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

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

AP42 Section:	9.10.1.2
Background Chapter	4
Reference:	1
Title:	Results of a Source Emission Compliance Test at Southern Minnesota Beet Sugar Cooperative, Renville, Minnesota, MMT Environmental, Inc., St. Paul, MN, January 21, 1988.

APPENDIX A

REPORT EXCERPTS FROM REFERENCE 1

(Southern Minnesota Beet Sugar Cooperative, January 21, 1988)

#29D ①

MMT Environmental, Inc.
4643 North Chatsworth Street
St. Paul, MN 55112

RESULTS OF A SOURCE EMISSION COMPLIANCE TEST AT SOUTHERN MINNESOTA BEET SUGAR COOPERATIVE RENVILLE, MINNESOTA 56284

January 21, 1988

Submitted to:

Southern Minnesota Beet Sugar
Cooperative
P.O. Box 500
Renville, Minnesota 56248

Attention: Mr. W.D. DeBelly

Prepared by:

Clifford E. Mohs
Manager, Technical Services

Approved by:

Milos Tomaides, Ph.D., P.E.
Senior Vice President

Report Number 8675
Project Number 8014

PARTICULATE EMISSION TEST CALCULATIONS

PROJECT NUMBER: 8014 COMPANY: SOUTHERN MN. BEET SUGAR
TEST NUMBER: 1 SOURCE: CYCLONE "A-2"
RUN NUMBER: 1 TIME: 1/21/88 1128-1231

TEST DATA

GAS METER COEFFICIENT	1.0035 Y	VOLUME OF LIQUID COLLECTED, ML	515.5 Vl
PITOT TUBE COEFFICIENT	0.840 Cp	GAS COMPOSITION, % V/V DRY;	
NOZZLE DIMENSIONS;		CARBON DIOXIDE	5.50 CD
DIAMETER, IN	0.375 Dn	OXYGEN	14.20 OX
AREA, SF	0.000767 An	CARBON MONOXIDE	0.00 CM
		NITROGEN (BY DIFFERENCE)	80.30 NI
STACK DIMENSIONS;			
DIAMETER/LENGTH, IN	47.50 Sl	AVE. TRAVERSE POINT DATA;	
WIDTH, IN	0.00 Sw	STACK TEMP., DEG F	288 Ts
AREA, SF	12.306 As	METER TEMP., DEG F	68 Tm
		ORIFICE PRESSURE, IN WC	1.450 Po
BAROMETRIC PRESSURE, IN HG	29.30 Pb	SQRT VELOCITY P., IN WC	0.421 Pv
STACK PRESSURES;		MASS OF PARTICULATE MATTER COLLECTED, G;	
STATIC, IN WC	0.00 Pg	FRONT CATCH (94.8%)	0.4246 Wf
ABSOLUTE, IN HG	29.30 Ps	BACK CATCH (5.2%)	0.0234 Wb
SAMPLING TIME, MIN	60.00 Ti	TOTAL CATCH	0.4480 Wt
VOLUME OF GAS SAMPLED AT METER, DCF	40.427 Vm		

CALCULATED RESULTS

VOLUME OF GAS SAMPLED AT METER, DSCF	39.872 Vms	GAS MOLECULAR WEIGHT;	
		DRY BASIS, LB/LB-MOLE	29.45 Md
		WET BASIS, LB/LB-MOLE	25.12 Ms
EQUIVALENT VOLUME OF WATER VAPOR COLLECTED, SCF	24.265 Vw	AVERAGE GAS VELOCITY, FPS	30.52 Vs
GAS MOISTURE CONTENT;		GAS VOLUMETRIC FLOW RATE;	
VOLUME FRACTION	0.3783 Bws	ACTUAL, ACFM	22532 Qa
PERCENT BY VOLUME	37.83 Bwp	STANDARD, SCFM	15567 Qs
		DRY STANDARD, DSCFM	9678 Qsd
		ISOKINETIC VARIATION, %	110.24 I

PARTICULATE EMISSION PARAMETER	FRONT CATCH	BACK CATCH	TOTAL CATCH
PARTICULATE CONCENTRATION			
ACTUAL, GR/ACF	0.0705 Caf	0.0039 Cab	0.0744 Cat
STANDARD, GR/SCF	0.1021 Csf	0.0056 Csb	0.1077 Cst
DRY STANDARD, GR/DSCF	0.1642 Cdf	0.0090 Cdb	0.1733 Cdt
PARTICULATE EMISSION RATE, LB/HR			
CLASSICAL METHOD	13.63 Rcf	0.75 Rcb	14.38 Rct
RATIO OF AREAS METHOD	15.02 Rrf	0.83 Rrb	15.85 Rrt

STANDARD CONDITIONS: 68 DEG F, 29.92 IN HG * NON-APPLICABLE DATA

PARTICULATE EMISSION TEST CALCULATIONS

PROJECT NUMBER: 8014 COMPANY: SOUTHERN MN. BEET SUGAR
TEST NUMBER: 1 SOURCE: CYCLONE "A-2"
RUN NUMBER: 2 TIME: 1/21/88 1248-1352

TEST DATA

GAS METER COEFFICIENT	1.0035	Y	VOLUME OF LIQUID COLLECTED, ML	460.0	Vl
PITOT TUBE COEFFICIENT	0.840	Cp			
			GAS COMPOSITION, % V/V DRY;		
NOZZLE DIMENSIONS;			CARBON DIOXIDE	4.60	CD
DIAMETER, IN	0.375	Dn	OXYGEN	15.60	OX
AREA, SF	0.000767	An	CARBON MONOXIDE	0.00	CM
			NITROGEN (BY DIFFERENCE)	79.80	NI
STACK DIMENSIONS;					
DIAMETER/LENGTH, IN	47.50	Sl	AVE. TRAVERSE POINT DATA;		
WIDTH, IN	0.00	Sw	STACK TEMP., DEG F	292	Ts
AREA, SF	12.306	As	METER TEMP., DEG F	68	Tm
			ORIFICE PRESSURE, IN WC	1.385	Po
BAROMETRIC PRESSURE, IN HG	29.30	Pb	SQRT VELOCITY P., IN WC	0.422	Pv
STACK PRESSURES;			MASS OF PARTICULATE MATTER		
STATIC, IN WC	0.00	Pg	COLLECTED, G;		
ABSOLUTE, IN HG	29.30	Ps	FRONT CATCH (96.0%)	0.4116	Wf
			BACK CATCH (4.0%)	0.0170	Wb
SAMPLING TIME, MIN	60.00	Ti	TOTAL CATCH	0.4286	Wt
VOLUME OF GAS SAMPLED AT METER, DCF	38.299	Vm			

CALCULATED RESULTS

VOLUME OF GAS SAMPLED AT METER, DSCF	37.767	Vms	GAS MOLECULAR WEIGHT;		
			DRY BASIS, LB/LB-MOLE	29.36	Md
			WET BASIS, LB/LB-MOLE	25.22	Ms
EQUIVALENT VOLUME OF WATER VAPOR COLLECTED, SCF	21.652	Vw	AVERAGE GAS VELOCITY, FPS	30.60	Vs
GAS MOISTURE CONTENT;			GAS VOLUMETRIC FLOW RATE;		
VOLUME FRACTION	0.3644	Bws	ACTUAL, ACFM	22593	Qa
PERCENT BY VOLUME	36.44	Bwp	STANDARD, SCFM	15535	Qs
			DRY STANDARD, DSCFM	9974	Qsd
			ISOKINETIC VARIATION, %	102.34	I

PARTICULATE EMISSION PARAMETER	FRONT CATCH	BACK CATCH	TOTAL CATCH
PARTICULATE CONCENTRATION			
ACTUAL, GR/ACF	0.0734 Caf	0.0030 Cab	0.0765 Cat
STANDARD, GR/SCF	0.1068 Csf	0.0044 Csb	0.1112 Cst
DRY STANDARD, GR/DSCF	0.1681 Cdf	0.0069 Cdb	0.1750 Cdt
PARTICULATE EMISSION RATE, LB/HR			
CLASSICAL METHOD	14.23 Rcf	0.59 Rcb	14.82 Rct
RATIO OF AREAS METHOD	14.56 Rrf	0.60 Rrb	15.16 Rrt

STANDARD CONDITIONS: 68 DEG F, 29.92 IN HG * NON-APPLICABLE DATA

PARTICULATE EMISSION TEST CALCULATIONS

PROJECT NUMBER: 8014 COMPANY: SOUTHERN MN. BEET SUGAR
TEST NUMBER: 1 SOURCE: CYCLONE "A-2"
RUN NUMBER: 3 TIME: 1/21/88 1430-1533

TEST DATA

GAS METER COEFFICIENT	1.0035	Y	VOLUME OF LIQUID COLLECTED, ML	614.1	Vl
PITOT TUBE COEFFICIENT	0.840	Cp			
			GAS COMPOSITION, % V/V DRY;		
NOZZLE DIMENSIONS;			CARBON DIOXIDE	6.00	CD
DIAMETER, IN	0.375	Dn	OXYGEN	13.10	OX
AREA, SF	0.000767	An	CARBON MONOXIDE	0.00	CM
			NITROGEN (BY DIFFERENCE)	80.90	NI
STACK DIMENSIONS;					
DIAMETER/LENGTH, IN	47.50	Sl	AVE. TRAVERSE POINT DATA;		
WIDTH, IN	0.00	Sw	STACK TEMP., DEG F	292	Ts
AREA, SF	12.306	As	METER TEMP., DEG F	68	Tm
			ORIFICE PRESSURE, IN WC	1.555	Po
BAROMETRIC PRESSURE, IN HG	29.30	Pb	SQRT VELOCITY P., IN WC	0.446	Pv
STACK PRESSURES;			MASS OF PARTICULATE MATTER		
STATIC, IN WC	0.00	Pg	COLLECTED, G;		
ABSOLUTE, IN HG	29.30	Ps	FRONT CATCH (95.8%)	0.4170	Wf
			BACK CATCH (4.2%)	0.0184	Wb
SAMPLING TIME, MIN	60.00	Ti	TOTAL CATCH	0.4354	Wt
VOLUME OF GAS SAMPLED AT METER, DCF	41.000	Vm			

CALCULATED RESULTS

VOLUME OF GAS SAMPLED AT METER, DSCF	40.448	Vms	GAS MOLECULAR WEIGHT;		
			DRY BASIS, LB/LB-MOLE	29.48	Md
			WET BASIS, LB/LB-MOLE	24.70	Ms
EQUIVALENT VOLUME OF WATER VAPOR COLLECTED, SCF	28.906	Vw	AVERAGE GAS VELOCITY, FPS	32.65	Vs
GAS MOISTURE CONTENT;			GAS VOLUMETRIC FLOW RATE;		
VOLUME FRACTION	0.4168	Bws	ACTUAL, ACFM	24108	Qa
PERCENT BY VOLUME	41.68	Bwp	STANDARD, SCFM	16566	Qs
			DRY STANDARD, DSCFM	9662	Qsd
			ISOKINETIC VARIATION, %	112.02	I

PARTICULATE EMISSION PARAMETER	FRONT CATCH	BACK CATCH	TOTAL CATCH
PARTICULATE CONCENTRATION			
ACTUAL, GR/ACF	0.0637 Caf	0.0028 Cab	0.0665 Cat
STANDARD, GR/SCF	0.0927 Cwf	0.0041 Cwb	0.0968 Cwt
DRY STANDARD, GR/DSCF	0.1590 Csf	0.0070 Csb	0.1660 Cst
PARTICULATE EMISSION RATE, LB/HR			
CLASSICAL METHOD	13.18 Rcf	0.58 Rcb	13.76 Rct
RATIO OF AREAS METHOD	14.75 Rrf	0.65 Rrb	15.40 Rrt

STANDARD CONDITIONS: 68 DEG F, 29.92 IN HG * NON-APPLICABLE DATA

SUMMARY OF PARTICULATE EMISSION TEST LABORATORY DATA

PROJECT NUMBER: 8014 COMPANY: SOUTHERN MN. BEET SUGAR
TEST NUMBER: 1 SOURCE: CYCLONE "A-2"

	MASS OF PARTICULATE MATTER COLLECTED, GRAMS							
	FRONT CATCH				BACK CATCH			TOTAL PARTICULATE MASS COLLECTED
RUN NUMBER	FRONT WASH	CYCLONE CATCH	FILTER CATCH	FRONT TOTAL	IMPINGER CATCH **	IMPINGER WASH	BACK TOTAL	
1	0.1630	0.0000	0.2616	0.4246	0.0112	0.0122	0.0234	0.4480
2	0.1760	0.0000	0.2356	0.4116	0.0087	0.0083	0.0170	0.4286
3	0.1611	0.0000	0.2559	0.4170	0.0122	0.0062	0.0184	0.4354

* NOT APPLICABLE

** CHLOROFORM/ETHYL ETHER EXTRACTION

FORM 138
Rev. 6-87

SOUTHERN MINNESOTA SUGAR CO-OP

(4) JAN 22 1988

DIFFUSER REPORT

DAY ENDING 8 A.M. 1-22-88

SIGNATURES

	OPER.	BEET END 4MAN
SHIFT 1	[illegible]	[illegible]
SHIFT 2	[illegible]	[illegible]
SHIFT 3	Julie Siebert	[illegible]

5%

	A.M. 9	10	11	P.M. 12	1	2	3	4	5	6	7	8	9	10	11	A.M. 12	1	2	3	4	5	6	7	8
BEETS SLICED TONS 320	320	320	320	322	290	290	290	321	0	270	308	300	300	310	310	325	300	318	300	280	290	275	275	278
COSSETTE SCALE	8 A.M. 21945								4 P.M. 24316								12 Mid. 26431							
SLICERS IN SERVICE		4	3	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
CONDITION OF COSSETTES	gd	gd	gd	gd	gd	gd	gd	gd		gd	gd	gd	gd	gd	gd	gd	gd	gd	gd	gd	gd	gd	gd	gd
TEMPS: SCALDING TEMP. ENT. DIFF. 90	90	83	79	84	90	88	89			76	84	85	82	82	83	84	84	84	82	83	80	76	76	75
RAW JUICE LVG. DIFF. 61	61	56	56	61	68	70	65			65	62	64	60	61	62	63	63	66	64	65	64	62	61	57
DIFFUSER SUPPLY 67	67	67	68	67	68	68	67			69	67	67	67	66	67	67	68	68	68	68	68	69	69	69
RAW JUICE TO CARBS. 71	80	78	-	79	82	86	85			84	84	83	82	82	82	83	84	85	85	85	85	85	83	-
Cossette 55	55	50	50	56	62	64	57			58	57	59	53	55	56	58	58	60	58	58	58	59	57	58
WATER FLOW TO DIFF. (TON/HR) 300	305	305 295	305 295	295 295	275	275	275			275	275	275 285	285 275	295	295 300	300	270	270	270	270	270 260	260 245	245	245
DIFF. SCREENS CLEANED																				X		X		
RAW JUICE FLOW %		72	66	70	70	70	70			66	66	70	70	70	70	70	66	70	70	66	66	66	66	66
DELAY TO SLICE (BELOW 250 TON/HR)																								

FORMALDEHYDE GALS. SHIFT 1 12:45 pm. 2 gal. SHIFT 2 _____ SHIFT 3 8 gal 5:00 am

FOAM OIL GALS. SHIFT 1 7'8½" SHIFT 2 7'8½"-7'6" SHIFT 3 7'6"-7'5"

DIFFUSER TEMP.		9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
69	CELL 2		71		70	71	74	74	X		72	69	70	69	69	69	X	69	72	72	72	73	72	71	X
71	CELL 9		70			71	71	73	X		71	70	70	70	70	70	X	69	70	71	71	71	70	70	X
70	CELL 13		69		71	71	71	72	X		67	67	69	69	69	69	X	68	69	70	70	69	69	69	X
67	CELL 17		68		70	70	70	70	X		66	67	67	67	67	67	X	67	68	69	69	67	67	68	X
67	CELL 22		66		67	67	67	67	X		64	65	65	66	66	66	X	65	66	66	66	66	66	66	X
67	CELL 25		66		67	67	67	67	X		66	65	66	66	66	66	X	65	66	66	66	66	66	66	X

REASON FOR DELAY: _____

SHUTTING @ 3:30 P.M. LIME KILN @ 5:00 P.M.

COMMENTS: Flushed flume 10:20 A.M. Flushed flume @ 5:15 P.M.
ICE FROZE "B" SLICER - SLICING AGAIN 11:50 -
B-SLICER MOTOR SHUT OFF 3 TIMES - JUMPED TRIP.

SOUTHERN MINNESOTA SUGAR CO-OP

DRYER REPORT

JAN 2 < 1200

Test Run

9.1 tons / hour — Tons pressed pulp / hour — 85%

DAY ENDING 1-22-88 8 A.M.

	OPERATOR	BEET END 4MAN
SHIFT 1	[illegible]	[illegible]
SHIFT 2	Sam	[illegible]
SHIFT 3	C.F.	[illegible]

TIME	A.M. 9	10	11	12	P.M. 1	2	3	4	5	6	7	8	9	10	11	12	A.M. 1	2	3	4	5	6	7	8
FEED RATE % NORTH	45	45	45	45	40	40	40	40	40	30	45	45	40	50	45	45	40	40	40	40	40	40	40	45
FEED RATE % SOUTH	45	45	45	45	40	40	40	40	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
FURNACE TEMP. NORTH	1050	1050	1050	1050	1050	1050	1100	1050	1300	1250	1400	1250	1250	1250	1300	1300	1250	1250	1250	1250	1250	1300	1200	1200
FURNACE TEMP. SOUTH	1200	1200	1200	1150	1200	1200	1200	1200	1100	1450	1350	1450	1400	1450	1450	1400	1350	1300	1300	1300	1300	1300	1300	1300
EXIT TEMP. NORTH	320	320	320	320	315	310	310	310	315	320	315	315	315	310	320	320	320	310	310	310	310	305	305	311
EXIT TEMP. SOUTH	325	325	325	310	310	310	310	310	325	330	325	330	330	330	330	330	330	330	325	325	325	325	330	330
MOISTURES PRESSED P.	76.2	76.6	75.8	76.0	73.6	75.6	73.4	76.4	78.0	77.8	77.8	11.5	78.2	78.0	78.0	77.4	76.6	76.8	76.4	76.8	76.6	76.2	76.6	76.8
MOISTURES DRIED P.	9.8	9.4	9.2	9.6	8.4	10.2	9.2	10.0	11.5	8.0	8.2	9.6	8.8	8.6	8.4	8.2	8.6	9.0	8.8	9.2	8.8	8.4	8.2	8.6
MOISTURES PELLETS	10.8	11.2	11.0	10.6	10.8	10.4	10.8	10.4	11.5	10.0	10.2	10.4	10.2	10.0	10.2	10.0	10.4	11.2	11.4	11.0	10.8	11.2	11.2	11.0
STORAGE BIN (E) OR (W)																								
PYROMETER NORTH	1200	1200	1200	1200	1200	1150	1250	1200	1300	1350	1450	1350	1350	1350	1400	1400	1300	1300	1300	1300	1300	1300	1310	1310
PYROMETER SOUTH	1400	1350	1000	1350	1350	1350	1350	1350	1250	1600	1500	1600	1550	1600	1600	1600	1600	1600	1600	1600	1600	1550	1550	1600
FIRE VISIBLE EXIT END NORTH	Y	Y	Y	Y	Y	Y	Y	Y																
FIRE VISIBLE EXIT END SOUTH	Y	Y	Y	Y	Y	Y	Y	Y																
CHEMICALS TO WATER TANK		X		X		X		X																

FEED RATE % NORTH 5: Tons

FUEL OIL USED — NORTH METER: 8 A.M. _____ 4 P.M. _____ 12 MID. _____ 8 A.M. _____

FUEL OIL USED — SOUTH METER: 8 A.M. 043052 4 P.M. 045427 12 MID. _____ 8 A.M. _____

REASON FOR PULP TO FLOOR: ID Damper 60% Recycle 35% combustion air 90%

*COMMENTS:

* NOTE TIMES FOR INSTALLATION OF NEW DIES AND ROLLERS.

F3

Filename: BEET1.WQ1
Date: 02-Dec-94
Facility: Southern Minnesota Beet Sugar Cooperative, Renville, Minnesota
Source: Fuel oil-fired drum pulp dryer (assumed south dryer)
Test date: Jan. 21, 1988

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	288	292	292	
	Pressure	in. HG	29.3	29.3	29.3	
	Moisture	%	37.83	36.44	41.68	
	Oxygen	%	14.2	15.6	13.1	
	Volumetric flow, actual	acfm	22532	22593	24108	
	Volumetric flow, standard*	dscfm	9683	9874	9667	
	Isokinetic variation	%	110.2	102.3	112	
	Wet pulp feed rate (Assumed South Dryer)	TPH	45.0	41.0	42.5	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.1642	0.1681	0.159	
	Condensible PM	G/dscf	0.0090	0.0069	0.007	
	CO2	% dv	5.5	4.6	6.0	
	Condensible organic PM	% of CPM	47.9%	51.2%	66.3%	
	Condensible inorganic PM	% of CPM	52.1%	48.8%	33.7%	
	Multiply all conc. by 4 because only one of four stacks was tested.					
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	54.5	56.9	52.7	
	Condensible PM	lb/hr	2.99	2.34	2.32	
	CO2	lb/hr	14600	12451	15901	
	Condensible organic PM	lb/hr	1.43	1.20	1.54	
	Condensible inorganic PM	lb/hr	1.56	1.14	0.782	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	1.21	1.39	1.24	1.28
	Condensible PM	lb/ton	0.0664	0.0570	0.0546	0.0593
	CO2	lb/ton	324	304	374	334
	Condensible organic PM	lb/ton	0.0318	0.0292	0.0362	0.0324
	Condensible inorganic PM	lb/ton	0.0346	0.0278	0.0184	0.0269
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.606	0.694	0.620	0.640
	Condensible PM	kg/Mg	0.0332	0.0285	0.0273	0.0297
	CO2	kg/Mg	162	152	187	167
	Condensible organic PM	kg/Mg	0.0159	0.0146	0.0181	0.0162
	Condensible inorganic PM	kg/Mg	0.0173	0.0139	0.00920	0.0135

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

RESULTS OF A SOURCE
EMISSION COMPLIANCE TEST
AT SOUTHERN MINNESOTA BEET SUGAR
COOPERATIVE
RENVILLE, MINNESOTA 56284

Report Number 8675
Project Number 8014

1 INTRODUCTION

On January 21, 1988, MMT Environmental, Inc. performed a source emission compliance test on one of the four cyclones used to remove the particulates from the exhaust gas of drum dryer "A". The cyclone tested is designated "A2", it is the only cyclone of the four that has straightening vanes in the discharge. Testing of the other cyclones, without flow straightening vanes, would be invalid due to turbulence and cyclonic flow patterns. The tests were performed at the request of Mr. W.D. DeBelly.

The MMT sampling team consisted of Clifford E. Mohs and Robert A. Laska.

MPCA officials were notified of the compliance test but elected not to observe the on-site testing.

2 TEST RESULTS

The significant results generated by the test program are presented in this section.

2.1 Particulate Emissions

Table 2.1 presents the results of the particulate emission tests. Particulate emissions of the three runs averaged 0.105 gr/SCF.

2.2 Visible Emissions

Attempts were made to make visible emissions observation during all three of the test runs but because of the high moisture content of the gas and the close proximity of the other stacks, it was impossible to make V.E. reading.

2.3 Cyclone A2 Particulate Removal

Table 2.3.1 presents the result of the pulp material collected at the bottom of the cyclone A2. Collected material averaged 263.2 lb/hr.

Table 2.3.2 presents the cyclone removal efficiency. The average efficiency was determined as 94.8%.

2.4. Comments

Flow measurements were made in two cyclones B1 and B2 of drum dryer "B", to determine if the flow patterns would be acceptable under EPA regulations to perform a US-EPA method 5 to determine the emissions. Both stacks showed significant cyclonic flow patterns and testing would not be acceptable unless straightening vanes or other mechanical method was used to provide a better flow pattern.

TABLE 2.1 SUMMARY OF PARTICULATE EMISSION TEST RESULTS

PROJECT NUMBER: 8814 COMPANY: SOUTHERN MN. BEET SUGAR
TEST NUMBER: 1 SOURCE: CYCLONE "A-2"

TEST PARAMETER	RUN 1	RUN 2	RUN 3	
TEST DATE	1/21/88	1/21/88	1/21/88	
TIME OF TEST, HR:				
START	1109	1249	1432	
FINISH	1231	1352	1533	
EFFLUENT TEMPERATURE, DEGREES F	288	292	292	
EFFLUENT MOISTURE CONTENT, % V/V	37.8	36.4	41.7	
EFFLUENT COMPOSITION, % V/V DRY:				
CARBON DIOXIDE	5.5	4.6	6.2	
OXYGEN	14.2	15.6	13.1	
CARBON MONOXIDE	0.0	0.2	0.2	
EFFLUENT VOLUMETRIC FLOW RATE:				
ACTUAL CONDITIONS, ACFM	22532	22593	24123	23,078
STANDARD CONDITIONS, SCFM	15567	15535	16566	
DRY STANDARD CONDITIONS, DSCFM	9678	9874	9662	~~9738~~
ISOKINETIC VARIATION, %	110.2	100.3	113.0	105.17
EFFLUENT PARTICULATE CONCENTRATION:				
ACTUAL CONDITIONS, GR/ACF	0.0744	0.0765	0.0665	
STANDARD CONDITIONS, GR/SCF	0.1077	0.1112	0.0968	
DRY STANDARD CONDITIONS, GR/DSCF	0.1733	0.1753	0.1663	0.1714
SOURCE PARTICULATE EMISSION RATE:				
CLASSICAL METHOD, LB/HR	14.36	14.92	13.76	14.32
RATIO OF AREAS METHOD, LB/HR	15.85	15.16	15.42	15.47

Rated @ 23,000 ACFM

100.3% of rated

PARTICULATE CONCENTRATION AND EMISSION RATES BASED ON ANALYSIS OF THE SAMPLING TRAIN FRONT AND BACK CATCHES.

STANDARD CONDITIONS: 68 DEGREES FAHRENHEIT, 29.92 INCHES OF MERCURY.

Figure 3.1 Description of Sampling Location

Duct cross-sectional dimensions at the sampling location: 47.5

Equivalent diameter (rectangular duct only): _____

Distance from sampling ports to the nearest flow disturbance;

Before sampling ports: 5.6 = _____ duct diameters

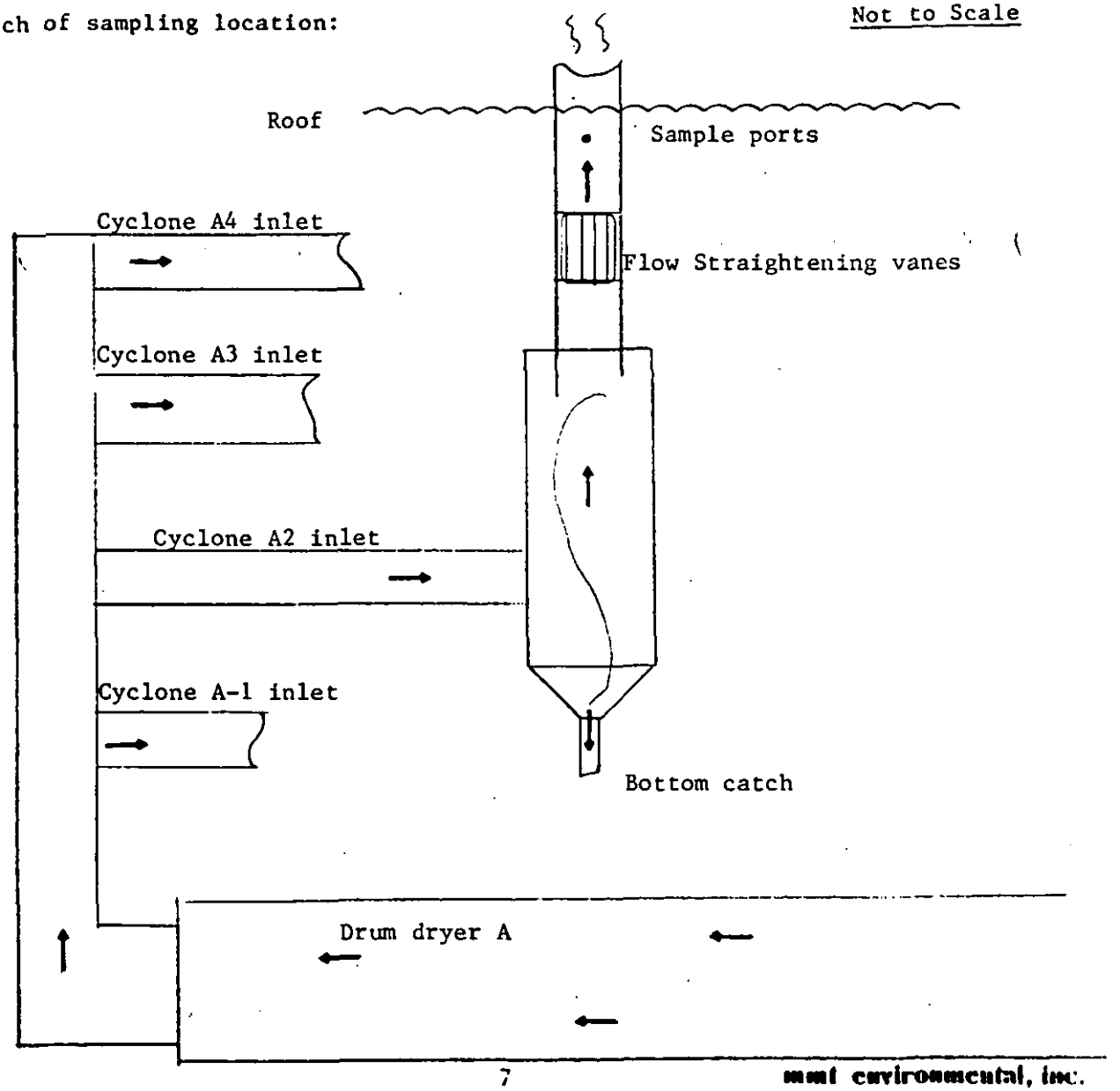
After sampling ports: 2.0 = _____ duct diameters

Number of sampling points;

Required by EPA Method 1: 26

Actually used: Only used 20 because straightening vanes were installed

Number of ports: 2

Points per port: 10

Sketch of sampling location: Not to Scale