (mg) = 78.87
TOTAL WEIGHTS (g) = 0.0789

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.
PARTICULATE SAMPLING DATA AND CALCULATIONS

PLANT: WHEY SOURCE: MILL EXH. FRONT HALF
DATE: 7-24-90

CLOCK TIME:	60.000	60.000	60.000
1.000 NUMBER	P-1	P-2	P-3
B. STACK DIAMETER, In	9.250	9.250	9.250
C. STACK AREA, Sq.Ft	0.467	0.467	0.467
D. No. SAMPLE POINTS	16.000	16.000	16.000
E. TOTAL SAMPLE TIME, MIN.	60.000	60.000	60.000
F. NOZZLE DIAMETER, In.	0.119	0.119	0.119
G. NOZZLE AREA, Sq.Ft.	0.00008	0.00008	0.00008
H. CALIBRATION FACTORS:			
PITOT TUBE, Cp	0.8080	0.8080	0.8080
GAS METER, y	1.008	1.008	1.008
I. BAROMETRIC PRESSURE, In.Hg.	29.250	29.200	29.200
J. STACK STATIC PRESSURE In.H20	3.050	3.050	3.050
K. STACK GAS TEMP.	157.50	160.44	155.63
L. AVG. Sq. Rt. VEL. HEAD	2.45	2.41	2.42
M. AVG. METER TEMP.	97.38	99.81	101.13
N. AVG. METER PRESS., H2O	0.98	0.95	0.97
O. METER VOL., ACTUAL Cu. Ft.	31.27	32.810	33.820
P. METER VOL., @STP	29.378	30.636	31.507
Q. LIQUID VOL., H20 COND., Ml.	11.600	7.000	8.900
R. VAPOR VOL., H20 COND., @STP, Cu.Ft.	0.550	0.332	0.422
S. TOTAL GAS SAMPLED, @ STP, Cu.Ft.	29.928	30.968	31.928
T. %MOISTURE IN EXHAUST GAS			
1) AT TEST LOCATION	1.837	1.071	1.321
2) BEFORE COLLECTOR	0.000	0.000	0.000
U. DRY GAS COMP. %O2	20.9	20.9	20.9
%CO2	0.0	0.0	0.0
%CO	0.0	0.0	0.0
%N2	79.1	79.1	79.1
V. DENSITY & MOL. Wt. -STACK GAS			
1)DRY, @ STP,Lbs/Cu.Ft.	0.0746	0.0746	0.0746
2)WET, @ STP,Lbs/Cu.Ft.	0.0740	0.0743	0.0742
3)WET @ STACK,Lbs/Cu.Ft.	0.0621	0.0619	0.0623
4)MOL.Wt., @ STP,Lb/MOLE	28.844	28.844	28.844
W. WEIGHT OF GAS SAMPLED:			
1)DRY GAS,Lbs	2.190	2.284	2.349
2)WET GAS,Lbs	2.216	2.299	2.369
X. TOTAL PARTICULATE COLLECTED (GRAMS)	0.0630	0.0070	0.0789

Y. AVERAGE GAS VELOCITY, FPM	8713	8585	8599
Z. STACK GAS FLOW RATE			
1)AT STACK, Qa, ACFM	4066	4007	4013
2)AT Std.,Qstd, SCFM	3412	3340	3372
3)Std. DRY,Qdg, SCFM	3349	3304	3327
AA. PERCENT EXCESS AIR	**********		
BB. CONCENTRATION CONVERSION FACTORS:			
1)50% E.A.,AFTER COLLECTOR	49.653	65.145	59.137
2)50% E.A.,BEFORE COLLECTOR	116.344	115.778	115.962
3)MOISTURE BEFORE COLLECTOR	1.012	1.007	1.008
CC. PARTICULATE CONCENTRATION:			
1)Lbs/1000 Lbs., ACTUAL	0.063	0.007	0.073
2)Lbs/1000 Lbs., DRY	0.063	0.007	0.074
3)Lbs/1000 Lbs., WET @ 50%E.A	3.110	0.437	4.337
4)Lbs/1000 Lbs., DRY @ 50%E.A	7.287	0.776	8.505
5)GRAINS / DSCF	0.033	0.004	0.039
6)POUNDS / HOUR	0.949	0.100	1.101
DD. PERCENT ISOKINETIC	87.7	92.7	94.6

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No.:P-1
SOURCE: MILL EXH. WTS. DATE: 8-18-90
BACK HALF

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FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 5.240

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	54.00	30.00		0.00
CONT. No.	00131-15	00131-10	00131-12	0
FIN. WTS.	1585.80	1546.40	1585.20	0.00
INT. WTS.	1578.50	1544.90	1584.40	0.00
NET WTS.	7.30	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	6.50	0.70 mg		-0.80
ACE CORR.	1.26			0.00
FINAL WTS	5.24 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = 3.87

	WATER RINSE (mg)	WATER BLANK (mg)	CONT. BLANK (mg)
LIQUID VL	248.00	30.00	
CONT. No.	00131-14	00131-11	00131-12
FIN. WTS.	1580.60	1553.80	1585.20
INT. WTS.	1571.80	1552.50	1584.40
NET WTS.	8.80	1.30	0.80
CONT CORR	0.80	0.80	
NET WTS.	8.00	0.50 mg	
ACE CORR.	4.13		
FINAL WTS	3.87 mg		

TOTAL WEIGHTS (mg) = 9.11
TOTAL WEIGHTS (g) = 0.0091

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-2
SOURCE: MILL EXH. WTS. DATE: 8-13-90
BACK HALF

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FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 7.30

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINSE (mg)
LIQUID VL	47.00	30.00		0.00
CONT. No.	00131-18	00131-10	00131-12	0
FIN. WTS.	1603.30	1546.40	1585.20	0.00
INT. WTS.	1594.10	1544.90	1584.40	0.00
NET WTS.	9.20	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	8.40	0.70 mg		-0.80
ACE CORR.	1.10			1.10
FINAL WTS	7.30 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = 3.32

	WATER RINSE (mg)	WATER BLANK (mg)	CONT. BLANK (mg)
LIQUID VL	221.00	30.00	
CONT. No.	00131-17	00131-11	00131-12
FIN. WTS.	1593.10	1553.80	1585.20
INT. WTS.	1585.30	1552.50	1584.40
NET WTS.	7.80	1.30	0.80
CONT CORR	0.80	0.80	
NET WTS.	7.00	0.50 mg	
ACE CORR.	3.68		
FINAL WTS	3.32 mg		

TOTAL WEIGHTS (mg) = 10.62
TOTAL WEIGHTS (g) = 0.0106

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-3
SOURCE: MILL EXH. WTS. DATE: 8-13-90
BACK HALF

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FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 2.67

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	44.00	30.00		0.00
CONT. No.	00131-22	00131-10	00131-12	0
FIN. WTS.	1547.80	1546.40	1585.20	0.00
INT. WTS.	1543.30	1544.90	1584.40	0.00
NET WTS.	4.50	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	3.70	0.70 mg		-0.80
ACE CORR.	1.03			0.00
FINAL WTS	2.67 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = -0.25

	WATER RINSE (mg)	WATER BLANK (mg)	CONT. BLANK (mg)
LIQUID VL	237.00	30.00	
CONT. No.	00131-21	00131-11	00131-12
FIN. WTS.	1578.70	1553.80	1585.20
INT. WTS.	1574.20	1552.50	1584.40
NET WTS.	4.50	1.30	0.80
CONT CORR	0.80	0.80	
NET WTS.	3.70	0.50 mg	
ACE CORR.	3.95		
FINAL WTS	-0.25 mg		

TOTAL WEIGHTS (mg) = 2.42
TOTAL WEIGHTS (g) = 0.0024

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.
PARTICULATE SAMPLING DATA AND CALCULATIONS

PLANT: WHEY
DATE: 7-24-90

SOURCE: MILL EXH. BACK HALF

CLOCK TIME:	60.000	60.000	60.000
1.000 NUMBER	P-1	P-2	P-3
B. STACK DIAMETER, In	9.250	9.250	9.250
C. STACK AREA, Sq.Ft	0.467	0.467	0.467
D. No. SAMPLE POINTS	16.000	16.000	16.000
E. TOTAL SAMPLE TIME, MIN.	60.000	60.000	60.000
F. NOZZLE DIAMETER, In.	0.119	0.119	0.119
G. NOZZLE AREA, Sq.Ft.	0.00008	0.00008	0.00008
H. CALIBRATION FACTORS:			
PITOT TUBE, Cp	0.8080	0.8080	0.8080
GAS METER, y	1.008	1.008	1.008
I. BAROMETRIC PRESSURE, In.Hg.	29.250	29.200	29.200
J. STACK STATIC PRESSURE In.H20	3.050	3.050	3.050
K. STACK GAS TEMP.	157.50	160.44	155.63
L. AVG. Sq. Rt. VEL. HEAD	2.45	2.41	2.42
M. AVG. METER TEMP.	97.38	99.81	101.13
N. AVG. METER PRESS., H2O	0.98	0.95	0.97
O. METER VOL., ACTUAL Cu. Ft.	31.27	32.810	33.820
P. METER VOL., @STP	29.378	30.636	31.507
Q. LIQUID VOL., H20 COND., Ml.	11.600	7.000	8.900
R. VAPOR VOL., H20 COND., @STP, Cu.Ft.	0.550	0.332	0.422
S. TOTAL GAS SAMPLED, @ STP, Cu.Ft.	29.928	30.968	31.928
T. %MOISTURE IN EXHAUST GAS			
1) AT TEST LOCATION	1.837	1.071	1.321
2) BEFORE COLLECTOR	0.000	0.000	0.000
U. DRY GAS COMP. %O2	20.9	20.9	20.9
%CO2	0.0	0.0	0.0
%CO	0.0	0.0	0.0
%N2	79.1	79.1	79.1
V. DENSITY & MOL. Wt. -STACK GAS			
1)DRY, @ STP,Lbs/Cu.Ft.	0.0746	0.0746	0.0746
2)WET, @ STP,Lbs/Cu.Ft.	0.0740	0.0743	0.0742
3)WET @ STACK,Lbs/Cu.Ft.	0.0621	0.0619	0.0623
4)MOL.Wt., @ STP,Lb/MOLE	28.844	28.844	28.844
W. WEIGHT OF GAS SAMPLED:			
1)DRY GAS,Lbs	2.190	2.284	2.349
2)WET GAS,Lbs	2.216	2.299	2.369
X. TOTAL PARTICULATE COLLECTED (GRAMS)	0.0091	0.0106	0.0024

Y. AVERAGE GAS VELOCITY, FPM	8713	8585	8599
Z. STACK GAS FLOW RATE			
1)AT STACK, Qa, ACFM	4066	4007	4013
2)AT Std.,Qstd, SCFM	3412	3340	3372
3)Std. DRY,Qdg, SCFM	3349	3304	3327
AA. PERCENT EXCESS AIR	**********		
BB. CONCENTRATION CONVERSION FACTORS:			
1)50% E.A.,AFTER COLLECTOR	49.653	65.145	59.137
2)50% E.A.,BEFORE COLLECTOR	116.344	115.778	115.962
3)MOISTURE BEFORE COLLECTOR	1.012	1.007	1.008
CC. PARTICULATE CONCENTRATION:			
1)Lbs/1000 Lbs., ACTUAL	0.009	0.010	0.002
2)Lbs/1000 Lbs., DRY	0.009	0.010	0.002
3)Lbs/1000 Lbs., WET @ 50%E.A	0.449	0.663	0.133
4)Lbs/1000 Lbs., DRY @ 50%E.A	1.053	1.178	0.261
5)GRAINS / DSCF	0.005	0.005	0.001
6)POUNDS / HOUR	0.137	0.151	0.034
DD. PERCENT ISOKINETIC	87.7	92.7	94.6

SWANSON ENVIRONMENTAL, INC.

PITOT TRAVERSE DATA
DRYER EXAUST

PLANT:	FOREMOST WHEY	PITOT No.	4.000	STACK PRES. In. H20	0.290
DATE:	7-24-90	STACK DIA.	18.000	STACK TEMP. F.	117.250
TIME:	815.000	B.P. In.Hg.	29.870	STACK AREA Sq.Ft.	1.767
WB. TEMP	0.000	DB. TEMP.	0.000	SAMPLE POINTS	12.000
% H2O VOL	1.318	Cp :	0.797	Ps:	29.891

SAMPLE POINTS	SQRT PITOT DELTA	PITOT DELTA	STACK TEMP
1	1.072	1.150	118.000
2	1.034	1.070	118.000
3	1.044	1.090	118.000
4	1.204	1.450	118.000
5	1.118	1.250	117.000
6	1.095	1.200	117.000
7	0.616	0.380	117.000
8	0.721	0.520	117.000
9	0.700	0.490	117.000
10	0.640	0.410	117.000
11	0.624	0.390	117.000
12	0.557	0.310	116.000
13	0.000	0.000	0.000
14	0.000	0.000	0.000
15	0.000	0.000	0.000
16	0.000	0.000	0.000
17	0.000	0.000	0.000
18	0.000	0.000	0.000
19	0.000	0.000	0.000
20	0.000	0.000	0.000
21	0.000	0.000	0.000
22	0.000	0.000	0.000
23	0.000	0.000	0.000
24	0.000	0.000	0.000
AVERAGES:	0.87		117.25

****

1). Vs= 2903.66 (Gs= 0.995)
2). Qs= 5131.20
3). Qscfm= 4706.68 SCFM DRY= 4644.63

Vs = 2.9 Cp 60 SQRT(Ts,ave+460)*AVE.SQRT(DELTA-P)*SQRT(29.92/Ps*1/Gs)
Qs = Vs*As AND Qscfm=Qs*530/(Ts+460)*Ps/29.92

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SWANSON ENVIRONMENTAL INC.

TEST No.: P-1

PLANT:	FOREMOST WHEY	PITOT No:	4.000	CALIBRATION PITOT:	0.7970
DATE:	7-24-90	METER BOX:	N-2	NOZ. DIA. Inches :	0.2430
LOCATION:	ROTHSCHOLD	AMB TEMP F.	73.000	STACK DIA. Inches :	18.0000
OPERATOR:	TGW	B.P. In.Hg.	29.250	STACK PRESS In. H2O:	0.9700
SOURCE:	DRYER EXH.	ASSUMED %M:	5.0	H20 VOL. Ml. :	13.600
LEAK TST:	0.004	METER DEL-H	1.754	METER f:	2.963
Hg INT.:	17.000	Kiso:	1482.273	Yd:	1.012
LEAK TST:	0.003	PROBE LEN:	72.000	SAMPLE PTS:	12
Hg FIN.:	27.000	W.B.TEMP F.	0.000	TOT.TIME:	60.000

****

SAMPLE POINTS	PITOT SQRT	ORIFICE No.	DRY GAS	METER TEMP F	STACK TEMP F	PITOT DELTA
1	1.265	5.070	200.040	94.000	138.000	1.600
2	1.183	3.720	205.760	94.000	137.000	1.400
3	1.183	3.720	211.190	95.000	132.000	1.400
4	1.095	3.870	216.650	95.000	130.000	1.200
5	1.095	3.340	222.070	95.000	130.000	1.200
6	1.140	3.630	227.370	95.000	129.000	1.300
7	1.049	3.080	232.490	95.000	127.000	1.100
8	1.049	3.080	237.300	96.000	128.000	1.100
9	1.072	3.220	242.000	96.000	127.000	1.150
10	1.118	3.540	246.770	97.000	123.000	1.250
11	1.245	4.390	251.750	99.000	124.000	1.550
12	1.183	4.340	257.350	99.000	126.000	1.400
13	0.000	0.000	262.840	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000
17	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000
FINAL #	1.140	3.750	62.800	95.833	129.250	

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SWANSON ENVIRONMENTAL INC.

TEST No.: P-2

PLANT:	FOREMOST WHEY	PITOT No:	4.000	CALIBRATION PITOT:	0.7970
DATE:	7-24-90	METER BOX:	N-2	NOZ. DIA. Inches :	0.2430
LOCATION:	ROTHSCHOLD	AMB TEMP F.	75.000	STACK DIA. Inches :	18.0000
OPERATOR:	TGW	B.P. In.Hg.	29.200	STACK PRESS In. H2O:	0.9700
SOURCE:	DRYER EXH.	ASSUMED %M:	5.000	H20 VOL. Ml. :	17.700
LEAK TST:	0.001	METER DEL-H	1.754	METER f:	2.963
Hg INT.:	17.000	Kiso:	1482.273	Yd:	1.012
LEAK TST:	0.003	PROBE LEN:	72.000	SAMPLE PTS:	12
Hg FIN.:	21.000	W.B.TEMP F.	0.000	TOT. TIME:	60.000

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SAMPLE POINTS	PITOT SQRT	ORIFICE No.	DRY GAS	METER TEMP	STACK TEMP	PITOT DELTA
1	1.039	3.080	263.120	99.000	121.000	1.080
2	0.854	2.100	267.750	101.000	118.000	0.730
3	1.034	3.090	271.510	101.000	116.000	1.070
4	1.166	3.900	276.350	101.000	119.000	1.360
5	1.140	3.720	281.620	101.000	121.000	1.300
6	1.118	3.580	286.860	101.000	120.000	1.250
7	1.118	3.610	292.120	102.000	117.000	1.250
8	1.095	3.450	297.370	102.000	119.000	1.200
9	1.140	3.730	302.470	102.000	121.000	1.300
10	1.072	3.320	307.790	102.000	116.000	1.150
11	1.049	3.200	312.730	102.000	113.000	1.100
12	1.095	3.460	317.700	102.000	117.000	1.200
13	0.000	0.000	322.790	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000
17	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000
				0.000		
FINAL #	1.08	3.35	59.67	101.33	118.17	

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SWANSON ENVIRONMENTAL INC.

TEST No.: P-3

PLANT:	FOREMOST WHEY	PITOT No:	4.000	CALIBRATION PITOT:	0.7970
DATE:	7-24-90	METER BOX:	N-2	NOZ. DIA. Inches :	0.2430
LOCATION:	ROTHSCHOLD	AMB TEMP F.	77.000	STACK DIA. Inches :	18.0000
OPERATOR:	TGW	B.P. In.Hg.	29.200	STACK PRESS In. H2O:	0.9700
SOURCE:	DRYER EXH.	ASSUMED %M:	5.000	H20 VOL. Ml. :	18.500
LEAK TST:	0.002	METER DEL-H	1.754	METER f:	2.963
Hg INT.:	20.000	Kiso:	1482.273	Yd:	1.012
LEAK TST:	0.001	PROBE LEN:	72.000	SAMPLE PTS:	12
Hg FIN.:	14.000	W.B.TEMP F.	0.000	TOT. TIME:	60.00

SAMPLE POINTS	PITOT SQRT	ORIFICE No.	DRY GAS	METER TEMP	STACK TEMP	PITOT DELTA
1	1.049	3.140	324.610	100.000	120.000	1.100
2	1.100	3.470	327.810	100.000	118.000	1.210
3	1.072	3.310	333.010	100.000	117.000	1.150
4	0.854	2.100	338.260	100.000	116.000	0.730
5	0.985	2.780	343.530	101.000	119.000	0.970
6	1.025	3.010	348.930	101.000	118.000	1.050
7	1.000	2.860	353.210	101.000	121.000	1.000
8	1.100	3.490	358.440	101.000	116.000	1.210
9	1.025	3.020	366.610	101.000	117.000	1.050
10	1.025	3.020	372.010	102.000	119.000	1.050
11	1.072	3.300	377.010	102.000	121.000	1.150
12	1.095	3.460	380.610	102.000	118.000	1.200
13	0.000	0.000	382.020	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000
17	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000
23	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000
		0.000				
FINAL #	1.03	3.08	57.41	100.92	118.33	

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No.:P-1
SOURCE: DRYER EXH. WTS. DATE: 8-13-90
FRONT HALF

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FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 2.277

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	61.00	30.00		0.00
CONT. No.	00131-28	00131-10	00131-12	0
FIN. WTS.	1602.50	1546.40	1585.20	0.00
INT. WTS.	1598.00	1544.90	1584.40	0.00
NET WTS.	4.50	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	3.70	0.70 mg		-0.80
ACE CORR.	1.42			0.00
FINAL WTS	2.28 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = 1.15

	TEST FILTER	BLANK FILTER
FILTER No	820-29	820-36
FINAL WT.	47.00	51.30
INT. WT.	45.42	50.83
NET WT.	1.58	0.47 mg
BLK. CORR	0.43	
FINAL WT.	1.15 mg	

FRACTION C BACK UP FILTER FRACTION C TOTAL WTS (mg) = 1.01

		BLANK
FILTER No	00703-3	00703-4
FINAL WT.	53373.90	50076.50
INT. WT.	53373.10	50076.70
NET WT.	0.80	-0.20 mg
BLK. CORR	-0.21	
FINAL WT.	1.01 mg	

TOTAL WEIGHTS (mg) = 4.44
TOTAL WEIGHTS (g) = 0.0044

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-2
SOURCE: DRYER EXH. WTS. DATE: 8-13-90
FRONT HALF

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FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 0.74

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINSE (mg)
LIQUID VL	71.00	30.00		0.00
CONT. No.	00131-31	00131-10	00131-12	0
FIN. WTS.	1571.20	1546.40	1585.20	0.00
INT. WTS.	1568.00	1544.90	1584.40	0.00
NET WTS.	3.20	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	2.40	0.70 mg		-0.80
ACE CORR.	1.66			0.00
FINAL WTS	0.74 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = 1.33

	TEST FILTER	BLANK FILTER
FILTER No	820-32	820-36
FINAL WT.	44.50	51.30
INT. WT.	42.76	50.83
NET WT.	1.74	0.47 mg
BLK. CORR	0.41	
FINAL WT.	1.33 mg	

FRACTION C BACK UP FILTER FRACTION C TOTAL WTS (mg) = 7.31

FILTER No	00703-12	BLANK00703-4
FINAL WT.	52261.70	50076.50
INT. WT.	52254.60	50076.70
NET WT.	7.10	-0.20 mg
BLK. CORR	-0.21	
FINAL WT.	7.31 mg	

TOTAL WEIGHTS (mg) = 9.38
TOTAL WEIGHTS (g) = 0.0094

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-3
SOURCE: DRYER EXH. WTS. DATE: 8-13-90
FRONT HALF

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FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 0.45

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	32.00	30.00		0.00
CONT. No.	00121-84	00131-10	00131-12	0
FIN. WTS.	1563.20	1546.40	1585.20	0.00
INT. WTS.	1561.20	1544.90	1584.40	0.00
NET WTS.	2.00	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	1.20	0.70 mg		-0.80
ACE CORR.	0.75			0.00
FINAL WTS	0.45 mg		mg	0.00

FRACTION B FRONT FILTER FRACTION B TOTAL WTS (mg) = 0.11

	TEST FILTER	BLANK FILTER
FILTER No	820-31	820-36
FINAL WT.	44.40	51.30
INT. WT.	43.88	50.83
NET WT.	0.52	0.47 mg
BLK. CORR	0.41	
FINAL WT.	0.11 mg	

FRACTION C BACK UP FILTER FRACTION C TOTAL WTS (mg) = 20.62

FILTER No	00703-1	BLANK00703-4
FINAL WT.	55017.10	50076.50
INT. WT.	54996.70	50076.70
NET WT.	20.40	-0.20 mg
BLK. CORR	-0.22	
FINAL WT.	20.62 mg	

TOTAL WEIGHTS (mg) = 21.18
TOTAL WEIGHTS (g) = 0.0212

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.
PARTICULATE SAMPLING DATA AND CALCULATIONS

PLANT: WHEY SOURCE: DRYER EXH. FRONT HAL
DATE: 7-24-90

	CLOCK TIME:	60.000	60.000	60.000
	1.000 NUMBER	P-1	P-2	P-3
B.	STACK DIAMETER, In	18.000	18.000	18.000
C.	STACK AREA, Sq.Ft	1.767	1.767	1.767
D.	No. SAMPLE POINTS	12.000	12.000	12.000
E.	TOTAL SAMPLE TIME, MIN.	60.000	60.000	60.000
F.	NOZZLE DIAMETER, In.	0.243	0.243	0.243
G.	NOZZLE AREA, Sq.Ft.	0.00032	0.00032	0.00032
H.	CALIBRATION FACTORS:			
	PITOT TUBE, Cp	0.7970	0.7970	0.7970
	GAS METER, y	1.012	1.012	1.012
I.	BAROMETRIC PRESSURE, In.Hg.	29.250	29.200	29.200
J.	STACK STATIC PRESSURE In.H20	0.970	0.970	0.970
K.	STACK GAS TEMP.	129.25	118.17	118.33
L.	AVG. Sq. Rt. VEL. HEAD	1.14	1.08	1.03
M.	AVG. METER TEMP.	95.83	101.33	100.92
N.	AVG. METER PRESS., H2O	3.75	3.35	3.08
O.	METER VOL., ACTUAL Cu. Ft.	62.80	59.670	57.410
P.	METER VOL., @STP	59.811	56.123	54.000
Q.	LIQUID VOL., H20 COND., Ml.	13.600	17.700	18.500
R.	VAPOR VOL., H20 COND., @STP, Cu.Ft.	0.645	0.839	0.877
S.	TOTAL GAS SAMPLED, @ STP, Cu.Ft.	60.456	56.962	54.877
T.	%MOISTURE IN EXHAUST GAS			
	1) AT TEST LOCATION	1.066	1.473	1.598
	2) BEFORE COLLECTOR	0.000	0.000	0.000
U.	DRY GAS COMP. %O2	20.9	20.9	20.9
	%CO2	0.0	0.0	0.0
	%CO	0.0	0.0	0.0
	%N2	79.1	79.1	79.1
V.	DENSITY & MOL. Wt. -STACK GAS			
	1)DRY, @ STP,Lbs/Cu.Ft.	0.0746	0.0746	0.0746
	2)WET, @ STP,Lbs/Cu.Ft.	0.0743	0.0741	0.0741
	3)WET @ STACK,Lbs/Cu.Ft.	0.0653	0.0663	0.0663
	4)MOL.Wt., @ STP,Lb/MOLE	28.844	28.844	28.844
W.	WEIGHT OF GAS SAMPLED:			
	1)DRY GAS,Lbs	4.459	4.184	4.026
	2)WET GAS,Lbs	4.489	4.223	4.067
X.	TOTAL PARTICULATE COLLECTED (GRAMS)	0.0044	0.0094	0.0212

Y. AVERAGE GAS VELOCITY, FPM	3897	3653	3507
Z. STACK GAS FLOW RATE			
1)AT STACK, Qa, ACFM	6886	6455	6197
2)AT Std.,Qstd, SCFM	6055	5774	5542
3)Std. DRY,Qdg, SCFM	5990	5689	5454
AA. PERCENT EXCESS AIR	**********		
BB. CONCENTRATION CONVERSION FACTORS:			
1)50% E.A.,AFTER COLLECTOR	65.281	55.998	53.647
2)50% E.A.,BEFORE COLLECTOR	115.774	116.074	116.166
3)MOISTURE BEFORE COLLECTOR	1.007	1.009	1.010
CC. PARTICULATE CONCENTRATION:			
1)Lbs/1000 Lbs., ACTUAL	0.002	0.005	0.011
2)Lbs/1000 Lbs., DRY	0.002	0.005	0.012
3)Lbs/1000 Lbs., WET @ 50%E.A	0.142	0.274	0.616
4)Lbs/1000 Lbs., DRY @ 50%E.A	0.252	0.568	1.333
5)GRAINS / DSCF	0.001	0.003	0.006
6)POUNDS / HOUR	0.059	0.126	0.283
DD. PERCENT ISOKINETIC	91.1	90.0	90.3

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No.:P-1
SOURCE: DRYER EXH. WTS. DATE: 8-13-90
BACK HALF

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FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 2.620

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	42.00	30.00		0.00
CONT. No.	00131-30	00131-10	00131-12	0
FIN. WTS.	1584.70	1546.40	1585.20	0.00
INT. WTS.	1580.30	1544.90	1584.40	0.00
NET WTS.	4.40	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	3.60	0.70 mg		-0.80
ACE CORR.	0.98			0.00
FINAL WTS	2.62 mg		mg	0.00

FRACTION B TOTAL WTS (mg) = 1.37

	WATER RINSE (mg)	WATER BLANK (mg)	CONT. BLANK (mg)
LIQUID VL	260.00	30.00	
CONT. No.	00131-29	00131-11	00131-12
FIN. WTS.	1553.60	1553.80	1585.20
INT. WTS.	1547.10	1552.50	1584.40
NET WTS.	6.50	1.30	0.80 mg
CONT CORR	0.80	0.80	
NET WTS.	5.70	0.50 mg	
ACE CORR.	4.33		
FINAL WTS	1.37 mg		

TOTAL WEIGHTS (mg) = 3.99
TOTAL WEIGHTS (g) = 0.0040

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-2
SOURCE: DRYER EXH. WTS. DATE: 8-13-90
BACK HALF

****

FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 5.50

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINSE (mg)
LIQUID VL	43.00	30.00		0.00
CONT. No.	00121-83	00131-10	00131-12	0
FIN. WTS.	1586.90	1546.40	1585.20	0.00
INT. WTS.	1579.60	1544.90	1584.40	0.00
NET WTS.	7.30	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	6.50	0.70 mg		-0.80
ACE CORR.	1.00			0.00
FINAL WTS	5.50 mg		mg	0.00

FRACTION B TOTAL WTS (mg) = -0.72

	WATER RINSE (mg)	WATER BLANK (mg)	CONT. BLANK (mg)
LIQUID VL	247.00	30.00	
CONT. No.	00131-32	00131-11	00131-12
FIN. WTS.	1594.40	1553.80	1585.20
INT. WTS.	1590.20	1552.50	1584.40
NET WTS.	4.20	1.30	0.80 mg
CONT CORR	0.80	0.80	
NET WTS.	3.40	0.50 mg	
ACE CORR.	4.12		
FINAL WTS	-0.72 mg		

TOTAL WEIGHTS (mg) = 4.78
TOTAL WEIGHTS (g) = 0.0048

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.

PLANT: WHEY TEST DATE: 7-24-90 TEST No: P-3
SOURCE: DRYER EXH. WTS. DATE: 8-13-90
BACK HALF

****

FRACTION A ACETONE RINSES FRACTION A TOTAL WTS (mg) = 4.30

	ACE. RINSE (mg)	ACE BLANK (mg)	CONT. BLANK (mg)	5A FILTER RINS (mg)
LIQUID VL	47.00	30.00		0.00
CONT. No.	00121-86	00131-10	00131-12	0
FIN. WTS.	1550.20	1546.40	1585.20	0.00
INT. WTS.	1544.00	1544.90	1584.40	0.00
NET WTS.	6.20	1.50	0.80 mg	0.00
CONT CORR	0.80	0.80		0.80
NET WTS.	5.40	0.70 mg		-0.80
ACE CORR.	1.10			0.00
FINAL WTS	4.30 mg			mg 0.00

FRACTION B TOTAL WTS (mg) = 2.18

	WATER RINSE (mg)	WATER BLANK (mg)	CONT. BLANK (mg)
LIQUID VL	229.00	30.00	
CONT. No.	00121-85	00131-11	00131-12
FIN. WTS.	1553.00	1553.80	1585.20
INT. WTS.	1546.20	1552.50	1584.40
NET WTS.	6.80	1.30	0.80 mg
CONT CORR	0.80	0.80	
NET WTS.	6.00	0.50 mg	
ACE CORR.	3.82		
FINAL WTS	2.18 mg		

TOTAL WEIGHTS (mg) = 6.49
TOTAL WEIGHTS (g) = 0.0065

(1) DO NOT APPLY ANY WEIGHT LOSS CORRECTION FOR LIQUID BLANKS.

*BLANK CORR. WT.= FINAL USED WT./INITIAL BLANK WT * NET CHANGE IN BLANK
*ACE. CORR. WT.= RINSE LIQ./BLANK LIQ. * BLANK LIQ. GAIN IN WT.

SWANSON ENVIRONMENTAL, INC.
PARTICULATE SAMPLING DATA AND CALCULATIONS

PLANT: WHEY SOURCE: DRYER EXH. BACK HALF
DATE: 7-24-90

CLOCK TIME:	60.000	60.000	60.000
1.000 NUMBER	P-1	P-2	P-3
B. STACK DIAMETER, In	18.000	18.000	18.000
C. STACK AREA, Sq.Ft	1.767	1.767	1.767
D. No. SAMPLE POINTS	12.000	12.000	12.000
E. TOTAL SAMPLE TIME, MIN.	60.000	60.000	60.000
F. NOZZLE DIAMETER, In.	0.243	0.243	0.243
G. NOZZLE AREA, Sq.Ft.	0.00032	0.00032	0.00032
H. CALIBRATION FACTORS:			
PITOT TUBE, Cp	0.7970	0.7970	0.7970
GAS METER, y	1.012	1.012	1.012
I. BAROMETRIC PRESSURE, In.Hg.	29.250	29.200	29.200
J. STACK STATIC PRESSURE In.H20	0.970	0.970	0.970
K. STACK GAS TEMP.	129.25	118.17	118.33
L. AVG. Sq. Rt. VEL. HEAD	1.14	1.08	1.03
M. AVG. METER TEMP.	95.83	101.33	100.92
N. AVG. METER PRESS., H2O	3.75	3.35	3.08
O. METER VOL., ACTUAL Cu. Ft.	62.80	59.670	57.410
P. METER VOL., @STP	59.811	56.123	54.000
Q. LIQUID VOL., H20 COND., Ml.	13.600	17.700	18.500
R. VAPOR VOL., H20 COND., @STP, Cu.Ft.	0.645	0.839	0.877
S. TOTAL GAS SAMPLED, @ STP, Cu.Ft.	60.456	56.962	54.877
T. %MOISTURE IN EXHAUST GAS			
1) AT TEST LOCATION	1.066	1.473	1.598
2) BEFORE COLLECTOR	0.000	0.000	0.000
U. DRY GAS COMP. %O2	20.9	20.9	20.9
%CO2	0.0	0.0	0.0
%CO	0.0	0.0	0.0
%N2	79.1	79.1	79.1
V. DENSITY & MOL. Wt. -STACK GAS			
1)DRY, @ STP,Lbs/Cu.Ft.	0.0746	0.0746	0.0746
2)WET, @ STP,Lbs/Cu.Ft.	0.0743	0.0741	0.0741
3)WET @ STACK,Lbs/Cu.Ft.	0.0653	0.0663	0.0663
4)MOL.Wt., @ STP,Lb/MOLE	28.844	28.844	28.844
W. WEIGHT OF GAS SAMPLED:			
1)DRY GAS,Lbs	4.459	4.184	4.026
2)WET GAS,Lbs	4.489	4.223	4.067
X. TOTAL PARTICULATE COLLECTED (GRAMS)	0.0040	0.0048	0.0065

Y. AVERAGE GAS VELOCITY, FPM	3897	3653	3507
Z. STACK GAS FLOW RATE			
1)AT STACK, Qa, ACFM	6886	6455	6197
2)AT Std.,Qstd, SCFM	6055	5774	5542
3)Std. DRY,Qdg, SCFM	5990	5689	5454
AA. PERCENT EXCESS AIR	**********		
BB. CONCENTRATION CONVERSION FACTORS:			
1)50% E.A.,AFTER COLLECTOR	65.281	55.998	53.647
2)50% E.A.,BEFORE COLLECTOR	115.774	116.074	116.166
3)MOISTURE BEFORE COLLECTOR	1.007	1.009	1.010
CC. PARTICULATE CONCENTRATION:			
1)Lbs/1000 Lbs., ACTUAL	0.002	0.002	0.004
2)Lbs/1000 Lbs., DRY	0.002	0.003	0.004
3)Lbs/1000 Lbs., WET @ 50%E.A	0.128	0.140	0.188
4)Lbs/1000 Lbs., DRY @ 50%E.A	0.226	0.289	0.408
5)GRAINS / DSCF	0.001	0.001	0.002
6)POUNDS / HOUR	0.053	0.064	0.087
DD. PERCENT ISOKINETIC	91.1	90.0	90.3

SWANSON ENVIRONMENTAL, INC.

SAMPLING DATA CALCULATION EQUATIONS

A. Sample Number (Test)
B. Stack Dimensions - inches or feet, (In. or Ft.)
C. Area of Stack - square feet, (Sq. Ft.)
D. Number of Points Sample
E. Duration of Sample - time in minutes, (min.)
F. Nozzle Diameter - inches, (In.)
G. Nozzle Area - square feet, (Sq. Ft.)
H. Calibration Factors
   1) Pitot tube, (C_p)
   2) Gas Meter, (γ)
I. Barometric Pressure - inches of mercury, (" Hg)
J. Static Pressure in Stack - inches of water, (" H_2O)
K. Stack Gas Temperature - ^oF
L. Average Square Root of Velocity Head of Points Sampled, ($\overline{\sqrt{\Delta P_s}}$)
M. Average Meter Temperature - ^oF
N. Average Meter Pressure - inches of water, (" H_2O)
O. Meter Volume, Actual Gas Meter Reading, cubic feet,(Cu. Ft.)
P. Meter Volume @ STP, Cu. Ft. = $H_2 \times O \left[\frac{530 \times [I + (0.07355 \times N)]}{(M+460) \times 29.92}\right]$
Q. Liquid Volume of Water Condensed, Ml.

R. Vapor Volume of Water Condensed, @ STP, Cu. Ft., = (Q × 0.0474)

S. Total Gas Sampled, @ STP, Cu. Ft. = (R + P)

T. Percent Moisture in Exhaust Gas
   1) At Test Location = (R/S × 100)
   2) Before Collector (when applicable)

U. Dry Gas Composition : % O_2
% CO_2
% CO
% N_2

V. Density and Molecular Weight of Stack Gas :

1) Dry, @ STP, Lbs./Cu. Ft. $= \left[\frac{(\%O_2 \times .0827) + (\%CO_2 \times .1137) + [(\%CO + N_2) \times .0724]}{100}\right]$

2)Moist, @ STP, Lbs./Cu. Ft. $= \left[\left(V_1 \times \frac{(100-T)}{100}\right) + \left(.0465 \times \frac{T}{100}\right)\right]$

3) Moist Gas, @ Stack Conditions, Lbs./Cu. Ft. =

$$= V_2 \times \left(\frac{530}{K + 460}\right) \times \left(\frac{I + 0.07355 \times J}{29.92}\right)$$

4) Molecular Weight, Dry, @STP, Lb./Mole = (V_1 × 386.9 Cu. Ft./Mole)

NOTE: STP = 29.92 "Hg., 70^oF

SAMPLING DATA CALCULATION EQUATIONS

W. Weight of Gas Sampled:
1) Dry Gas, Lbs. $= (P \times V_1)$
2) Moist Gas, Lbs. $= (S \times V_2)$

X. Total Weight of Particulate Collected, Grams

Y. Average Gas Velocity, $\left(FPM \cdot \frac{1096}{\sqrt{V_3}} \times (L_{avg}) \times (H_1)\right)$

Z. Stack Gas Flow Rate :
1) Stack Conditions, $Q_a = ACFM\ (C \times Y)$
2) Standard Conditions, Q_{std}, SCFM $= \left(\left(Z_1 \cdot \left(\frac{530}{K \cdot 460}\right) \times \left(\frac{I + 0.07355 \times J}{29.92}\right)\right)\right)$
3) Standard Dry, $Q_{d.g.}$, SCFM $= Q_{std} \times \frac{100 - T}{100}$

AA. Percent Excess Air $= \frac{(\%O_2) - (0.5\ \%CO)}{(0.264\ \%N_2) - (\%O_2) + (0.5\%CO)} \times 100$

BB. Concentration Conversation Factors:
1)
1) 50% Excess Air , After Collector $= \frac{V_4 + 18\ T_1/(100-T_1)}{(0.1826\%N_2) - (2.0592\%O_2) + V_4 + \frac{18T_1}{(100-T}}$
2) 50% Excess Air, Before Collector
$= \frac{V_4 + 18T_1/(100-T_1)}{(0.1826\ \%N_2) - (2.0592\ \%O_2) + V_4 + \frac{18T2}{(100 - T_2)}}$
3) Moisture Before Collector $+= \left(\frac{V_4 + 18T_1/(100 - T_1)}{V_4 + 18T_2/(100 - T_2)}\right)$

CC. Particulate Concentration :
1) Lbs./1000 Lbs., Actual $= \frac{(1000 \times X)}{(454 \times W_2)}$
2) Lbs./1000 Lbs., Dry* $= (CC_1 \times BB_3)$
3) Lbs./1000 Lbs., Wet ** @50% E. A. $= (CC_1 \times BB_1)$
4) Lbs./1000 Lbs., Dry @ 50% E. A. $= (CC_1 \times BB_2)$
5) Grains/1000DSCF*** $= \frac{(X \times 7000 \times 100)(1000)}{(454 \times S \times (100 - T))}$
6) Pounds / Hour $= \left(Z_2 \times V_2 \times \left(\frac{1000\ X \times 0.06}{454 \times W_2}\right)\right)$

DD. Percent Isokinetic $= \frac{100 \times 29.92 \times (K + 460) \times S}{530 \times (I + 0.07355 \times J) \times E \times G \times Y}$

* Dry means process moisture included, moisture added by collector excluded (if applicable)

** Wet means actual moisture as measured after collector.

*** DSCF is under totally dry conditions - all moisture removed.

NOTE: STP = 29.92 " Hg., 70°F.

ENT Foremost Whey

WA 1010

DATE Tot 7-24-90

	DISH#	VOLUME	INT.WT.	FINAL WT.	FILTER#	INT.WT.	FINAL WT
nk	00131-10	30	1.5449	1.5464			
ter ANK	-11	30	1.5525	1.5538			
nt. ANK	-12		1.5844	1.5852			
l exh.					mill exh.		
etone	00131-13	71	1.5352	1.5579	P-1 Filter 820-30	0.05135	0.05207
Imp. H_2O	-14	248	1.5718	1.5806	P-1 Thimble 00703-13	55.7913	55.8336
Imp. cetone	-15	54	1.5785	1.5858	[redacted]		
etone	-16	76	1.5948	1.6009	P-2 Filter 820-34	0.04542	0.0468
Imp. $_2O$	-17	221	1.5853	1.5931	P-2 Thimble 00703-6	56.6588	56.6609
Imp. etone	-18	47	1.5941	1.6033			
Acetone	-20	40	1.5733	1.5800	P-3 Filter 820-33	0.0450	0.0447
Imp. $_2O$	-21	237	1.5742	1.5787	P-3 Thimble 00703-2	54.0063	54.0807
Imp. etone	-22	44	1.5433	1.5478			
yer exh.					Dryer ex.		
P-1 etone	00131-28	61	1.5980	1.6025	P-1 Filter 820-29	0.04542	0.0470
Imp. $_2O$	-29	260	1.5471	1.5536	P-1 Thimble 00703-3	53.3731	53.3739
Imp etone	-30	42	1.5803	1.5847			
etone	-31	71	1.5680	1.5712	P-2 Filter 820-32	0.04276	0.0445
Imp. $_2O$	-32	247	1.5902	1.5944	P-2 Thimble 00703-12	52.2546	52.2617
Imp. etone	00121-83	43	1.5796	1.5869			
etone	-84	32	1.5612	1.5632	P-3 Filter 820-31	0.04388	0.0444
Imp. $_2O$	-85	229	1.5462	1.5530	P-3 Thimble 00703-1	54.9967	55.0171
Imp etone	-86	47	1.5440	1.5502			
					Thimble Blank 00703-4	50.0767	50.0765
					Filter Blank 820-36	.05083	0.0513

7-24-90

FOREMOST DRYER EXHAUST

IMPINGER DATA

	INITIAL Vol(ml) WT(gm)	FINAL Vol(ml) WT(gm)	Δ Vol(ml) WT(gm)
#1	100	87	-13
#2	100	96	-4
#3	DRY	0	0
#4	888.1	918.7	30.6
#5			13.6
#1	100	94	-6
#2	100	98	-2
#3	DRY	1	+1
#4	852.6	877.3	24.7
#5			17.7
#1	100	68	-32
#2	100	80	-20
#3	DRY	31	+31
#4	902.7	942.2	39.5
#5			8.5

TES —

1-24-90

- FREMOST MILL EXHAUST

IMPINGER DATA

	INITIAL Vol(ml)	INITIAL WT(gm)	FINAL Vol(ml)	FINAL WT(gm)	Δ Vol(ml)	Δ WT(g
- 1						
#1	100		93		-7	
#2	100		98		-2	
#3	DRY		2		+2	
#4	894.1		912.7		18.6	
#5	B					11.6
- P.2						
#1	100		92		-8	
#2	100		96		-4	
#3	DRY		3		+3	
#4	935.2		951.2		+16	
#5						+7.0
- P.3						
#1	100		96		-4	
#2	100		90		-10	
#3	DRY		13		+13	
#4	826.5		836.4		+9.9	
#5						8.9

NOTES —

APPENDIX B

SOURCE: FOREMOST WHEY MILL EXHAUST

DATE	TIME	PITOT NUMBER	STACK DIMENSION
07/24/90	0745	5	9.25"

BAROMETRIC (P_b)	STATIC (P_s)	Q_s	STACK TEMP. T_s	C_p	STACK AREA A_s	WB TEMP T_w	B_{wo}
29.25	305			808	0467	95	165

SAMPLING POINT	PITOT (Δp)	STACK TEMP
1	305	175
2	815	174
3	710	171
4	665	171
5	580	171
6	800	170
7	950	170
8	10.+ ≈ B	170
1	540	171
2	610	172
3	620	172
4	610	172
5	470	172
6	490	171
7	580	170
8	≈11.50	170

SAMPLING POINT	PITOT (Δp)	STACK TEMP

$V_s = 2.9\, C_p\, 60 \sqrt{T_s \cdot \Delta p} \sqrt{\frac{29.92}{P_s} \cdot \frac{1}{Q_s}}$ $\quad Q_s = V_s \cdot A_s$

$Q_{scfm} = Q_s \cdot \frac{530}{T_s} \cdot \frac{P_s}{29.92}$

6% H_2O

SWANSON ENVIRONMENTAL INC

FIELD DATA SHEET

Plant: FOREMOST
Date: 7-24-90
Location:
Operator: TGW
Stack No.: MILLER
Run No. PART. NO 1
PITOT TUBE NO. 5 C_p 0.808
Meter Box No. ~~SO1 5500~~ N-1

Ambient Temperature: 73
Barometric Pressure P_b "H_g: 29.25
Assumed Moisture, % WV: 6
Probe Length, in.: 72"
Nozzle Diameter, in. D: .119"
Stack Diameter, in.: 9.25"
Stack Pressure, in H_2O P_g: 30.5
Sampling train LEAK TEST: Initial 0.011 @ 16; Final 0.006 @ 20

Meter ΔH @: 1.01463 M_1 0.17926
K_{iso} 1549.59104 Y_d 1.00816
WET BULB TEMPERATURE

Volume of Liquid Water Collected	Impinger Volume ml 1	2	3	4	Silica Gel Weight 0
Final					
Initial					
Liquid Collected					

V_{lc} Total

	SAMPLING POINT	TIME ●	PITOT ΔP_s	ORIFICE ΔH	DRY GAS METER V_m	METER TEMP T_m °F	VACUUM	STACK TEMP T_s °F	FILTER TEMP	IMPINGER TEMP
					74719					
	1	3.75	7.1	1.13	74816	96	14	165		
	2	7.5	7.4	1.19	75155	97	15	160		
	3	11.25	7.3	1.18	75368	97	15	156		
	4	15.0	6.7	1.09	75587	97	15	154		
	5	18.75	4.2	.68	75782	97	16	157		
	6	22.5	3.8	.62	75949	97	11	154		
	7	26.25	4.2	.68	76123	96	10	154		
	8	30.0	5.3	.86	76312	96	12	155		
	1	33.75	8.0	1.30	76312	96	16	155		
	2	37.5	6.6	1.07	76534	97	18	157		
	3	41.25	7.2	1.16	76751	98	17	158		
	4	45.0	7.7	1.25	76968	98	17	157		
	5	48.75	5.9	.96	77185	99	18	158		
	6	52.5	5.1	.82	77404	99	14	160		
	7	56.25	5.1	.82	77602	99	14	160		
	8	60.0	5.8	.94	77800	99	14	160		
					77846					

Orsat Measurement					
Test	Time	CO_2	O_2	CO	N_2
1					
2					
3					
4					

Filter No. T-00703-5

Filter No.

PITOT TUBE LEAK TEST: Initial 0.2 °; Final 0.2 °

COMMENTS: Sampling train —

$$\Delta H = K_{iso} C_p^2 D^4 \left(1 - \frac{WV}{100}\right)^2 \frac{G_m}{G_s} \frac{P_s}{P_m} \frac{T_m}{T_s} \Delta P_s$$

SWANSON ENVIRONMENTAL INC

FIELD DATA SHEET

Plant FOREMOST

Date 7-24-90

Location

Operator TGW

Stack No. MILL EX

Run No. PART. NO 2

PITOT TUBE NO. 5 C_p 0.808

Meter Box No. ~~[illegible]~~ - N-1

Ambient Temperature 75

Barometric Pressure P_b "Hg 29.28

Assumed Moisture, % WV 6

Probe Length, in. 6'

Nozzle Diameter, in. D .119

Stack Diameter, in. 9.25"

Stack Pressure, in H_2O P_g 3.05

Sampling train LEAK TEST Initial 0.006 @ 16"
Final 0.004 @ 15"

Meter $\Delta H_@$ 1.81463 M_f 0.17926

K_{iso} 1549.59104 Y_d 1.00816

WET BULB TEMPERATURE

Volume of Liquid Water Collected	Impinger Volume ml 1	2	3	4	Silica Gel Weight g
Final					
Initial					
Liquid Collected					

V_{lc} Total

	SAMPLING POINT	TIME ●	PITOT ΔP_s	ORIFICE ΔH	DRY GAS METER V_m	METER TEMP T_m °F	VACUUM	STACK TEMP T_s °F	FILTER TEMP	IMPINGER TEMP
	1	3.75	51	.80	780.16	97	10	176		
	2	7.50	52	.83	781.88	98	10	165		
	3	11.25	67	1.08	784.07	98	11	162		
	4	15.0	64	1.03	786.12	98	14	162		
	5	18.75	64	1.03	788.23	98	14	163		
	6	22.5	52	.84	790.40	99	14	161		
	7	26.25	51	.82	792.44	100	13	162		
	8	30.0	50	.81	794.45	100	12	162		
					796.41					
	1	33.75	76	1.23	796.41	100	14	162		
	2	37.5	76	1.23	798.62	100	14	161		
	3	41.25	75	1.22	800.83	101	14	158		
	4	45.0	70	1.14	803.04	101	15	156		
	5	48.75	45	.74	805.35	101	11	155		
	6	52.5	38	.62	807.20	102	10	157		
	7	56.25	49	.81	808.96	102	11	152		
	8	60.0	60	.99	810.89	102	13	153		
					812.97					

Orsat Measurement					
Test	Time	CO_2	O_2	CO	N_2
1					
2					
3					
4					

Filter No. T-00703-~~[illegible]~~6

Filter No.

PITOT TUBE LEAK TEST Initial 0 @ "
Final 0 @ "

COMMENTS: Sampling train —

$$\Delta H = K_{iso} C_p^2 D^4 \left(1 - \frac{WV}{100}\right)^2 \frac{G_m}{G_s} \frac{P_s}{P_m} \frac{T_m}{T_s} \Delta P_s$$

SWANSON ENVIRONMENTAL INC

FIELD DATA SHEET

Plant: FOREMOST
Date: 7-24-90
Location:
Operator: TGW
Stack No.: MILL EX
Run No.: PART. NO 3
PITOT TUBE NO. 5 C_p 0.800
Meter Box No. ~~S01-E200~~ N-1

Ambient Temperature: 77
Barometric Pressure P_b "Hg: 29.20
Assumed Moisture, % WV: 6
Probe Length, in.: 6'
Nozzle Diameter, in. D: .119
Stack Diameter, in.: 9.25"
Stack Pressure, in H_2O P_s: 3.05
Sampling Train LEAK TEST: Initial Qs 0.000 @ 15"; Final Qs 0.000 @ 8"

Meter ΔH@: 1.81463 m, 0.17926
K ... 1549.59 / Dt, 1.00816

WET BULB TEMPERATURE:

Volume of Liquid Water Collected	Impinger Volume ml 1	2	3	4	Silica Gel Weight g
Final					
Initial					
Liquid Collected					

V_{lc} Total

	SAMPLING POINT	TIME θ	PITOT ΔPs	ORIFICE ΔH	DRY GAS METER Vm	Tm °F	VACUUM	STACK TEMP Ts °F	FILTER TEMP	IMPINGER TEMP
					81.3 29					
	1	3.75	73	.119	81.6 61	100	6	156		
	2	7.50	75	.124	81.8 41	100	6	162		
	3	11.25	72	.117	82.0 31	100	6	159		
	4	15.0	55	.84	82.2 12	100	6	156		
	5	18.75	45	.73	82.4 45	100	6	154		
	6	22.5	40	.65	82.6 25	101	5	153		
	7	26.25	37	.61	82.7 45	101	5	152		
	8	30.	41	.67	82.9 76	101	5	154		
	1	33.75	77	.126	82.9 76	101	7	155		
	2	37.50	67	.109	83.1 99	101	6	157		
	3	41.25	71	.116	83.4 39	102	7	156		
	4	45.0	75	.123	83.6 71	102	7	153		
	5	48.75	61	.100	83.9 00	102	6	156		
	6	52.5	57	.93	84.1 11	102	6	158		
	7	56.25	51	.83	84.3 13	102	5	156		
	8	60.0	56	.92	84.5 21	103	6	153		
					84.7 11					

Orsat Measurement					
Test	Time	CO_2	O_2	CO	N_2
1					
2					
3					
4					

Filter No.: T.00703.2

Filter No.:

PITOT TUBE LEAK TEST: Initial Qs 0 ; Final Qs 0

COMMENTS: Sampling train —

$$\Delta H = K_{100} C_p^2 D^4 \left(1 - \frac{WV}{100}\right)^2 \frac{C_m}{C_s} \frac{P_s}{P_m} \frac{T_m}{T_s} \Delta P_s$$

SOURCE: FOREMOST WHEY DRYER EXHAUST

DATE	TIME	PITOT NUMBER	STACK DIMENSION
07/24/90	0815	4	18"

BAROMETRIC (P_b)	STATIC (P_s)	G_s	STACK TEMP. T_s	C_p	STACK AREA A_s	WB TEMP T_w	B_{wo}
29.25	0.97			.797	1.767	80	115

SAMPLING POINT	PITOT (Δp)	STACK TEMP
1	1.15	118
2	1.07	118
3	1.09	118
4	1.45	118
5	1.25	117
6	1.20	117
1	.38	117
2	.52	117
3	.49	117
4	.41	117
5	.39	117
6	.31	116

SAMPLING POINT	PITOT (Δp)	STACK TEMP

$V_s = 2.9\, C_p\, 60 \sqrt{T_s \cdot \Delta p} \sqrt{\frac{29.92}{P_s} \cdot \frac{1}{G_s}}$ $\quad Q_s = V_s \cdot A_s$ $\quad Q_{scfm} = Q_s \cdot \frac{530}{T_s} \cdot \frac{P_s}{29.92}$

5% H_2O

SWANSON ENVIRONMENTAL INC

FIELD DATA SHEET

Plant FOREMOST

Date 7-24-90

Location

Operator TGW

Stack No. DRYER EXH

Run No. PART. NO 1

PITOT TUBE NO. 4 C_p 0.797

Meter Box No. ~~501-5500~~ - N-2

Ambient Temperature 73

Barometric Pressure P_b H_g 29.25

Assumed Moisture, % WV 5

Probe Length, in. 72"

Nozzle Diameter, in. D .243

Stack Diameter, in. 18"

Stack Pressure, in H_2O P_g 0.97

Sampling train LEAK TEST Initial 0.004217 Final 0.003227

Meter $\Delta H_@$ 1.75447 M_t 2.96290

K_{iso} 1482.2732 Y_d 1.01217

WET BULB TEMPERATURE

Volume of Liquid Water Collected	Impinger Volume ml 1	2	3	4	Silica Gel Weight g
Final					
Initial					
Liquid Collected					

V_{lc} Total

	SAMPLING POINT	TIME ●	PITOT ΔP_s	ORIFICE ΔH	DRY GAS METER V_m	METER TEMP T_m °F	VACUUM	STACK TEMP T_s °F	FILTER TEMP	IMPINGER TEMP			
					200 04								
	1	5	1.60	307	20576	94	17	138					
	2	10	1.4	372	21119	94	17	137					
	3	15	1.4	372	21665	95	17	132					
	4	20	1.2	387	22207	95	17	130					
	5	25	1.2	334	22737	95	16	130					
	6	30	1.3	363	23249	95	15	129					
	1	5	1.1	308	23249	95	13	127					
	2	10	1.1	308	23730	96	13	128					
	3	15	1.15	322	24200	96	12	127					
	4	20	1.25	354	24677	97	14	123					
	5	25	1.55	439	25170	99	17	124					
	6	30	1.4	434	25735	99	17	126					
					26284								

Orsat Measurement					
Test	Time	CO_2	O_2	CO	N_2
1					
2					
3					
4					

Filter No. T-00703-3

Filter No.

PITOT TUBE LEAK TEST Initial 0. @ " Final 0. @ "

COMMENTS: Sampling train —

$$K_{iso} C_p^2 D^4 \left(1-\frac{WV}{100}\right)^2 \frac{G_m}{G_s} \frac{P_s}{P_m} \frac{T_m}{T_s} \Delta P_s$$

SWANSON ENVIRONMENTAL INC

FIELD DATA SHEET

2-96290

Plant FOREMOST

Date 7-24-90

Location

Operator TGW

Stack No. DRYER EX

Run No. PART. NO 2

PITOT TUBE NO. 4 C_p 0.797

Meter Box No. ~~501-5500~~ N-2

Ambient Temperature 75

Barometric Pressure P_b "Hg 29.28

Assumed Moisture, % WV 5

Probe Length, in. 6'

Nozzle Diameter, in. D .243, ~~.319~~

Stack Diameter, in. 18"

Stack Pressure, in H_2O P_g .97

Sampling train LEAK TEST Initial 0.001 @ 17 Final 0.003 @ 21

Meter ΔH @ 1.75447 M_t ~~[illegible]~~

K_{iso} 1482.27 Y_d 1.01217

WET BULB TEMPERATURE

Volume of Liquid Water Collected	Impinger Volume ml 1	2	3	4	Silica Gel Weight g
Final					
Initial					
Liquid Collected					

V_{lc} Total

	SAMPLING POINT	TIME ●	PITOT ΔP_s	ORIFICE ΔH	DRY GAS METER V_m	METER TEMP T_m °F	VACUUM	STACK TEMP T_s °F	FILTER TEMP	IMPINGER TEMP			
	1	5	1.08	308	263.12	99	12	121					
	2	10	.73	210	267.75	100	10	118					
	3	15	1.07	309	271.51	101	12	116					
	4	20	1.36	390	276.35	101	16	119					
	5	25	1.30	372	281.62	101	16	121					
	6	30	1.25	358	286.86	101	17	120					
					292.12								
	1	35	1.25	361	292.12	102	17	117					
	2	40	1.2	345	297.37	102	16	119					
	3	45	1.3	373	302.47	102	17	121					
	4	50	1.15	332	307.74	102	16	116					
	5	55	1.1	32	312.73	102	15	113					
	6	60	1.2	346	317.70	102	16	117					
					322.79								

Orsat Measurement					
Test	Time	CO_2	O_2	CO	N_2
1					
2					
3					
4					

Filter No. T-00703-12

Filter No.

PITOT TUBE LEAK TEST Initial 0. @ " Final 0. @ "

COMMENTS: Sampling train —

$$\Delta H = K_{iso} C_p^2 D^4 \left(1 - \frac{WV}{100}\right)^2 \frac{G_m}{G_s} \frac{P_s}{P_m} \frac{T_m}{T_s} \Delta P_s$$

SWANSON ENVIRONMENTAL INC

FIELD DATA SHEET

Plant: FOREMOST

Date: 7-24-90

Location:

Operator: TGW

Stack No.: DRYER EXH.

Run No.: PART. NO 3

PITOT TUBE NO. 4 C_p 0.797

Meter Box No. ~~501 5500~~ - N-2

Ambient Temperature: 77

Barometric Pressure P_b "Hg: 29.20

Assumed Moisture, % WV: 5

Probe Length, in.: 72"

Nozzle Diameter, in. D: .243"

Stack Diameter, in.: 18"

Stack Pressure, in H_2O P_g: .97

Sampling train LEAK TEST: Initial 0.002 @ 20. Final 0.001 @ 14.

Meter $\Delta H_@$: 1.75447 M_f: 2.96290

K_{iso}: 1482.27318 Y_d: 1.01217

WET BULB TEMPERATURE:

Volume of Liquid Water Collected	Impinger Volume ml 1	2	3	4	Silica Gel Weight g
Final					
Initial					
Liquid Collected					

V_{lc} Total

	SAMPLING POINT	TIME ●	PITOT ΔP_s	ORIFICE ΔH	DRY GAS METER V_m	METER TEMP T_m °F	VACUUM	STACK TEMP T_s °F	FILTER TEMP	IMPINGER TEMP			
	1	5	1.10	314	324.61	100	12	120					
	2	10	1.21	347	327.81	100	13	118					
	3	15	1.15	331	333.01	100	13	117					
	4	20	.73	210	338.26	100	11	116					
	5	25	.97	278	343.53	101	12	119					
	6	30	1.05	301	348.93	101	12	118					
					353.21								
	1	35	1.00	286	353.21	101	12	121					
	2	40	1.21	349	358.44	101	14	116					
	3	45	1.05	302	363.61	101	13	117					
	4	50	1.05	302	372.01	102	13	119					
	5	55	1.15	330	377.01	102	14	121					
	6	60	1.2	346	380.61	102	14	118					
					~~[illegible]~~								
					382.02								

Orsat Measurement					
Test	Time	CO_2	O_2	CO	N_2
1					
2					
3					
4					

Filter No.

Filter No.

PITOT TUBE LEAK TEST: Initial 0. @ ; Final 0. @

COMMENTS: Sampling train —

$$\Delta H = K_{iso} C_p^2 D^4 \left(1 - \frac{WV}{100}\right)^2 \frac{G_m}{G_s} \frac{P_s}{P_m} \frac{T_m}{T_s} \Delta P_s$$

Run No. 1

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: Foremost Whey Prod.	Date: 7-24-90
Location: Foremost Dr.	FID Number:
City, State, Zip Code: Rothschild, WI 54474	Observer Certification Date: 4-17-90
Discharge Location: Mill exhaust	Control Device: Baghouse
Height of Discharge Above Ground: 50'	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	1333		1437
Observer Location: Distance to Discharge	20'		20'
Direction from Discharge	E		E
Height of Observation Point in Relation to Discharge	10' lower than dischg.		same
Plume Description (Color, Length, etc.)	white 15'		same
Plume Background Description	Dark background thru doorway		same
Weather Conditions: Wind Direction	W		W
Wind Speed	5-10		5-10
Ambient Temperature	95°		83°
Sky Conditions (clear, overcast, % clouds, etc.)	33% clouds		66% clouds

Describe Point in Plume at Which Opacity was Determined: 6' straight out from end of stack

Remarks:

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	20	0	34	0	0	0	0
5	0	0	5	0	35	15	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	10	37	10	0	0	0
8	0	0	5	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	25	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	5	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	5	0
19	0	5	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	15
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	5	0	54	0	0	0	0
25	0	0	0	0	55	5	0	0	0
26	0	0	5	0	56	5	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

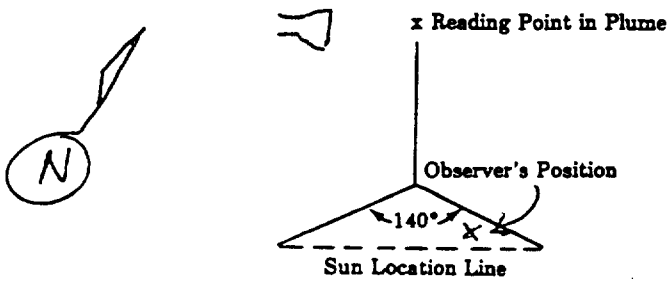
Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average
1	1333-1437	140	0.55
2	1555-1659	30	0.13
3	1732-1836	90	0.38

Signature of Observer: Tim Young

Name of Observer (Please print): Tim Young

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

Run No. 2

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: Foremost Whey Prod.	Date: 7-24-90
Location: Foremost Dr.	FID Number:
City, State, Zip Code: Rothschild, WI 54474	Observer Certification Date: 4-17-90
Discharge Location: Mill exhaust	Control Device: Baghouse
Height of Discharge Above Ground: 50'	Steam Plume? Attached Yes (No) Detached

	Initial		Final
Time of Observation	1555		1659
Observer Location: Distance to Discharge	30'		20'
Direction from Discharge	E		E
Height of Observation Point in Relation to Discharge	10' lower than discharge		Same
Plume Description (Color, Length, etc.)	white 15'		white 15'
Plume Background Description	Dark background thru hoomway		Same
Weather Conditions: Wind Direction	W		W
Wind Speed	5-10		5-10
Ambient Temperature	80°		76°
Sky Conditions (clear, overcast, % clouds, etc.)	33% clouds		25% clouds

Describe Point in Plume at Which Opacity was Determined
6' straight out from end of stack

Remarks:
Stack exits a wall horizontally and cannot be seen properly with sun at back.
Stack is in shadow of wall

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	5	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	15	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	5	0	56	0	0	0	0
27	0	0	5	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

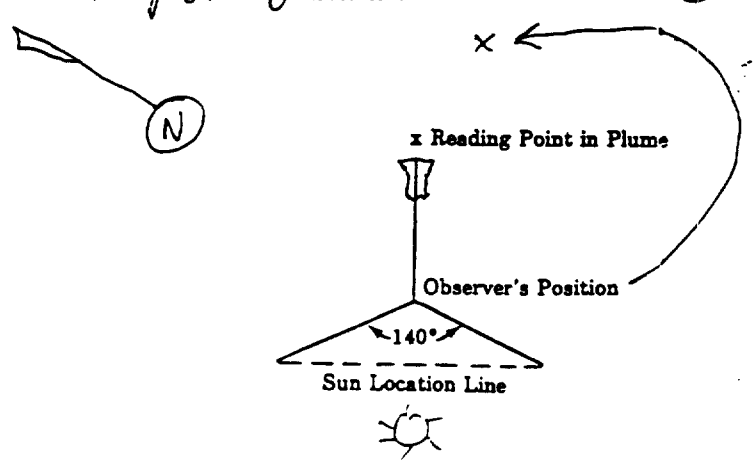
Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

Allowable Source Opacity

Signature of Observer: Tim Young	Name of Observer (Please print): Tim Young

Sketch of Observer, Discharge, and Sun Location.



Run No 3

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: Foremost Whey Prod.	Date: 7-24-90
Location: Foremost Pr.	FID Number:
City, State, Zip Code: Rothschild WI 54474	Observer Certification Date: 4-17-90
Discharge Location: Mill exhaust	Control Device: Baghouse
Height of Discharge Above Ground: 50'	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	1732		1836
Observer Location: Distance to Discharge	20'		20'
Direction from Discharge	E		E
Height of Observation Point in Relation to Discharge	10' lower than discharge		Same
Plume Description (Color, Length, etc.)	white 15'		white 15'
Plume Background Description	Dark background thru doorway		Same
Weather Conditions: Wind Direction	W		W
Wind Speed	5-15		5-15
Ambient Temperature	75°		75°
Sky Conditions (clear, overcast, % clouds, etc.)	10% clouds		clear

Describe Point in Plume at Which Opacity was Determined
6' straight out from end of stack

Remarks:

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	10
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	5
7	0	15	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	5	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	5	0	0	5	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	20	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	5	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	15	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	5	0	59	0	0	0	0

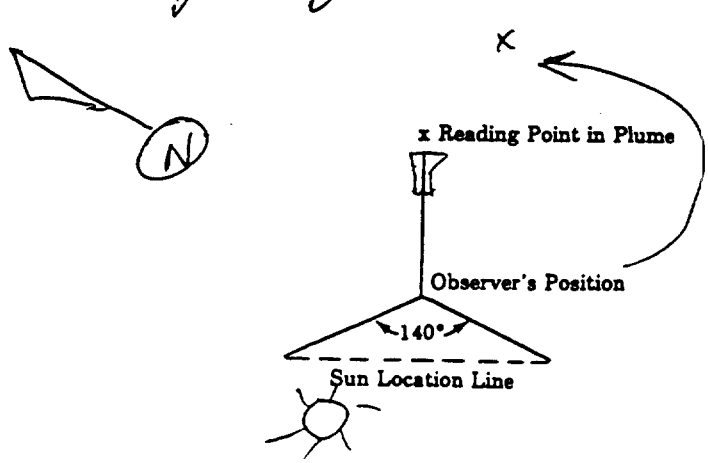
Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

Signature of Observer: Tim Young

Name of Observer (Please print): Tim Young

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

Run No 1

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: Foremost Whey Prod.	Date: 7-24-90
Location: Foremost Dr.	FID Number:
City, State, Zip Code: Rothschild WI 54474	Observer Certification Date: 4-17-90
Discharge Location: Dryer exhaust	Control Device: Baghouse
Height of Discharge Above Ground: 50'	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	1333		1437
Observer Location: Distance to Discharge	30'		30'
Direction from Discharge	E		E
Height of Observation Point in Relation to Discharge	10' lower than discha		same
Plume Description (Color, Length, etc.)	None		None
Plume Background Description	Sky		Sky
Weather Conditions: Wind Direction	W		W
Wind Speed	5-10		5-10
Ambient Temperature	85°		83°
Sky Conditions (clear, overcast, % clouds, etc.)	33% clouds		66% clouds

Describe Point in Plume at Which Opacity was Determined
3' straight out from end of stack

Remarks:
Horiz. stack out of wall

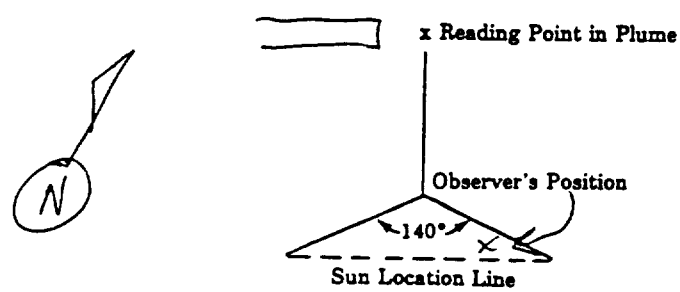
SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average
1	1333 - 1437	Ø	Ø
2	1555 - 1659	Ø	Ø
3	1732 - 1837	Ø	Ø

Signature of Observer: Tim Young	Name of Observer (Please print): Tim Young

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

Run No 2

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: Foremost Whey Prod.	Date: 7-24-90
Location: Foremost Dr.	FID Number:
City, State, Zip Code: Rothschild, WI 54474	Observer Certification Date: 4-17-90
Discharge Location: Dryer exhaust	Control Device: Baghouse
Height of Discharge Above Ground: 50'	Steam Plume Attached: Yes / Detached: No

	Initial		Final
Time of Observation	1555		1659
Observer Location: Distance to Discharge	30'		30'
Direction from Discharge	E		E
Height of Observation Point in Relation to Discharge	10' lower than discharge.		Same
Plume Description (Color, Length, etc.)	None		None
Plume Background Description	sky		sky
Weather Conditions: Wind Direction	W		W
Wind Speed	5-10		5-10
Ambient Temperature	80°		76°
Sky Conditions (clear, overcast, % clouds, etc.)	33% clouds		25% clouds

Describe Point in Plume at Which Opacity was Determined
3' straight out from end of stack

Remarks:
Stack exits a wall horizontally and cannot be seen properly ~~from~~ with the sun at my back. Stack is in shadow of wall

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

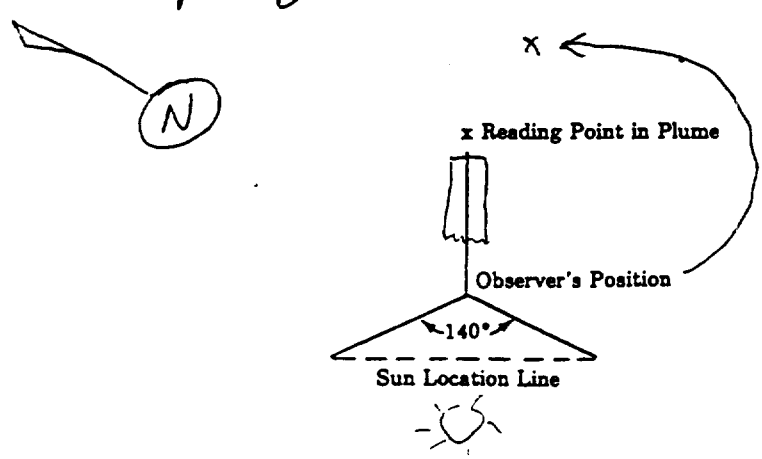
Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

Allowable Source Opacity

Signature of Observer: Tim Young	Name of Observer (Please print): Tim Young

Sketch of Observer, Discharge, and Sun Location.



Run No 3

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: Foremost Whey Prod.	Date: 7-24-90
Location: Foremost Pr.	FID Number:
City, State, Zip Code: Rothschild, WI	Observer Certification Date: 4-17-90
Discharge Location: Dryer exhaust	Control Device: Baghouse
Height of Discharge Above Ground: 50'	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	1732		1837
Observer Location: Distance to Discharge	30'		30'
Direction from Discharge	E		E
Height of Observation Point in Relation to Discharge	10' lower than discharge		Same
Plume Description (Color, Length, etc.)	None		None
Plume Background Description	Sky		Sky
Weather Conditions: Wind Direction	W		W
Wind Speed	5-15		5-15
Ambient Temperature	75°		75°
Sky Conditions (clear, overcast, % clouds, etc.)	10% clouds		clear

Describe Point in Plume at Which Opacity was Determined
3' straight out from end of stack

Remarks:

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

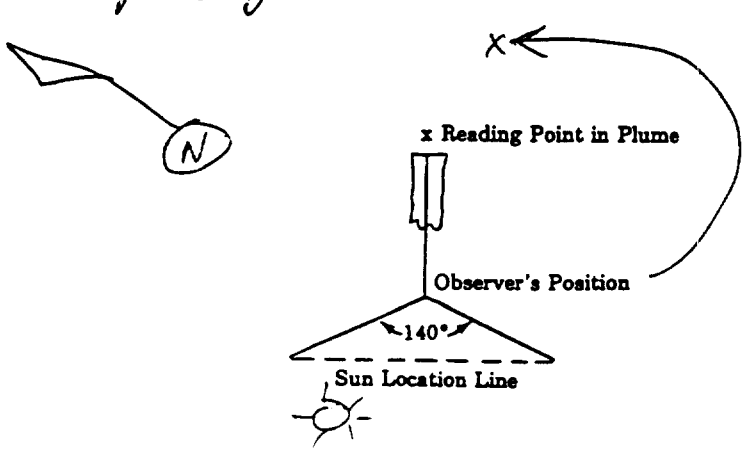
Summary of Average Opacity
(From Computer Program)

Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

Signature of Observer: Tim Young

Name of Observer (Please print): Tim Young

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

APPENDIX C

Swanson Environmental Inc. Name		Job No.
		Date
		Number of pages
		Page No.

SAMPLE CALCULATION

PERCENT ISOKINETIC =

$$\frac{100 * 29.92 * (460 + T_{sg}) * TG}{[530 * (B_p + 0.07355 * P_s) * ST * NA * V_g}$$

where — using dryer exhaust front half P-1 data:

T_{sg} = Stack gas temperature
TG = total gas Sampled Stp Cu. Ft
B_p = Barometric Pressure In Hg
P_s = Static Pressure In. H_2O
ST = Total Sample Time in Minutes
NA = Nozzle Area in sq. Ft.
V_g = Ave. Gas Velocity in FPM

Calculated

$$\%Iso = \frac{100 * 29.92 * (460 + 129.25) * 59.811}{[530 * (29.25 + 0.07355 * -.970) * 60 * .00032 * 3897}$$

$= 90.7$

Actual % Iso = 91.1

Differences due to rounding

APPENDIX D

DATE: 7-17-90 (TW) Y_{ds} = 1.00189 CALIBRATION METER IDENTIFICATION: WGM #63119

METER BOX IDENTIFICATION: NUTECH #2 BAROMETRIC PRESSURE (P_b): 29.70 in. Hg

	ORIFICE READING (ΔH) in. H_2O	CALIBRATION METER GAS VOLUME (V_{ds}) ft^3	METER BOX METER GAS VOLUME (V_d) ft^3	TEMPERATURE: CALIBRATION METER AVERAGE ($\bar{t}_{ds}$) °F	TEMPERATURE: METER BOX METER AVERAGE ($\bar{t}_d$) °F	DRY GAS METER PRESSURE (Δp) in. H_2O	FLOW RATE (Q) cfm	TIME (Θ) min.	METER BOX METER COEFFICIENT (Y_d)	K_d	$\Delta H_@$
Stop		5.004	166.735	78	76	-0.5	0.40623	12.0	1.03242	0.13888	1.73361
Start	0.5	0.001	161.904	78	76	-0.5					
Average		5.003	4.831	78	76	-0.5					
Stop		5.005	171.584	78	76	-0.9	0.56649	8.6	1.01725	0.13703	1.73525
Start	1.0	.005	166.735	78	76	-0.9					
Average		5.000	4.894	78	76	-0.9					
Stop		5.007	176.477	78	76	-1.3	0.68644	7.1	1.01664	0.13566	1.77480
Start	1.5	.005	171.584	78	76	-1.3					
Average		5.002	4.893	78	76	-1.3					
Stop		5.010	181.392	78	76	-1.7	0.78624	6.2	1.00978	0.13465	1.78837
Start	2.0	0.007	176.477	78	76	-1.7					
Average		5.003	4.915	78	76	-1.7					
Stop		5.008	186.354	78	77	-2.1	0.87745	5.55	1.00108	0.13449	1.76081
Start	2.5	0.010	181.392	78	77	-2.1					
Average		4.998	4.962	78	77	-2.1					
Stop		5.008	191.338	78	77	-2.5	0.96471	5.05	0.99583	0.13506	1.73400
Start	3.0	.008	186.354	78	77	-2.5					
Average		5.000	4.984	78	77	-2.5					
								Average	1.01217	0.13596	

$Q = 17.65 \cdot \frac{V_{ds}}{\Theta} \cdot \frac{P_b}{(t_d + 460)}$

$K_d = Y_{ds} \frac{V_{ds}}{\Theta} \sqrt{\frac{P_{ds}}{T_{ds} \; H}}$

$P_{ds} = (P_b + \frac{\Delta p}{13.6})$

$\Delta H_@ = 1.75447$

$V_{ds} \; (\bar{t}_d + 460) \; P_b$

$K_{ds} = \frac{27.40}{(K_d)^2} = \frac{27.40}{\ldots} = 148.227318$

SWANSON ENVIRONMENTAL INC.

DATE: 7-16-90 (Am) Y_{ds} = 1.00189 CALIBRATION METER IDENTIFICATION: WGM #63119

METER BOX IDENTIFICATION: NVTECH #1 BAROMETRIC PRESSURE (P_b): 29.55 in. Hg

	ORIFICE READING (ΔH) in. H_2O	CALIBRATION METER GAS VOLUME (V_{ds}) ft^3	METER BOX METER GAS VOLUME (V_d) ft^3	TEMPERATURE: CALIBRATION METER AVERAGE ($\bar{t}_{ds}$) °F	TEMPERATURE: METER BOX METER AVERAGE ($\bar{t}_d$) °F	DRY GAS METER PRESSURE (Δp) in. H_2O	FLOW RATE (Q) cfm	TIME (Θ) min.	METER BOX METER COEFFICIENT (Y_d)	K_d	$\Delta H@$
Stop		5.002	575.218	75°	75°	-0.5	.39325	12.4	1.00561	0.134409	1.1471
Start	0.5	.000	570.250	75°	73°	-0.5					
Average		5.002	4.968	75°	74°	-0.5					
Stop		10.003	580.245	75°	77°	-0.8	.54779	8.9	0.99609	0.132413	1.7844
Start	1.0	5.002	575.218	75°	75°	-0.8					
Average		5.001	5.027	75°	76°	-0.8					
Stop		15.003	588.304	75.0	79°	-1.1	.67745	7.2	1.01828	0.133817	1.8270
Start	1.5	10.002	583.372	74.5°	77°	-1.1					
Average		5.001	4.932	74.750	78°	-1.1					
Stop		20.003	593.322	74.5°	79°	-1.4	.75025	6.5	0.98168	0.128423	1.8480
Start	2.0	15.003	588.204	75°	79°	-1.4					
Average		5.000	5.118	74.750	79°	-1.4					
Stop		25.002	598.242	74.5°	80°	-1.7	.87891	5.55	1.02209	0.134614	1.8258
Start	2.5	20.003	593.322	74.5°	80°	-1.7					
Average		4.999	4.920	74.5°	80°	-1.7					
Stop		30.012	603.178	74.5°	81°	-2.1	.95851	5.1	1.02071	0.134106	1.8357
Start	3.0	25.002	598.242	74.5°	80°	-2.1					
Average		5.010	4.936	74.5°	80.5°	-2.1					
								Average	1.00816	0.132974	

$$Q = 17.65 \cdot \frac{V_{ds}}{\Theta} \cdot \frac{P_b}{(\bar{t}_{ds} + 460)}$$

$$K_d = Y_{ds} \frac{V_{ds}}{\Theta} \sqrt{\frac{P_{ds}}{T_{ds}\ H}} \qquad P_{ds} = \left(P_b + \frac{\Delta p}{13.6}\right)$$

$\Delta H@ = 1.81463$

$$Y_d = Y_{ds} \frac{V_{ds}}{V_d} \frac{(\bar{t}_d + 460)}{(\bar{t}_{ds} + 460)} \frac{P_b}{\left(P_b + \frac{\Delta H}{13.6}\right)}$$

$$K_{iso} = \frac{27.40}{(K_d)^2} = \frac{27.40}{(\quad)^2} = 1549.591041$$

SWANSON ENVIRONMENTAL INC.
24158 Hoggerty Road

PITOT TUBE CALIBRATION

Pitot tube calibration number 5 Date 7-17-90

Calibrated by DJ / BM

A Side Calibration

Run No.	Δp_{std} cm H_2O (in. H_2O)	Δp_s cm H_2O (in. H_2O)	$C_{p(s)}$	Deviation $C_{p(s)}-\bar{C}_{p(A)}$
1	.340	.505	.821	.01
2	.345	.515	.818	.01
3	.345	.515	.818	.01
		$\bar{C}_{p(side\ A)}$	.819	

B Side Calibration

Run No.	Δp_{std} cm H_2O (in. H_2O)	Δp_s cm H_2O (in. H_2O)	$C_{p(s)}$	Deviation $C_{p(s)}-\bar{C}_{p(B)}$
1	.335	.525	.799	.01
2	.335	.530	.795	.01
3	.340	.535	.797	.00
		$\bar{C}_{p(side\ B)}$	.797	

$\bar{X}$=.808

Figure 4-10. Pitot tube calibration data.

PITOT TUBE CALIBRATION

Pitot tube calibration number 4 6' Date 7-17-96

Calibrated by DS/ BM

A Side Calibration

Run No.	Δp_{std} cm H_2O (in. H_2O)	Δp_s cm H_2O (in. H_2O)	$C_{p(s)}$	Deviation $C_{p(s)}-\bar{C}_{p(A)}$
1	.330	.540	.782	.01
2	.335	.535	.791	.01
3	.340	.545	.789	.01
		$\bar{C}_{p(side\ A)}$	.787	

B Side Calibration

Run No.	Δp_{std} cm H_2O (in. H_2O)	Δp_s cm H_2O (in. H_2O)	$C_{p(s)}$	Deviation $C_{p(s)}-\bar{C}_{p(B)}$
1	.335	.515	.806	.00
2	.340	.520	.809	.01
3	.335	.520	.803	.01
		$\bar{C}_{p(side\ B)}$	.806	

$\bar{X} = .797$

Figure 4-10. Pitot tube calibration data.

TO: Rhonda O'Leary

From: Pat Merrick - Foremost

Wisconsin Dairies

P.O. BOX 111

BARABOO, WI 53913-0111

SEP 10 1990

Wausau DNR Office

SUBJECT

DATE 9/7/90

MESSAGE

Attached please find log sheets you requested for day air tests were done. Although at this time we ran product we did not run up to capacity which is approx. 3,000 pounds throughput per hr.

SIGNED Pat Merrick

Reply To

Date

FOREMOST WHEY PRODUCTS ROTHSCHILD PLANT #85

[redacted] 313 [redacted]

310REG 310WTH 310BW

[redacted] 304

LOT NUMBER [redacted]

RG027 RG027-1

GAS START 46364

GAS END

DATE STARTED 7-24-90

DATE ENDED

CRYSTALLINE DRYER PROCESSING LOG

TIME AM/PM (HOURLY)	OPERATOR INITIALS	DRYER TEMPERATURES INLET	OUTLET	CYCLONE	FEED VALVE	AUGER	MILL SEP.	AMPS	PSI	BAG ~~DRUM~~ NO.
12 noon	T. H.	–	–	–	–	–	–	–	–	–
1:00 P.M		255	196	203	8	4	1170	40	18	13
2:00 P.M		250	196	203	7	4	1169	40	18	40
3:00 P.M.		243	197	202	7	4	1171	40	18	65
4:00 P.M	S.U.	244	196	207	7	4	1171	40	18	88
5:00 P.M		244	196	202	7	4	1170	40	18	112
6:00 P.M		244	196	202	7	4	1170	40	18	138
7:00 P.M		~~242~~	~~192~~	~~200~~	~~7~~	~~4~~	~~1171~~	~~40~~	~~18~~	161
10:00 P.M		242	192	200	7	4	1171	41	18	167
11:00 P.M		242	194	201	7	4	1171	40	18	191
12:00 P.M	R.S.	243	196	201	6	4	1170	40	18	218
1:00 AM		241	196	200	7	4	1170	40	18	243
2:00		241	196	200	7	4	1170	40	18	269
3:00		240	196	200	7	4	1171	40	18	292

~~DRUM~~ NO.	3	88	162
% on	1.1	[illegible]	
% on	4.8	4.8	
% on 1.41		1.0	.5
% on 900		48	6.5

TANK ORIGIN 8

INCHES TO TOP 11

TANK TEMP. 70°

REFRACTIVE INDEX

SAMPLE B-4-MILL

ph

MOTHER LIQUOR DEST. TK# 30

COMMENTS

on product noon. Auger on 12:10 P.M. 12:20 P.M. Won't Feed on Auto, running MAN. 2:00 P.M. on AUTO. 2:45 P.M. Raised 2nd + 3rd speed on AUTO 6:00 maintenance work on centrifuge - its speeds are not right 6:50 auger off hopper maintenance still working on centrifuge 8:50 centrifuge fix wash basket. 9:10 back on prod. 9:40 auger on

REVIEWED AND APPROVED:

→ 50# to a bag

SUPERVISOR

QUALITY CONTROL

SUPERINTENDENT

MANAGER

1755-CDPL (1751b 5/90)

CREMOST WHEY PRODUCTS ROTHSCHILD PLANT #85

[redacted] 313 304 [redacted]

310REG 310WTH 310BW

LOT NUMBER [redacted]

GAS ~~START~~ NOON

GAS END

DATE STARTED 7-23-90

DATE ENDED 7-24-90

CRYSTALLINE DRYER PROCESSING LOG

TIME AM/PM (HOURLY)	OPERATOR INITIALS	DRYER TEMPERATURES INLET	OUTLET	CYCLONE	FEED VALVE	AUGER	MILL SEP.	AMPS	PSI	DRUM NO.
12:00	R.S.		NO	ROAD	ings					
1:00		252	198	203	9	6	1186	40	18	6
2:00		260	196	203	8½	6	1186	40	18	15
3:00		258	197	203	8½	6	1185	40	18	24
4:00		264	196	204	8½	6	1170	40	18	33
5:00		262	197	204	8½	6½	1170	40	18	42
6:00		264	196	203	9	6½	1170	40	18	52
7:00		262	197	204	9	6½	1170	40	18	61
8:00 A.M.	T.H.	230	197	200	9	—	1179	40	18	70
9:00 A.M.		266	197	204	9	6½	1170	40	18	75
10:00 A.M.		260	197	204	9	6½	1170	40	18	86
11:00 A.M.		—	—	199	—	—	1179	40	18	92 LAST B

DRUM NO.	1	10	25	33	58	83					
% on	.2	.4	.1	.3	.3	.3					
% on	2.2	2.1	1.8	2.9	3.5	3.7					
% on											
% on											

TANK ORIGIN 7

INCHES TO TOP 11"

TANK TEMP. 70 9

REFRACTIVE INDEX 24.2

SAMPLE B-4 Mill

ph 4.2

MOTHER LIQUOR DEST. TK#6

COMMENTS

start to set up for down grading - 6:00 change mine wash up everything and start up. 11:00 warm dryer 11:05 spray bagger room 11:31 1st batch. centrifuge

12:10 AM - Auger on

8:00 A.M. Auger off Basket Low. Auger on 8:20 10:45 Auger off

200# to 1 drum

REVIEWED AND APPROVED:

SUPERVISOR [signature]

QUALITY CONTROL [signature]

SUPERINTENDENT [signature]

MANAGER [signature]

755-CDPL (1751b 5/90)