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.

EVALUATOR CMC EVALUATION DATE 7/14/92

METHOD 5: SECONDARY EMISSIONS TEST REPORT EVALUATION

STATE: WY FACILITY: FMC - WYOMING CORP TEST DATE: 2/14,21/91

PROCESS(ES) TESTED: MONO-2 calciner
gas fired, w/ 4 cyclones & ESP

SAMPLING DURATION 2
must have at least 3 runs, each ≥ 1 hour duration, with sampling ≥ 2 minutes at each traverse point, and total sampling volume ≥ 30 dscf

26 ft³ each run

PRODUCTION RATE 3
is process or production rate during testing representative of normal rates

CONTROL DEVICE(S) 2
are devices described, and their efficiencies given

no

METHOD 1 3
are calculations accurate, and is figure provided

METHODS 2,3 2
are data and calculations included for gas velocity, cyclonic flow, and molecular weight determination, and is source of barometric pressure noted

no

METHOD 4 3
are data and calculations included for moisture content determination, and is moisture content realistic (< saturation)

FIELD DATA is field data on standard forms, and does raw data correspond with printout 3

BOILER TESTS N/A
calculation of F_0 from Orsat accurate

SAMPLING TEMPERATURE 3
both probe and filter must be maintained at 248 ± 25°F or other temperature specified in NSPS

BACK-HALF 3
if any, what method was used to catch and recover condensible matter

WY H₂O

EQUIPMENT were a borosilicate glass probe liner and a glass fiber filter used 2

no doc.

CALIBRATION were both pre- and post-test calibrations performed for
meter box 2
pitot tube 2
temperature sensor no doc. 2
nozzle (3 #) 2

LEAK CHECKS both pre- and post-test 3

BLANKS were filter and reagent blanks analyzed, and were any problems addressed 3

SAMPLE PREP 3
filter desiccation and tare weights documented

ISOKINETICS within 100±10% for all runs 3

COMPLIANCE TEST REPORT
SOURCE NS-3
MONO-2 CALCINER
FEBRUARY 1991

FMC Wyoming Corporation
Green River, Wyoming

STACK EMISSIONS SURVEY
FMC WYOMING CORPORATION
GREEN RIVER, WYOMING

FEBRUARY 1991

SOURCE NS-3
(Mono 2 Calciner)

Certification of Report

The sampling and analysis represented by this report was performed under my direction and supervision.

Date: February 26, 1991 Signature: Dale L Clark

Dale L. Clark
Sr. Environmental Engineer

I have reviewed all testing details and results in this report and hereby certify that the test report is authentic and accurate.

Date: February 28, 1991 Signature: Wesley K. Nash

Wesley K. Nash
Environmental Manager

TABLE OF CONTENTS

Introduction

Compliance tests for particulate emissions were conducted on the Mono 2 Calciner (Source NS-3) on February 14, 1991 and February 21, 1991 at FMC Wyoming Corporation's plant located near Green River Wyoming.

The sampling followed the procedures set forth in Appendix II of the "Wyoming Air Quality Standards and Regulations", Wyoming Department of Environmental Quality, 1989.

FMC Wyoming Personnel taking part in the testwork were:

Dale Clark	Senior Environmental Engineer
Ted Brown	Environmental Engineer
Simon Lee	Environmental Engineering Aide
Kieth Norris	Senior Laboratory Analyst

Summary of Results

This section summarizes results of the particulate emission tests performed on the Mono 2 Calciner (Source NS-3). Table I is a summary of the results of the particulate tests performed on this unit. Details of the individual tests, including field data sheets, laboratory data sheets and calculation sheets can be found in the Appendix.

The data listed in Table I shows that the particulate emission from Source NS-3 was 31.7 lb/hr, well below the allowable of 41 lbs/hr. This emission rate is based on the average of the three lowest tests which can be used to determine compliance of emission standards.

Table I
FMC Wyoming Corporation
SUMMARY OF STACK SAMPLING CALCULATIONS

Stack: NS - 3 (MONO 2 CALCINER)	TEST 1	TEST 2	TEST 3	TEST 4
Test Code Number	91-RF-1	91-RF-2	91-RF-3	91-RF-4
Ambient Barometric Pressure, (in Hg)	24.06	24.06	24.11	24.11
Absolute stack gas pressure., (in. Hg)	24.06	24.06	24.11	24.11
Absolute average stack gas temp., (R)	863	881.2	859.4	866.8
Absolute average dry gas meter temp., (R)	545	566.3	560.8	560.9
Total volume of water collected, (ml)	374.9	382.3	358.9	387.9
Volume of gas through dry gas meter, (ft3)	32.39	34.526	33.897	34.902
Average press. drop across orifice, (in. H2O)	0.536	0.582	0.592	0.612
Pitot tube coefficient	0.84	0.84	0.84	0.84
Average velocity head of stack gas, (in. H2O)	0.852	0.889	0.868	0.881
Cross sectional area of stack, (ft2)	50.27	50.27	50.27	50.27
Front half particulate collected, (gm)	0.0869	0.0955	0.0732	0.0866
Back half particulate collected, (gm)	0.014	0.0146	0.0127	0.0145
Total particulate collected, (gm)	0.1009	0.1101	0.0859	0.1011
Total sampling time, (min)	72	72	72	72
Cross sectional area of nozzle, (ft2*10-4)	2.986	2.986	2.986	2.986
Gas volume, (acfm)	218,445	230,004	221,159	225,864
Gas volume, (scfm)	107,880	111,242	109,906	111,286
Percent isokinetic	93.9	93.2	92.8	94.9
Emission rate, (lb/hr)	33.4	36.7	28.7	33.1

Discussion of Results

The four particulate tests taken on the stack appeared to be valid representations of the actual emissions during the tests. The indicative parameters calculated from the field data are in close agreement. The moisture percentages were within 1.4% of the 40.6% mean value. The measured flow rates (Qs) were within 2.0% of the mean value. Isokinetic sampling rates on all four tests were maintained well within the 90% to 110% allowable range.

Description of Process Operation

Crushed Trona ore (sodium sesquicarbonate) is fed into the gas fired rotary calciner where the trona is converted to impure soda ash (sodium carbonate) by heat.

The exhaust gases from the calciner pass through two sets of four dry cyclones and a four set electrostatic precipitator for particulate removal before emission to the atmosphere.

Description of Sampling Location

The sampling ports are located on the circular stack approximately 100 feet above the ground. The sampling was performed from two ports on the stack located 17 feet (2.1 stack diameters) downstream of the stack inlet, and 5 feet (0.63 stack diameters) upstream of the stack outlet. The area of the stack is 50.27 square feet. Port and wall thickness is 7 inches.

Sampling and Analysis Procedures

Testing for particulate emissions was conducted February 14 and February 21 using Reference Method 5 from Appendix II of the "Wyoming Air Quality Standards and Regulations" -1989. Each test consisted of traversing both sample diameters, with twelve points being sampled on each diameter. Sample points were determined by Reference Method 1. Each point was sampled for three minutes for a total sample time of seventy two minutes.

The testwork was completed without incident and the samples were returned to the FMC Environmental Department work area for recovery and analysis.

Operational parameters that were logged during the testwork can be found in the logsheets in the Appendix.

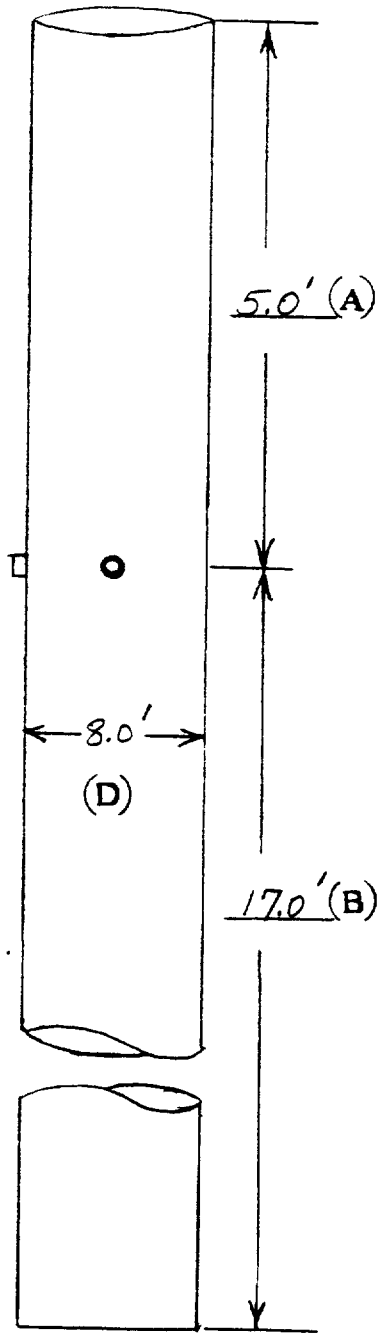
Testing was done on two different days to validify the test results and operating conditions that resulted in the emission rates being well below the allowable of 41 lbs/hr.

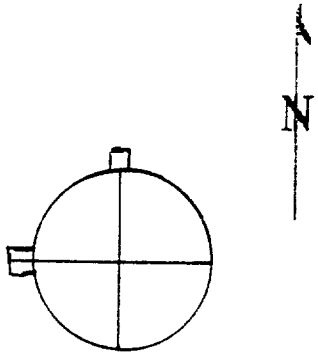
APPENDIX A

Location of Sample Points

FMC Wyoming Corporation
Green River Wyoming

NS - 3





B/D = 2.1

No. of points per traverse = 24
No. of points per diameter = 12
No. diameters per run = 2
Sample time per point = 3 min

Traverse Points on Each Diameter

	% of Diameter	Distance From Inside Wall (in)	Distance From Coupling (in)
1	2.1	2.02	9.02
2	6.7	6.43	13.43
3	11.8	11.33	18.33
4	17.7	16.99	23.99
5	25.0	24.00	31.00
6	35.5	34.08	41.08
7	64.5	61.92	68.92
8	75.0	72.00	69.00
9	82.3	79.01	86.01
10	88.2	84.67	91.67
11	93.3	89.57	96.57
12	97.9	93.98	103.98

APPENDIX B

Source Emission Calculations

TEST NO. 91-RF-1 DATE 2-14-91

VELOCITY AND VOLUME DETERMINATION

****

DRY GAS VOLUME

Vmstd=(17.71 deg R/in. Hg)*Vm*(Pbar+deltaH/13.6)/Tm)

Where Vmstd=Volume(ft3) of gas sample at 70F and 29.92 in. Hg
Vm=Volume (ft3) of gas at meter conditions
Tm=Average dry gas meter temperature (R)
Pbar=Barometric pressure (in. Hg)
deltaH=Pressure drop across orifice (in. WG)

Vmstd=17.71* 32.39*(24.06+0.536/13.6)/545.0 = 25.365 ft3

VOLUME OF WATER VAPOR

Where Vwstd=Volume (ft3) of water vapor
Vlc=Total volume of water collected (ml)

Vwstd = .00474* 374.9 = 17.770 ft3

MOISTURE CONTENT

Bwo=Vwstd*100/(Vwstd+Vmstd)

Where Bwo=Percent moisture

Bwo = 17.77*100/(17.77+ 25.37) = 41.196 percent

CONCENTRATION

Cs'=(15.43 grains/gm)*Mn/(Vmstd+Vwstd)

Where Cs'=Concentration (grains/scf)
Mn=Total particulate collected (gm)

Cs' = 15.43*0.1009/(25.37+ 17.77) = 0.0361 grains/scf

STACK VELOCITY

V=Kp*85.48*SQR(delta P)*SQR(Mw*Ps))

Where V=Stack velocity (ft/sec)
Ts=Stack absolute temperature (R)
deltaP=Average pitot reading (in. WG)
Mw=Molecular wt. of stack gas (lb/lb mole)
Kp=Pitot tube coefficient

Mw=0.18*41.20+0.44* 9.76+0.32* 3.76+0.28*45.28 = 25.593 lb/mole

V=0.84*85.48*0.852*SQR(863.0/(25.59*24.06)) = 72.424 ft/sec

STACK VOLUME

ACFM=V*A*60 AND SCFM=ACFM*530*Ps/(Ts*29.92)

Where ACFM=Actual cubic Ft per minute at stack conditions
A=Stack area (ft2)
SCFM=Standard cubic ft. per min. (29.92 in. Hg & 530 R)

ACFM = 72.42* 50.270*60 = 218445 acfm

SCFM = 218445*530*24.06/(863.0*29.92) = 107880 scfm

CALCULATED DUST LOAD

lb/hr=Cs'*SCFM*60/7000 grains/lb

DUST LOAD= 0.0361*107880*60/7000 = 33.37 Lb/Hr

ISOKINETIC RATE

I = 93.90246 %

TEST NO. 91-RF-2 DATE 2-14-91

VELOCITY AND VOLUME DETERMINATION

****

DRY GAS VOLUME

Vmstd=(17.71 deg R/in. Hg)*Vm*(Pbar+deltaH/13.6)/Tm)

Where Vmstd=Volume(ft3) of gas sample at 70F and 29.92 in. Hg
Vm=Volume (ft3) of gas at meter conditions
Tm=Average dry gas meter temperature (R)
Pbar=Barometric pressure (in. Hg)
deltaH=Pressure drop across orifice (in. WG)

Vmstd=17.71* 34.53*(24.06+0.582/13.6)/566.3 = 26.025 ft3

VOLUME OF WATER VAPOR

Where Vwstd=Volume (ft3) of water vapor
Vlc=Total volume of water collected (ml)

Vwstd = .00474* 382.3 = 18.121 ft3

MOISTURE CONTENT

Bwo=Vwstd*100/(Vwstd+Vmstd)

Where Bwo=Percent moisture

Bwo = 18.12*100/(18.12+ 26.02) = 41.048 percent

CONCENTRATION

Cs'=(15.43 grains/gm)*Mn/(Vmstd+Vwstd)

Where Cs'=Concentration (grains/scf)
Mn=Total particulate collected (gm)

Cs' = 15.43*0.1101/(26.02+ 18.12) = 0.0385 grains/scf

STACK VELOCITY

V=Kp*85.48*SQR(delta P)*SQR(Mw*Ps))

Where V=Stack velocity (ft/sec)
Ts=Stack absolute temperature (R)
deltaP=Average pitot reading (in. WG)
Mw=Molecular wt. of stack gas (lb/lb mole)
Kp=Pitot tube coefficient

Mw=0.18*41.05+0.44*10.20+0.32* 3.42+0.28*45.33 = 25.664 lb/mole

V=0.84*85.48*0.889*SQR(881.2/(25.66*24.06)) = 76.256 ft/sec

STACK VOLUME

ACFM=V*A*60 AND SCFM=ACFM*530*Ps/(Ts*29.92)

Where ACFM=Actual cubic Ft per minute at stack conditions
A=Stack area (ft2)
SCFM=Standard cubic ft. per min. (29.92 in. Hg & 530 R)

ACFM = 76.26* 50.270*60 = 230004 acfm

SCFM = 230004*530*24.06/(881.2*29.92) = 111242 scfm

CALCULATED DUST LOAD

lb/hr=Cs'*SCFM*60/7000 grains/lb

DUST LOAD= 0.0385*111242*60/7000 = 36.69 Lb/Hr

ISOKINETIC RATE

I = 93.19697 %

TEST NO. 91-RF-3 DATE 2-21-91

VELOCITY AND VOLUME DETERMINATION

****

DRY GAS VOLUME

Vmstd=(17.71 deg R/in. Hg)*Vm*(Pbar+deltaH/13.6)/Tm)

Where Vmstd=Volume(ft3) of gas sample at 70F and 29.92 in. Hg
Vm=Volume (ft3) of gas at meter conditions
Tm=Average dry gas meter temperature (R)
Pbar=Barometric pressure (in. Hg)
deltaH=Pressure drop across orifice (in. WG)

Vmstd=17.71* 33.90*(24.11+0.592/13.6)/548.6 = 26.430 ft3

VOLUME OF WATER VAPOR

Where Vwstd=Volume (ft3) of water vapor
Vlc=Total volume of water collected (ml)

Vwstd = .00474* 358.9 = 17.012 ft3

MOISTURE CONTENT

Bwo=Vwstd*100/(Vwstd+Vmstd)

Where Bwo=Percent moisture

Bwo = 17.01*100/(17.01+ 26.43) = 39.160 percent

CONCENTRATION

Cs'=(15.43 grains/gm)*Mn/(Vmstd+Vwstd)

Where Cs'=Concentration (grains/scf)
Mn=Total particulate collected (gm)

Cs' = 15.43*0.0859/(26.43+ 17.01) = 0.0305 grains/scf

STACK VELOCITY

V=Kp*85.48*SQR(delta P)*SQR(Mw*Ps))

Where V=Stack velocity (ft/sec)
Ts=Stack absolute temperature (R)
deltaP=Average pitot reading (in. WG)
Mw=Molecular wt. of stack gas (lb/lb mole)
Kp=Pitot tube coefficient

Mw=0.18*39.16+0.44* 9.25+0.32* 4.75+0.28*46.85 = 25.753 lb/mole

V=0.84*85.48*0.868*SQR(859.4/(25.75*24.11)) = 73.324 ft/sec

STACK VOLUME

ACFM=V*A*60 AND SCFM=ACFM*530*Ps/(Ts*29.92)

Where ACFM=Actual cubic Ft per minute at stack conditions
A=Stack area (ft2)
SCFM=Standard cubic ft. per min. (29.92 in. Hg & 530 R)

ACFM = 73.32* 50.270*60 = 221159 acfm

SCFM = 221159*530*24.11/(859.4*29.92) = 109906 scfm

CALCULATED DUST LOAD

lb/hr=Cs'*SCFM*60/7000 grains/lb

DUST LOAD= 0.0305*109906*60/7000 = 28.74 Lb/Hr

ISOKINETIC RATE

I = 92.82736 %

TEST NO. 91-RF-4 DATE 2-21-91

VELOCITY AND VOLUME DETERMINATION

****

DRY GAS VOLUME

Vmstd=(17.71 deg R/in. Hg)*Vm*(Pbar+deltaH/13.6)/Tm)

Where Vmstd=Volume(ft3) of gas sample at 70F and 29.92 in. Hg
Vm=Volume (ft3) of gas at meter conditions
Tm=Average dry gas meter temperature (R)
Pbar=Barometric pressure (in. Hg)
deltaH=Pressure drop across orifice (in. WG)

Vmstd=17.71* 34.90*(24.11+0.612/13.6)/560.9 = 26.619 ft3

VOLUME OF WATER VAPOR

Where Vwstd=Volume (ft3) of water vapor
Vlc=Total volume of water collected (ml)

Vwstd = .00474* 387.9 = 18.386 ft3

MOISTURE CONTENT

Bwo=Vwstd*100/(Vwstd+Vmstd)

Where Bwo=Percent moisture

Bwo = 18.39*100/(18.39+ 26.62) = 40.854 percent

CONCENTRATION

Cs'=(15.43 grains/gm)*Mn/(Vmstd+Vwstd)

Where Cs'=Concentration (grains/scf)
Mn=Total particulate collected (gm)

Cs' = 15.43*0.1011/(26.62+ 18.39) = 0.0347 grains/scf

STACK VELOCITY

V=Kp*85.48*SQR(delta P)*SQR(Mw*Ps))

Where V=Stack velocity (ft/sec)
Ts=Stack absolute temperature (R)
deltaP=Average pitot reading (in. WG)
Mw=Molecular wt. of stack gas (lb/lb mole)
Kp=Pitot tube coefficient

Mw=0.18*40.85+0.44* 9.94+0.32* 3.79+0.28*45.42 = 25.656 lb/mole

V=0.84*85.48*0.881*SQR(866.8/(25.66*24.11)) = 74.884 ft/sec

STACK VOLUME

ACFM=V*A*60 AND SCFM=ACFM*530*Ps/(Ts*29.92)

Where ACFM=Actual cubic Ft per minute at stack conditions
A=Stack area (ft2)
SCFM=Standard cubic ft. per min. (29.92 in. Hg & 530 R)

ACFM = 74.88* 50.270*60 = 225864 acfm

SCFM = 225864*530*24.11/(866.8*29.92) = 111286 scfm

CALCULATED DUST LOAD

lb/hr=Cs'*SCFM*60/7000 grains/lb

DUST LOAD= 0.0347*111286*60/7000 = 33.06 Lb/Hr

ISOKINETIC RATE

I = 94.97481 %

APPENDIX C

Calibration of Equipment

FMC, WYOMING CORPORATION
GREEN RIVER, WYOMING

METER BOX CALIBRATION DATA AND CALCULATION FORM

DATE: 2/5/91
Pb: 24.1

METER BOX NUMBER: NAPP, D514
CALIBRATED BY: SIMON

DH (IWC)	Vw (FT3)	Vd (FT3)	Tw (F)	Td (F)	DP (IWC)	TIME (MIN)	Yd	DH@	Q
0.5	6.719	6.907	72.5	97	-0.4	15.00	1.0149	1.669	0.358
0.5	6.776	6.955	73	99	-0.4	15.00	1.0191	1.638	0.360
1.5	7.031	7.653	73	103	-0.7	10.00	0.9641	2.014	0.561
1.5	7.007	7.644	73	104	-0.7	10.00	0.9636	2.024	0.559
3.0	10.034	10.752	73	107	-1.1	10.00	0.9806	1.964	0.800
3.0	10.119	10.714	73	107	-1.1	10.00	0.9924	1.931	0.807
						AVERAGES:	0.9891	1.873	

FMC Wyoming Corporation

ORIFICE & METER CALIBRATION

DATE: 2-5-91

CONTROL UNIT # D-514 (Napp)

BAROMETRIC PRESSURE: 24.10

S. Lee

RUN #	1	2	3	4	5	6
VOLUME WET TEST METER (ft3)	6.719	6.736	7.031	7.007	10.034	10.119
VOLUME DRY GAS METER (ft3)	935.454	943.016	950.224	958.104	966.092	977.19(
	942.361	949.971	957.877	965.748	976.844	987.90(
	6.907	6.955	7.653	7.644	10.752	10.714
TEMP. WET TEST METER (F.)	72.5°F	73°F	73°F	73°F	73°F	73°
TEMP. DRY GAS METER (F.) IN	189 102	98 102 104	104 110 112	101 112 113	110 116 116	110 115 117
TEMP. DRY GAS METER (F.) OUT	92 93 94	95 96 97	96 97 98	98 99 99	99 100 101	100 101 101
AVERAGE DRY GAS TEMP. (F.)	97°F	99°F	103°F	104°F	107°F	107°F
TIME (MIN.)	15	15	10	10	10	10
ORIFICE DH	0.5	0.5	1.5	1.5	3.0	3.0
	.35"wg	.35"WG	.65"wg	.65"wg	1.05	1.05"wg

COMMENTS:

.1
.25
.35

.25
.4
.65

.1871
.0816

6.250
.219
6.469

6.500
.236
6.736

.45
.60
1.05

10.000
.119
10.119

7.000
.031
7.031

7.000
.007
7

10.000
3

APPENDIX D

Field Testing
and
Analytical Data

FMC

STACK SAMPLING FIELD DATA

Company _____

Plant Location Green River

Run No. 91-RF-1

Sampling Location NS-3

Date 2-14-91

Start Time 9:35 - 10:23

Finish Time 10.12 - 10:59

Meter Correction 0.9891

Stack Area 50.27

Assumed Moisture % 40

Probe Tip Diameter, in. 0.234

Probe Length, ft. 10

Ambient Temperature, °F _____

Bar. Pressure, in. Hg. 24.06

Initial Leak Check, CFM 0.001 at 15 in. Hg

Final Leak Check, CFM 0.000 at 15 in. Hg

Orsat, %CO_2 16.6%

% O_2 6.4%

% CO 0.0

Point No.	Time (min)	Dry Gas Meter FT^3	Pitot in. H_2O P	Pitot in. H_2O $\sqrt{P}$	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum in. Hg Gauge	Sample Box Temp. °F	Impinger Temp. °F	Stack Press. in Hg	Stack Temp °F
W. Port													
1	0	17328	0.52	0.721	0.38	0.38	55	55	1.8	256	26		365
2	3	18.5	0.57	0.755	0.43	0.43	64	54	2.0	277	27		40[illegible]
3	6	19.7	0.68	0.825	0.50	0.50	68	55	2.1	280	26		410
4	9	21.0	0.79	0.889	0.58	0.58	71	57	2.1	277	24		416
5	12	22.4	0.87	0.933	0.64	0.64	75	59	2.2	283	25		420
6	15	23.8	0.87	0.933	0.64	0.64	79	62	2.2	287	23		420
7	18	25.3	0.89	0.943	0.69	0.67	82	65	2.4	289	23		41[illegible]
8	21	26.8	0.85	0.911	0.62	0.62	86	68	2.1	290	23		416
9	24	28.2	0.77	0.877	0.55	0.55	88	70	2.0	297	23		415
10	27	29.6	0.73	0.854	0.53	0.53	89	73	1.9	296	23		414
11	30	30.9	0.70	0.837	0.51	0.51	91	75	1.9	294	22		411
12	33	32.3	0.64	0.800	0.46	0.46	93	78	1.9	297	21		41[illegible]
	36	33.563											
N. Port													
1	0	33.563	0.47	0.686	0.34	0.34	93	87	2.0	263	26		36[illegible]
2	3	34.7	0.53	0.728	0.39	0.39	95	88	2.0	269	26		39[illegible]
3	6	35.9	0.60	0.775	0.44	0.44	98	89	2.1	263	27		401
4	9	37.1	0.64	0.800	0.47	0.47	100	90	2.3	263	26		40[illegible]
5	12	38.4	0.77	0.877	0.56	0.56	103	91	2.3	289	26		40[illegible]
6	15	39.8	0.83	0.911	0.62	0.62	105	93	2.8	268	26		40[illegible]
7	18	41.4	0.83	0.911	0.62	0.62	107	94	2.8	267	27		40[illegible]
8	21	42.8	0.85	0.922	0.62	0.62	108	94	2.8	269	26		40[illegible]
9	24	44.3	0.85	0.922	0.62	0.62	109	96	3.0	257	27		40[illegible]
10	27	45.8	0.80	0.894	0.58	0.58	110	97	3.0	267	28		399
11	30	47.3	0.75	0.866	0.54	0.54	110	98	2.8	267	27		39[illegible]
12	33	48.6	0.75	0.866	0.54	0.54	110	99	2.9	263	27		39[illegible]
	36	50.075											
(0.9891)(32.747)=							4074						
TOTAL	Vm	32.390	20.436		12.87		85°F						968
AVG.			0.852		0.536		545°R						403° 863

FMC Wyoming Corporation
Emission Testing
Laboratory Data

Date: 2-14-91 Run No.: 91-RF-1

Location: NS-3

MOISTURE COLLECTED

GM/ML

Impinger 1	Final Weight	740.8	
	Initial Weight	545.1	
		196.7	Increase 195.7
Impinger 2	Final Weight	717.8	
	Initial Weight	552.5	
		165.3	Increase 165.3
Impinger 3	Final Weight	452.0	
	Initial Weight	444.9	
		7.1	Increase 7.1
Impinger 4	Final Weight	613.6	
	Initial Weight	606.8	
		6.8	Increase 6.8

Total Moisture Catch 374.9

PARTICULATE COLLECTED

FRONT HALF WASH
Beaker (Gross Weight) 74.4814
Beaker (Tare Weight) 74.4291

TOTAL WASH CATCH 0.0523

ACETONE BLANK
Beaker (Gross Weight) 75.1993
Beaker (Tare Weight) 75.1993

TOTAL BLANK -0-

FRONT HALF ANALYSIS
(Nozzle, Probe, Cyclone, Filter)

Filter (Gross Weight) 0.5800
Filter (Tare Weight) 0.5454
Filter Catch 0.0346

Washings 0.0523
Total Catch 0.0869
Acetone Blank -0-

TOTAL FRONT CATCH 0.0869

BACK HALF ANALYSIS
(Impingers, Filter Back-Half)

Beaker (Gross Weight) 74.0821
Beaker (Tare Weight) 74.0681

TOTAL BACK HALF CATCH 0.0140

TOTAL TRAIN CATCH _____

FMC

STACK SAMPLING FIELD DATA

Company _____

Plant Location Green River

Run No. 91-RF-2

Sampling Location NS-3

Date 2-14-91

Start Time 12:37

Finish Time 1:54 pm

Meter Correction 0.9891

Stack Area 60.27

Assumed Moisture % 40

Probe Tip Diameter, in. 0.234

Probe Length, ft. 10

Ambient Temperature, °F _____

Bar. Pressure, in. Hg. 23.91 24.06

Initial Leak Check, CFM 0.000 at 15 in. Hg

Final Leak Check, CFM 0.001 at 5 in. Hg

Orsat, %CO_2 17.3%

% O_2 5.8%

% CO _____

Point No.	Time (min)	Dry Gas Meter FT3	Pitot in. H_2O P	Pitot $\sqrt{P}$	Orifice ΔH in H_2O Desired	Orifice ΔH Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum in. Hg Gauge	Sample Box Temp. °F	Impinger Temp. °F	Stack Press. in Hg	Stack Temp. °F
1	0	50.440	.44	0.663	.33	.33	100	99	2	266	32		410
2	3	51.20	.64	0.800	.47	.47	104	99	3	263	33		417
3	6	53.0	.74	0.860	.57	.57	106	100	3	242	32		430
4	9	54.4	.86	0.927	.62	.62	108	100	3	263	31		429
5	12	55.9	.95	0.975	.69	.69	110	100	3	253	34		432
6	15	57.5	.98	0.990	.72	.72	111	101	3.5	261	34		433
7	18	59.1	.91	0.954	.65	.65	111	101	3.2	270	34		43[illegible]
8	21	60.6	.84	0.916	.62	.62	112	101	3.1	271	33		43[illegible]
9	24	62.1	.84	0.916	.62	.62	112	101	3.1	274	33		428
10	27	63.6	.78	0.883	.56	.56	111	102		278	33		42[illegible]
11	30	64.9	.71	0.843	.51	.51	111	102	3.0	284	34		42[illegible]
12	33	66.3	.66	0.812	.48	.48	112	103	3.0	272	37		424
	36	67.662											
1	0	67.662	.49	0.700	.36	.36	107	103	2.5	271	38		409
2	3	69.1	.57	0.755	.42	.42	110	105	2.8	268	39		418
3	6	70.3	.71	0.843	.51	.51	112	105	3.0	268	38		420
4	9	71.8	.80	0.894	.58	.58	113	105	3.0	270	38		424
5	12	73.2	.86	0.927	.62	.62	113	104	3.2	270	38		424
6	15	74.6	.98	0.990	.71	.71	114	104	3.8	270	38		423
7	18	76.2	.94	0.969	.69	.69	113	103	4.0	264	38		420
8	21	77.8	.98	0.990	.71	.71	113	104	4.0	268	38		418
9	24	79.4	.98	0.990	.73	.73	113	103	4.0	272	38		416
10	27	81.0	.90	0.949	.65	.65	112	102	4.0	269	39		413
11	30	82.5	.80	0.894	.58	.58	111	102	4.0	264	40		410
12	33	84.0	.80	0.894	.58	.58	111	102	3.8	262	41		410
	36	85.347											
(0.9891)(34.907) =							5101						10109
TOTAL	Vm	34.526	21.334		13.98		106.3°F						421.2
AVG.			0.889		0.582		566.3°R						881.[illegible]

FMC Wyoming Corporation
Emission Testing
Laboratory Data

Date: 2-14-91 Run No.: 91-RF-2

Location: NS-3

MOISTURE COLLECTED

			GM/ML
Impinger 1	Final Weight	830.5	
	Initial Weight	538.6	
		291.9	Increase 291.9
Impinger 2	Final Weight	611.1	
	Initial Weight	533.0	
		78.1	Increase 78.1
Impinger 3	Final Weight	431.4	
	Initial Weight	427.7	
		3.7	Increase 3.7
Impinger 4	Final Weight	626.6	
	Initial Weight	618.0	
		8.6	Increase 8.6

Total Moisture Catch 382.3

PARTICULATE COLLECTED

FRONT HALF WASH
Beaker (Gross Weight) 14.6339
Beaker (Tare Weight) 14.5700

TOTAL WASH CATCH 0.0639

ACETONE BLANK
Beaker (Gross Weight) 15.1993
Beaker (Tare Weight) 15.1993

TOTAL BLANK - 0 -

FRONT HALF ANALYSIS
(Nozzle, Probe, Cyclone, Filter)

Filter (Gross Weight) 0.5753
Filter (Tare Weight) 0.5437
Filter Catch 0.0316

Washings 0.0639
Total Catch 0.0955
Acetone Blank - 0 -

TOTAL FRONT CATCH 0.0955

BACK HALF ANALYSIS
(Impingers, Filter Back-Half)

Beaker (Gross Weight) 15.5617
Beaker (Tare Weight) 15.5461

TOTAL BACK HALF CATCH 0.0146

TOTAL TRAIN CATCH _____

STACK SAMPLING FIELD DATA

Company FMC

Plant Location Green River

Run No. 91-RF-3

Sampling Location NS-3

Date 2-21-91

Start Time 8:55 - 9:40

Finish Time 9:32 - 10:16

Meter Correction 0.9891

Stack Area 50.27

Assumed Moisture % 40

Probe Tip Diameter, in. 0.234

Probe Length, ft. 10

Ambient Temperature, °F

Bar. Pressure, in. Hg. 24.11

Initial Leak Check, CFM 0.000 at 15 in. Hg

Final Leak Check, CFM 0.000 at 15 in. Hg

Orsat, $\%CO_2$ 15.2

$\%\ O_2$ 7.8

% CO -0-

Point No.	Time (min)	Dry Gas Meter FT³	Pitot in. H_2O P	Pitot in. H_2O $\sqrt{P}$	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum in. Hg Gauge	Sample Box Temp. °F	Impinger Temp. °F	Stack Press. in Hg	Stac Temp °F
W. Port													
1	0	105.230	0.57	0.755	0.44	0.44	65	65	2.2	300	26		38C
2	3	106.7	0.64	0.800	0.51	0.51	72	63	2.2	294	26		392
3	6	108.0	0.77	0.877	0.60	0.60	76	65	3.0	296	27		399
4	9	109.4	0.85	0.922	0.66	0.66	80	66	3.1	295	26		401
5	12	110.8	0.90	0.949	0.70	0.70	83	68	3.3	293	25		406
6	15	112.3	0.94	0.969	0.74	0.74	86	70	3.8	292	26		408
7	18	113.8	0.93	0.964	0.74	0.74	89	72	3.8	294	26		409
8	21	115.4	0.88	0.938	0.68	0.68	91	74	3.2	291	27		409
9	24	116.9	0.83	0.911	0.64	0.64	93	77	3.2	285	27		409
10	27	118.4	0.79	0.889	0.63	0.63	94	78	3.1	283	27		407
11	30	119.9	0.74	0.860	0.55	0.55	95	80	2.9	287	27		405
12	33	121.2	0.67	0.818	0.53	0.53	96	82	2.9	290	27		405
	36	122.609											
N. Port													
1	0	122.609	0.51	0.714	0.40	0.40	94	88	2.3	283	29		382
2	3	123.8	0.58	0.761	0.44	0.44	98	89	2.7	280	31		390
3	6	125.1	0.60	0.774	0.47	0.47	99	90	2.9	279	32		399
4	9	126.3	0.64	0.800	0.50	0.50	101	91	3.0	280	34		400
5	12	127.6	0.70	0.837	0.55	0.55	103	92	3.0	279	34		401
6	15	129.0	0.84	0.916	0.66	0.66	105	93	3.2	276	34		404
7	18	130.6	0.87	0.933	0.68	0.68	107	94	3.4	274	32		401
8	21	132.1	0.89	0.943	0.70	0.70	108	95	3.5	278	31		401
9	24	133.7	0.87	0.933	0.68	0.68	109	96	3.5	281	30		399
10	27	135.2	0.78	0.885	0.60	0.60	110	97	3.1	280	30		396
11	30	136.6	0.72	0.848	0.57	0.57	110	97	3.1	278	30		392
12	33	138.1	0.70	0.837	0.66	0.55	110	98	3.1	285	30		392
	36	139.501											
(0.9891	X34.271) =						4254						95C
TOTAL	Vm	33.897	20.831		14.22		88.6°F						394.
AVG.			0.868		0.592		548.6°R						859.

FMC Wyoming Corporation
Emission Testing
Laboratory Data

)ate: 2-21-91 Run No.: 91-RF-3

ocation: NS-3

MOISTURE COLLECTED

			GM/ML
Impinger 1	Final Weight	785.6	
	Initial Weight	543.7	
		237.7	Increase 237.9
Impinger 2	Final Weight	669.5	
	Initial Weight	570.5	
		99.0	Increase 99.0
Impinger 3	Final Weight	439.5	
	Initial Weight	427.5	
		12.0	Increase 12.0
Impinger 4	Final Weight	619.1	
	Initial Weight	611.1	
		8.0	Increase 8.0

Total Moisture Catch 358.9

PARTICULATE COLLECTED

FRONT HALF WASH
Beaker (Gross Weight) 74.4771
Beaker (Tare Weight) 74.4284

TOTAL WASH CATCH 0.0487

ACETONE BLANK
Beaker (Gross Weight) 74.0675
Beaker (Tare Weight) 74.0667

TOTAL BLANK 0.0006

FRONT HALF ANALYSIS
(Nozzle, Probe, Cyclone, Filter)

ter (Gross Weight) 0.5671
ter (Tare Weight) 0.5420
Filter Catch 0.0251

ashings 0.0487
Total Catch 0.0738
et : Blank 0.0006

)TAL FRONT CATCH 0.0732

BACK HALF ANALYSIS
(Impingers, Filter Back-Half)

Beaker (Gross Weight) 75.2120
Beaker (Tare Weight) 75.1993

TOTAL BACK HALF CATCH 0.0127

TOTAL TRAIN CATCH 0.0859

STACK SAMPLING FIELD DATA

Company FMC

Plant Location Green River

Run No. 91-PF-4

Sampling Location NS-3

Date 2-21-91

Start Time 10:30 11:

Finish Time 36 11:45

Meter Correction 0.9891

Stack Area 50.27

Assumed Moisture % 40

Probe Tip Diameter, in. 0.234

Probe Length, ft. 10

Ambient Temperature, °F

Bar. Pressure, in. Hg. 24.11

Initial Leak Check, CFM .005 at 15 in. Hg

Final Leak Check, CFM .005 at 15 in. Hg

Orsat, %CO_2 16.8

% O_2 6.4

% CO -0-

Point No.	Time (min)	Dry Gas Meter FT³	Pitot in. H_2O P	Pitot in. H_2O $\sqrt{P}$	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum in. Hg Gauge	Sample Box Temp. °F	Impinger Temp. °F	Stack Press. in Hg	Stack Temp °F
W. Port													
1	0	139.915	.61	0.781	.48	.48	106	102	1.0	262			39
2	3	141.3	.67	0.818	.52	.52	109	103	3.0	268			401
3	6	142.6	.80	0.894	.63	.63	110	103	4.0	282			404
4	9	144.1	.90	0.949	.70	.70	110	103	3.5	290			410
5	12	145.7	.90	0.949	.70	.70	110	103	3.0	294			412
6	15	147.3	1.0	1.000	.78	.78	110	101	2.0	305			41
7	18	148.9	.91	0.954	.71	.71	109	101	2.0	302			412
8	21	150.5	.85	0.922	.66	.66	107	100	2.0	304			41
9	24	152.0	.80	0.894	.63	.63	107	99	2.0	220			411
10	27	153.5	.76	0.872	.60	.60	105	98	2.0	234			40
11	30	155.0	.70	0.837	.55	.55	104	98	2.0	228			409
12	33	156.4	.64	0.800	.50	.50	103	97	2.0	231			40
	36	157.755											
N. Port													
1	0	157.255	.50	0.707	.39	.39	99	95	1.0	248			39
2	3	159.0	.58	0.761	.46	.46	100	95	1.5	245			40
3	6	160.3	.61	0.781	.48	.48	101	95	2.0	241			40
4	9	161.6	.65	0.806	.51	.51	101	94	2.0	243			40
5	12	162.9	.74	0.860	.59	.59	102	94	2.0	227			41
6	15	164.3	.90	0.949	.70	.70	103	93	2.0	223			41
7	18	165.9	.97	0.985	.75	.75	103	94	2.1	222			411
8	21	167.5	1.0	1.000	.78	.78	104	93	2.0	220			410
9	24	169.2	.95	0.975	.74	.74	103	93	2.0	255			40
10	27	170.8	.84	0.916	.66	.66	102	93	2.1	266			40
11	30	172.3	.72	0.848	.57	.57	101	93	2.0	267			39
12	33	173.7	.78	0.883	.60	.60	101	92	2.0	258			39
	36	175.202											
(0.9891)(35.287)=34.902							48 42						99
TOTAL	Vm	39.902	21.141		14.69		100.9°F						406
AVG.			0.881		0.612		560.9°R						846

FMC Wyoming Corporation
Emission Testing
Laboratory Data

Date: 2-21-91

Run No.: 91-RF-4

Location: NS-3

MOISTURE COLLECTED

GM/ML

Impinger 1	Final Weight	765.6		
	Initial Weight	555.9		
		209.7	Increase	209.7
Impinger 2	Final Weight	700.1		
	Initial Weight	547.5		
		152.6	Increase	152.6
Impinger 3	Final Weight	438.7		
	Initial Weight	420.4		
		18.3	Increase	18.3
Impinger 4	Final Weight	592.6		
	Initial Weight	585.3		
		7.3	Increase	7.3

Total Moisture Catch 387.9

PARTICULATE COLLECTED

FRONT HALF WASH
Beaker (Gross Weight) 75.5980
Beaker (Tare Weight) 75.5463

TOTAL WASH CATCH 0.0517

ACETONE BLANK
Beaker (Gross Weight) 74.0673
Beaker (Tare Weight) 74.0667

TOTAL BLANK 0.0006

FRONT HALF ANALYSIS
(Nozzle, Probe, Cyclone, Filter)

Filter (Gross Weight) 0.5784
Filter (Tare Weight) 0.5429
Filter Catch 0.0355

Washings 0.0517
Total Catch 0.0872
Acetone Blank 0.0006

TOTAL FRONT CATCH 0.0866

BACK HALF ANALYSIS
(Impingers, Filter Back-Half)

Beaker (Gross Weight) 74.5845
Beaker (Tare Weight) 74.5700

TOTAL BACK HALF CATCH 0.0145

TOTAL TRAIN CATCH 0.1011