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:	9
Title:	Emissions Survey Conducted at Western Sugar Company's Billings, Montana Production Facility, American Environmental Testing Company, Inc., December 1988.

APPENDIX I

REPORT EXCERPTS FROM REFERENCE 9

(Western Sugar Company, December 1988)

1988-89

"EMISSIONS SURVEY CONDUCTED AT

WESTERN SUGAR COMPANY'S BILLINGS, MONTANA

PRODUCTION FACILITY"

American Environmental Testing Company Inc.

801-266-7111

"EMISSIONS SURVEY CONDUCTED AT WESTERN SUGAR COMPANY'S BILLINGS, MONTANA PRODUCTION FACILITY"

Principal Chemists:

V. Brent Benson

Paul Tayler, PhD.

Technicians:

J. Paul Benson
Scott A. Staley
John R. Talcott

Test Dates: (Boiler)

12-6-88 and 12-7-88

(Pulp Dryer)

12-8-88 and 12-9-88

Prepared For: Mr. Randy A. Mielke, Regional Engineer

Western Sugar Company
P. O. Box 30878
Billings, Montana 59107

Prepared By: V. Brent Benson, Technical Director

American Environmental Testing, Inc.
565 South Birch Drive
Spanish Fork, Utah 84660

TABLE I-B

(Data Summary - Pulp Dryer)

	Test 1	Test 2	Test 2	Ave.
I. North Dryer Method 5 Particulate Emissions				
a) Sample Volume collected (DSCF)	61.698	47.350	47.713	52.254
b) Particulate matter collected (mg)	131.1	135.0	145.1	137.1
c) Emission rate (lbs/hr)	5.59	7.35	7.74	6.89
1. lbs/dscf x 10^{-6}	4.685	6.286	6.704	5.892
2. grains/dscf	0.0328	0.0440	0.0469	0.0412
II. South Dryer Method 5 Particulate Emissions				
a) Sample Volume collected (dscf)	48.783	46.022	45.157	46.654
b) Particulate matter collected (mg)	80.0	139.5	80.2	99.9
c) Emission rate (lbs/hr)	4.47	7.27	4.25	5.33
1. lbs/dscf x 10^{-6}	3.615	6.683	3.915	4.738
2. grains/dscf	0.0253	0.0468	0.0274	0.0332
III. Total Emissions				
a) lbs/hr.	10.06	14.63	11.99	12.23
b) % of allowable	9.17	13.34	10.93	11.15

III. PROCEDURES AND METHODS:

A. Plant Operations.

Plant production levels for pulp dryer and boiler firing rates are given in Appendix "D". Boiler run sheets are also included in Appendix "D" with 15 minutes parameter readings recorded during the testing period by Western Sugar production personnel.

B. Emissions Testing:

All of the test procedures employed were as specified in 40 CFR 60.424 (7-1-85 and as ammended) and in the "Quality Assurance Handbook for Air Pollution Measurement Systems". The standard Method 5 train was modified to allow for a Method 8 to be run concurrently with the particulate tests.

1. Calibrations:

   Calibration data and forms are included as Appendix "A".

2. Traverse Points:

   a) Pulp Dryer

   Figure I, is a diagram of the exhaust stacks from the East beet pulp dryer. With this geometry, it was necessary to use twenty-four (24) traverse points for each of the six Method 5 compliance tests. One complete test consisted of a test on each of the North and South exhaust stacks with the particulate loading from each being added for compliance criteria.

Table IV a)

FIELD AND LABORATORY DATA.

Plant or Job Description: Western Sugar - Billings, Montana

East Dryer - North and South Stacks Bank

RUN NO. Compl. #5

DATE 12-8-88

SYMBOL	DESCRIPTION	UNITS	N#1 1	S#1 2	N#2 3
V_m	volume dry gas sampled @ meter conditions	ft^3	61.145	47.330	45.745
P_b	barometric pressure	"Hg abs	26.52	26.33	26.30
ΔH	average pressure drop across the orifice meter	in H_2O	1.788	2.04	1.878
T_m	average gas meter temperature	°F	57.4	42.9	40.2
Y_i	meter coefficient		1.116	1.116	1.116
V_w	total H_2O collected, impingers & silica gel	ml	539.8	398.1	385.6
CO_2		%	3.6	2.3	3.3
O_2		%	11.4	10.8	11.3
$N_2 + CO$		%	85.0	86.9	85.4
R_n	nozzle dia.	in.	0.492	0.492	0.492
T_s	stack temperature	°F	168.5	162.7	167.1
$\sqrt{\Delta P}$	velocity head of stack gas	in. H_2O	0.2253	0.2284	0.2175
C_p	pitot tube coefficient		0.8955	0.8955	0.8555
P_s	static pressure	in H_2O	+0.02	+0.02	+0.02
A_s	area stack	$ft.^2$	38.028	38.028	38.028
T_t	net time of test	min.	96.0	72.0	72.0
Mg_p	Total particulates	mg	131.1	80.0	135.0

Table IV b)

FIELD AND LABORATORY DATA.

Plant or Job Description: Western Sugar Company - Billings, Montana
East Bank of Pulp Dryers

RUN NO. Part. Compliance

DATE 12-9-88

SYMBOL	DESCRIPTION	UNITS	#2 S 1	#3 N 2	#3 S 3
V_m	volume dry gas sampled @ meter conditions	ft^3	45.681	47.496	44.687
P_b	barometric pressure	"Hg abs	26.33	26.28	26.22
ΔH	average pressure drop across the orifice meter	in H_2O	1.755	1.931	1.726
T_m	average gas meter temperature	°F	54.5	55.0	50.8
Y_i	meter coefficient		1.116	1.116	1.116
V_w	total H_2O collected, impingers & silica gel	ml	428.0	422.8	413.6
CO_2		%	2.6	3.4	2.6
O_2		%	10.7	11.0	10.8
N_2+ CO		%	86.7	85.6	86.6
R_n	nozzle dia.	in.	0.492	0.492	0.492
T_s	stack temperature	°F	170.2	173.1	170.8
$\sqrt{\Delta P}$	velocity head of stack gas	in H_2O	0.2091	0.2203	0.2082
C_p	pitot tube coefficient		0.8955	0.8955	0.8955
P_s	static pressure	in H_2O	26.332 +0.02	26.282 +0.02	26.222 +0.02
A_s	area stack	$ft.^2$	38.028	38.028	38.028
T_t	net time of test	min.	72.0	72.0	72.0
Mg_p	Total particulates	mg	139.5	145.1	80.2

DATA SUMMARY.

Table V a)

Plant or Job Description: Western Sugar - Billings, Montana

East Dryer Bank - North and South Stack

Date 12-8-88

SYMBOL	DESCRIPTION	UNITS	N #1 1	S #1 2	N #2 3
$V_{m\ std}$	volume dry gas sampled @ standard conditions*	dscf	61.698	48.783	47.350
$V_{w\ gas}$	volume water vapor collected @ standard conditions*	scf	25.408	18.739	18.150
B_{wp}	proportion by volume of water vapor in gas steam dimensionless		0.2917	0.2775	0.2771
M_d	dry molecular weight	lb/lb mole	29.032	28.80	28.980
M_s	wet molecular weight	lb/lb. mile	25.814	25.803	25.937
V_s	stack gas velocity	ft/sec	16.526	16.739	15.965
Q_s	volumetric flow rate dry basis, standard conditions*	ft^3/hr	1.1933403 X 10^6	1.2344225 X 10^6	1.1694386 X 10^6
Iso	isokinetic variation	%	93.45	95.21	97.6
C_s	conc. particulate matter in stack gas, dry basis	lb/scf	4.6844495 X 10^{-6}	3.615334 X 10^{-6}	6.285513 X 10^{-6}
Em_4	emission rate	lb/hr gr/dscf	5.59 0.0328	4.47 0.0253	7.35 0.0440
				Comb. 10.06 #/hr.	Comb. 14.62 #/hr

* 70° F & 29.92 "Hg

DATA SUMMARY.

Table V b)

Plant or Job Description: Western Sugar Company - Billings, Montana

East Dryer Bank

Date 12-9-88

SYMBOL	DESCRIPTION	UNITS	S #2 1	N #3 2	S #3 3
$V_{m\ std}$	volume dry gas sampled @ standard conditions*	dscf	46.022	47.713	45.157
$V_{w\ gas}$	volume water vapor collected @ standard conditions*	scf	20.146	19.901	19.468
B_{wp}	proportion by volume of water vapor in gas steam dimensionless		0.3045	0.2943	0.3013
M_d	dry molecular weight	lb/lb mole	28.844	28.984	28.848
M_s	wet molecular weight	lb/lb. mile	25.542	25.751	25.580
V_s	stack gas velocity	ft/sec	15.496	16.312	15.457
Q_s	volumetric flow rate dry basis, standard conditions*	ft^3/hr	1.08792859×10^6	1.1544942×10^6	1.0845970×10^6
Iso	isokinetic variation	%	101.93	99.63	100.31
C_s	conc. particulate matter in stack gas, dry basis	lb/scf	6.682449×10^{-6}	$6.704364551 \times 10^{-6}$	$3.915400937 \times 10^{-6}$
Em_4	emission rate	lb/hr gr/dscf	7.27 0.0468	7.74 0.0469	4.25 0.0274

* 70° F & 29.92 "Hg

American Environmental Testing Co.
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JOB Western Sugar Co., Billing Mont.
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

East Dryer Production Rates.

#1

12/8-88

Tons/Hr. @ = 135 Tons.

24/Hr = 3240 Tons.

#2

12/9-88

Tons/Hr. @ = 135 Tons.

24/Hr. = 3240 Tons.

recieved from Tol Moore on 12/11-88.
T.B.

Filename: BEET9.WQ1
Date: 07-Dec-94
Facility: Western Sugar Company
Location: Billings, Montana
Source: East Pulp Dryer
Natural gas-fired rotary drum beet pulp dryer controlled with a wet scrubber
Test date: Dec. 8-9, 1988

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	168.5	167.1	173.1	
NORTH STACK	Pressure	in. HG	26.52	26.3	26.28	
	Moisture	%	29.17	27.71	29.43	
	Oxygen	%	10.8	11.3	11	
	Volumetric flow, actual	acfm	ND	ND	ND	
	Volumetric flow, standard*	dscfm	19889	19491	19242	
	Isokinetic variation	%	93.45	97.6	99.63	
Circle: Production or feed rate		TPH	135.00	135.00	135.00	
Capacity:	Feed to dryers					
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0285	0.0401	0.0430	
	Condensible inorganic PM	G/dscf	0.00425	0.00391	0.00388	
	CO2	% vol	2.3	3.3	3.4	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	4.87	6.70	7.10	
	Condensible inorganic PM	lb/hr	0.725	0.653	0.640	
	CO2	lb/hr	3134	4407	4483	
	Total PM	lb/hr	5.59	7.35	7.74	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.0360	0.0496	0.0526	0.0461
	Condensible inorganic PM	lb/ton	0.00537	0.00484	0.00474	0.00498
	CO2	lb/ton	23.2	32.6	33.2	29.7
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.0180	0.0248	0.0263	0.0230
	Condensible inorganic PM	kg/Mg	0.00269	0.00242	0.00237	0.00249
	CO2	kg/Mg	11.6	16.3	16.6	14.8

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	162.7	170.2	170.8	
SOUTH STACK	Pressure	in. HG	26.33	26.33	26.22	
	Moisture	%	27.75	30.45	30.13	
	Oxygen	%	11.4	10.7	10.8	
	Volumetric flow, actual	acfm	ND	ND	ND	
	Volumetric flow, standard*	dscfm	20574	18132	18077	
	Isokinetic variation	%	95.21	101.93	100.31	
Circle: Production or feed rate		TPH	135.00	135.00	135.00	
Capacity:						
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0180	0.0377	0.0175	
	Condensible inorganic PM	G/dscf	0.00727	0.00906	0.00991	
	CO2	% vol	3.6	2.6	2.6	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	3.18	5.87	2.71	
	Condensible inorganic PM	lb/hr	1.28	1.41	1.54	
	CO2	lb/hr	5075	3230	3220	
	Total PM	lb/hr	4.46	7.27	4.25	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.0235	0.0435	0.0201	0.0290
	Condensible inorganic PM	lb/ton	0.00950	0.0104	0.0114	0.0104
	CO2	lb/ton	37.6	23.9	23.9	28.5
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.0118	0.0217	0.0100	0.0145
	Condensible inorganic PM	kg/Mg	0.00475	0.00521	0.00569	0.00522
	CO2	kg/Mg	18.8	12.0	11.9	14.2

Confirm Cond. inorganic

TOTAL EMISSION FACTORS FOR BOTH STACKS	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.0596	0.0931	0.0726	0.0751
	Condensible inorganic PM	lb/ton	0.0149	0.0153	0.0161	0.0154
	CO2	lb/ton	60.8	56.6	57.1	58.1
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.0298	0.0465	0.0363	0.0375
	Condensible inorganic PM	kg/Mg	0.00744	0.00763	0.00805	0.00771
	CO2	kg/Mg	30.4	28.3	28.5	29.1

"EMISSIONS SURVEY CONDUCTED AT WESTERN SUGAR COMPANY'S BILLINGS, MONTANA PRODUCTION FACILITY"

I. INTRODUCTION:

At the request of Western Sugar Company's Mr. Randy A. Mielke, American Environmental Testing, Inc., conducted the following emissions tests at their Billings, Montana production facility.

1. Coal fired boiler

   Combined EPA Methods 5 and 8 for particulate matter and SO_2 emissions from the exhaust stack and the SO_2 from the scrubber inlet.

2. Beet pulp dryer

   EPA Method 5 for particulate matter from the dryer combustion and pelletizing circuit.

The tests on the boiler were conducted on December 6 and 7, 1988. The pulp dryer tests were run on December 8 and 9, 1988. The tests were observed by Mr. Harry Keltz and Mr. Jim Hughes from the Montana State Air Quality Bureau.

II. SUMMARY:

The results of the compliance tests are summarized in Table I. The allowable emission rate on the boiler for particulate matter and SO_2 during the test period was 87.67 #/hr. and 2.0 #/10^6 Btu's respectively. The allowable ceiling level for particulate matter from the pulp dryer was 109.67 lbs/hr. during the testing period. (See Appendix "D" - Allowable emission rate calculations).

Using the production rates supplied by Western Sugar the coal fired boiler emitted 94.41% of the allowable particulate emissions and 7.62% of the allowable SO_2 rate. The east pulp dryer bank emissions were 11.15% of the allowable rate during the testing period.

IV. RESULTS AND CONCLUSIONS:

A. Compliance Testing - General

All original field and laboratory data work sheets for each test are included in Appendix "B". This includes:

1. Nozzle measurement forms.
2. Particulate field data forms.
3. Moisture and filter weight forms.
4. Orsat analysis forms.
5. Acetone wash and blank sheet.
6. SO_3 and H_2SO_4 and SO_2 analysis sheets.
7. SO_2 calculation forms.

B. East Dryer Bank

Due to the fact that the dryer was being fired with natural gas during the testing it was not required that SO_2 emissions be measured at this time. The EPA Method 5 particulate data was collected from the north and south stacks alternately for a total of three (3) tests on each, or a total of three (3) complete tests comprising of a test on both the north and south stack. The total emission rate reflects the addition of one south and one north stack test particulate loading.

The data from these tests are summarized in Tables IV a) and b).

Compliance data calculated from the raw data in Table IV, are given in Table V a) and b). The average particulate loading for all of the tests was 12.23 lbs/hr., which is 11.15% of the allowable set by the Montana Air Quality Bureau (109.67 lbs/hr. for 135 tons/day feed rate).

EPA Method 5.

LABORATORY DATA

Company Western Sugar Billings Run No. Comp #1

Sampling Loaction East Pulp Dryer Date 12/8-88

~~South~~ North

MOISTURE COLLECTED

		GM/ML	Water Weight/~~Volume Gain~~ GM/ML
IMPINGER 1	Final Weight/Volume	747.4	
	Initial Weight/Vol.		
	Increase	570.6	+176.8
IMPINGER 2	Final Weight/Volume	750.7	
	Initial Weight/Vol.		
	Increase	587.6	+163.1
IMPINGER 3	Final Weight/Volume	572.9	
	Initial Weight/Vol.		
	Increase	454.2	+128.7
IMPINGER 4	Final Weight/Volume	768.6	
	Initial Weight/Vol.		
	Increase	697.4	+71.2

PARTICULATE COLLECTED (+539.8g total)

FRONT-HALF ANALYSIS (Nozzle, Probe, Filter and Hot Box Glassware)

(1)	Filter & Particulates	0.8587
(2)	Filter Tare Weight	0.7699 g 6254-1
(3)	Net Dry Particulates (1-2)	0.0888 = 88.8 mg
(4)	Particulates Caught in Nozzle, Probe & Glassware	25.3 mg
(5)	Total Front Catch (3 & 4)	114.1 mg

BACK-HALF ANALYSIS (Impingers, Connecting Glassware)

(1)	Particulate caught in impingers evaporated down at less than 120° F.	17.0 mg.

TOTAL PARTICULATE CATCH (Sum of Front and Back-Half Catches)

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ORSAT ANALYSIS

(Ave. of 3 Analyses Each)

TEST NO.	~~South~~ North DESCRIPTION	VOLUME PERCENT - DRY			
		NITROGEN	OXYGEN	CARBON DIOXIDE	CARBON MONOXIDE
#1	Billings, Mont.	86.9 %	10.8%	2.3 %	<0.1
	Western Sugar Co.	86.9 %	10.7%	2.4 %	<0.1
	But Pulp Dryer.	86.9 %	10.8%	2.3 %	<0.1
	AVERAGE	86.9 %	10.76%	2.33 %	<0.1

EPA Method 5

LABORATORY DATA

Company Western Sugar Billings. Run No. Compliance #2

Sampling Location East Pulp Dryer. Date 12/8-88

~~South~~ North

MOISTURE COLLECTED

		GM/ML	~~Water Weight/Volume Gain~~ GM/ML
IMPINGER 1	Final Weight/Volume	764.9	
	Initial Weight/Vol.		
	Increase	571.2	+193.7
IMPINGER 2	Final Weight/Volume	765.1	
	Initial Weight/Vol.		
	Increase	590.1	+175.1
IMPINGER 3	Final Weight/Volume	460.3	
	Initial Weight/Vol.		
	Increase	454.7	+5.6
IMPINGER 4	Final Weight/Volume	706.1	
	Initial Weight/Vol.		
	Increase	694.9	+11.2

PARTICULATE COLLECTED +385.6g total

FRONT-HALF ANALYSIS (Nozzle, Probe, Filter and Hot Box Glassware)

(1)	Filter & Particulates	0.8679
(2)	Filter Tare Weight	0.7762 WSP-3
(3)	Net Dry Particulates (1-2)	0.0967 = 96.7mg.
(4)	Particulates Caught in Nozzle, Probe & Glassware	26.3mg.
(5)	Total Front Catch (3 & 4)	123.0mg.

BACK-HALF ANALYSIS (Impingers, Connecting Glassware)

(1)	Particulate caught in impingers evaporated down at less than 120° F.	12.0mg.

TOTAL PARTICULATE CATCH (Sum of Front and Back-Half Catches)

135.0 mg.

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Billings, Mont.
East Butt Dryer Bank
North Stack - Run #2 Compl.

ORSAT ANALYSIS

(Ave. of 3 Analyses Each)

TEST NO. DESCRIPTION	VOLUME PERCENT - DRY			
	NITROGEN	OXYGEN	CARBON DIOXIDE	CARBON MONOXIDE
#2 (North)	85.5	11.3	3.2	<0.1
12/8-88.	85.3	11.4	3.3	<0.1
	85.4	11.3	3.3	<0.1
AVERAGE	85.4	11.33	3.27	<0.1

EPA Method 5.

LABORATORY DATA

Company Western Sugar, Billings. Run No. #3 Compliance

Sampling Loaction East Pulp Drier. Date 12/9-88

~~North~~ 1/BP MOISTURE COLLECTED

~~South~~ North

		GM/ML	Water Weight/Volume Gain GM/ML
IMPINGER 1	Final Weight/Volume	779.1	
	Initial Weight/Vol.		
	Increase	569.4	+209.7
IMPINGER 2	Final Weight/Volume	745.5	
	Initial Weight/Vol.		
	Increase	587.4	+158.1
IMPINGER 3	Final Weight/Volume	494.8	
	Initial Weight/Vol.		
	Increase	454.9	+39.9
IMPINGER 4	Final Weight/Volume	694.4	
	Initial Weight/Vol.		
	Increase	679.3	+15.1

PARTICULATE COLLECTED +422.8g total

FRONT-HALF ANALYSIS (Nozzle, Probe, Filter and Hot Box Glassware)

(1) Filter & Particulates 0.8789
(2) Filter Tare Weight 0.7680g WSH-6
(3) Net Dry Particulates (1-2) 0.1109 = 110.9 mg.
(4) Particulates Caught in Nozzle, Probe & Glassware 22.2 mg.
(5) Total Front Catch (3 & 4) 133.1 mg.

BACK-HALF ANALYSIS (Impingers, Connecting Glassware)

(1) Particulate caught in impingers evaporated down at less than 120° F. 12.0 mg.

TOTAL PARTICULATE CATCH (Sum of Front and Back-Half Catches)

145.1 mg.

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12/9-88 Western Sugar.

ORSAT ANALYSIS

#3 North. (Ave. of 3 Analyses Each)

TEST NO. DESCRIPTION	VOLUME PERCENT - DRY			
	NITROGEN	OXYGEN	CARBON DIOXIDE	CARBON MONOXIDE
#2 South Stack -	+85.7	10.9	3.4	<0.1
Bulk Pulp Dryer.	85.6	11.0	3.4	<0.1
Billings, Mont.	+85.7	10.9	3.4	<0.1
AVERAGE	85.67	10.97	3.4	<0.1

EPA Method 5

LABORATORY DATA

Company Western Sugar Billings. Run No. Compliance #1 VOD.

Sampling Loaction East Pulp Dryer (South). Date 12/8-88

MOISTURE COLLECTED

		GM/ML	Water Weight/Volume Gain GM/ML
IMPINGER 1	Final Weight/Volume	758.4	
	Initial Weight/Vol.		
	Increase	570.4	+188.0
IMPINGER 2	Final Weight/Volume	730.2	
	Initial Weight/Vol.		
	Increase	582.5	+147.7
IMPINGER 3	Final Weight/Volume	500.9	
	Initial Weight/Vol.		
	Increase	455.0	+45.8
IMPINGER 4	Final Weight/Volume	727.9	
	Initial Weight/Vol.		
	Increase	711.3	+16.6

PARTICULATE COLLECTED +398.1 g total.

FRONT-HALF ANALYSIS (Nozzle, Probe, Filter and Hot Box Glassware)

(1)	Filter & Particulates	0.8986
(2)	Filter Tare Weight	0.8559 WSV-2
(3)	Net Dry Particulates (1-2)	0.0427 = 42.7mg.
(4)	Particulates Caught in Nozzle, Probe & Glassware	14.3
(5)	Total Front Catch (3 & 4)	57.0mg.

BACK-HALF ANALYSIS (Impingers, Connecting Glassware)

(1)	Particulate caught in impingers evaporated down at less than 120° F.	23.0mg.

TOTAL PARTICULATE CATCH (Sum of Front and Back-Half Catches)

80.0mg.

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Sandy, Utah 84070
801 566-4023

ORSAT ANALYSIS

(Ave. of 3 Analyses Each)

TEST NO. DESCRIPTION	VOLUME PERCENT - DRY			
	NITROGEN	OXYGEN	CARBON DIOXIDE	CARBON MONOXIDE
#1 North Dryer Stack	85.0	11.4	3.6	<0.1
East Bank at Western	85.0	11.5	3.5	<0.1
Sugar - Billings, Mont	85.0	11.4	3.6	<0.1
AVERAGE	85.0	11.43	3.57	<0.1

EPA Method 5

LABORATORY DATA

Company Western Sugar Billings Run No. #2 Compliance.

Sampling Loaction East Pulp Dryer Date 12/9-88.

~~North~~ South

MOISTURE COLLECTED

		~~GM/ML~~	~~Water Weight/Volume Gain GM/ML~~
IMPINGER 1	Final Weight/Volume	779.6	
	Initial Weight/Vol. Increase	567.8	+211.8
IMPINGER 2	Final Weight/Volume	754.2	
	Initial Weight/Vol. Increase	585.9	+168.3
IMPINGER 3	Final Weight/Volume	487.6	
	Initial Weight/Vol. Increase	454.6	+33.0
IMPINGER 4	Final Weight/Volume	701.2	
	Initial Weight/Vol. Increase	686.3	+14.9

PARTICULATE COLLECTED 428.0g total.

FRONT-HALF ANALYSIS (Nozzle, Probe, Filter and Hot Box Glassware)

(1)	Filter & Particulates	0.8589
(2)	Filter Tare Weight	0.7727. WSP-4
(3)	Net Dry Particulates (1-2)	0.0862 = 86.2 mg
(4)	Particulates Caught in Nozzle, Probe & Glassware	26.3 mg
(5)	Total Front Catch (3 & 4)	112.5 mg.

BACK-HALF ANALYSIS (Impingers, Connecting Glassware)

(1)	Particulate caught in impingers evaporated down at less than 120° F.	27.0 mg.

TOTAL PARTICULATE CATCH (Sum of Front and Back-Half Catches)

139.5 mg.

American Analytical
&
Environmental Laboratory, Inc.
8739 South 300 West
Sandy, Utah 84070
801 566-4023

#25.

Western Sugar.
Billings, Mont.
East Dryer Bank.

ORSAT ANALYSIS

(Ave. of 3 Analyses Each)

TEST NO. DESCRIPTION	VOLUME PERCENT - DRY			
	NITROGEN	OXYGEN	CARBON DIOXIDE	CARBON MONOXIDE
#2 S Compl.	86.7	2.6	10.7	<0.1
12/9-88.	86.6	2.6	10.8	<0.1
	86.9	2.5	10.6	<0.1
AVERAGE	86.73	2.57	10.7	<0.1
		CO_2	O_2	

EPA Method 5.

LABORATORY DATA

Company Western Sugar, Billings. Run No. #3 Compliance

Sampling Loaction East Pulp Dryer. Date 12/9-88.

~~North~~ South MOISTURE COLLECTED

		~~GM/ML~~	~~Water Weight/Volume Gain~~ ~~GM/ML~~
IMPINGER 1	Final Weight/Volume	762.0	
	Initial Weight/Vol.		
	Increase	575.3	+186.7
IMPINGER 2	Final Weight/Volume	773.8	
	Initial Weight/Vol.		
	Increase	590.3	+183.5
IMPINGER 3	Final Weight/Volume	486.8	
	Initial Weight/Vol.		
	Increase	455.0	+31.8
IMPINGER 4	Final Weight/Volume	655.2	
	Initial Weight/Vol.		
	Increase	643.6	+11.6

+413.6g total

PARTICULATE COLLECTED

FRONT-HALF ANALYSIS (Nozzle, Probe, Filter and Hot Box Glassware)

(1)	Filter & Particulates	0.8062
(2)	Filter Tare Weight	0.7709g. WSL-5
(3)	Net Dry Particulates (1-2)	0.0353 = 35.3mg.
(4)	Particulates Caught in Nozzle, Probe & Glassware	15.9mg.
(5)	Total Front Catch (3 & 4)	51.2mg.

BACK-HALF ANALYSIS (Impingers, Connecting Glassware)

(1)	Particulate caught in impingers evaporated down at less than 120° F.	29.0mg.

TOTAL PARTICULATE CATCH (Sum of Front and Back-Half Catches)

80.2mg.

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Western Sugar Company
Billings, Montana.

ORSAT ANALYSIS

(Ave. of 3 Analyses Each)

TEST NO. DESCRIPTION	VOLUME PERCENT - DRY			
	NITROGEN	OXYGEN	CARBON DIOXIDE	CARBON MONOXIDE
#3 Compliance	86.7	10.8	2.5	<0.1
South Exhaust Stack.	86.7	10.8	2.5	<0.1
Each Bankol Dryer.	86.6	10.8	2.6	<0.1
AVERAGE	86.63	10.8	2.57	<0.1