Magnitude 7 Metals LLC

STACK SAMPLE RESULTS

METHOD 14
LINE 1

Run Number 1 | 2/4/2020 - 2/5/2020 | EPA Method # 5 & 14

METER VOLUME	992.270	CU. FT.
SQUARE ROOT OF DELTA P	0.287	SQ. ROOT IN. WATER
AVERAGE DELTA H	1.542	IN. WATER
METERED GAS TEMPERATURE	70.6	DEG. F
STATIC PRESSURE IN STACK	-0.23	IN. WATER
STACK TEMPERATURE	70.3	DEG. F
BAROMETRIC PRESSURE	29.62	IN. Hg
PROBE TIP DIAMETER	0.3681	INCHES
GAS METER CORRECTION FACTOR	0.994	
TOTAL SAMPLING TIME	1395.0	MINUTES
TOTAL WATER COLLECTED	87.9	GRAMS
MOLECULAR WEIGHT	28.8	LB/LB-MOLE
SAMPLING DUCT AREA	1.25	SQ. FT.
TOTAL PARTICULATE COLLECTED	0.0343	GRAMS
GASEOUS FLUORIDE COLLECTED	0.01800	GRAMS
PARTICULATE FLUORIDE COLLECTED	0.00910	GRAMS
AVG ALUMINUM PRODUCTION RATE	440322	LBS./DAY/LINE
MANIFOLD ANEMOMETER VELOCITY	109.5	FT./MIN.
MANIFOLD THERMOCOUPLE TEMPERATURE	82.0	DEG. F
AVERAGE ROOF EXIT VELOCITY	124.8	FT./MIN.
AVERAGE ROOF EXIT TEMPERATURE	80.0	DEG. F
VOLUMETRIC FLOWRATE OUT ROOF	7970727	ACFM/LINE
VOLUME GAS SAMPLED	975.358	SCF
MOISTURE IN STACK GAS	0.422	%
VELOCITY OF STACK GAS (ACTUAL)	976	FT./MIN.
VOLUMETRIC FLOWRATE IN DUCT	1196	SCFM
PERCENT ISOKINETIC - TRAIN TO DUCT	98.87	%
VOLUMETRIC FLOWRATE OUT ROOF	7682839	SCFM/LINE
PERCENT ISOKINETIC - MANIFOLD TO ROOF	80.46	%
SECONDARY PARTICULATE CONCENTRATION	0.0012	GRAMS/SCM
SECONDARY PARTICULATE CONCENTRATION	0.00054	GRAINS/SCF
SECONDARY PARTICULATE EMISSION	35.74	LBS./HR.
SECONDARY PARTICULATE EMISSION	3.90	LBS./TON
PRIMARY PARTICULATE EMISSION	2.43	LBS./TON
PRIMARY AND SECONDARY PARTICULATE EMITTED	6.33	LBS./TON
GASEOUS FLUORIDE CONCENTRATION	0.652	MG./SCM
GASEOUS FLUORIDE CONCENTRATION	0.000285	GRAINS/SCF
PARTICULATE FLUORIDE CONCENTRATION	0.329	MG./SCM
PARTICULATE FLUORIDE CONCENTRATION	0.000144	GRAINS/SCF
TOTAL FLUORIDE CONCENTRATION	0.981	MG./SCM
TOTAL FLUORIDE CONCENTRATION	0.000429	GRAINS/SCF
TOTAL FLUORIDE EMISSION	28.236	LBS./HR./LINE
AVG. ALUMINUM PRODUCTION RATE	9.17	TON/HR./LINE
TOTAL SECONDARY FLUORIDE EMITTED	3.078	LBS./TON
TOTAL PRIMARY FLUORIDE EMITTED	0.658	LBS./TON
TOTAL PRIMARY AND SECONDARY FLUORIDE EMITTED	3.736	LBS./TON

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2/5/2020 09:53 AM

Stack Sample Results
Raw Data Averages
METHOD 14 LINE 1

Start Date: 2/4/2020 **Stop Date:** 2/5/2020 **Run #:** 1

Traverse Point	Delta P (in. Water)	Delta H (in. Water)	Meter Temperature (in)	Meter Temperature (out)	Static Pressure (in. Water)	Stack Temperature (Deg. F)
1-1a	0.06	1.10	66	66	-0.21	78
1-1b	0.06	1.10	73	70		79
1-2a	0.07	1.25	74	71	-0.22	83
1-2b	0.07	1.30	75	72		74
1-3a	0.06	1.10	71	69	-0.23	72
1-3b	0.06	1.10	72	70		68
2-1a	0.08	1.50	72	70	-0.23	71
2-1b	0.08	1.50	72	73		71
2-2a	0.10	1.85	69	65	-0.25	71
2-2b	0.10	1.85	70	67		69
2-3a	0.10	1.85	70	69	-0.23	69
2-3b	0.10	1.85	71	67		67
3-1a	0.08	1.50	70	72	-0.23	66
3-1b	0.08	1.50	71	70		65
3-2a	0.10	1.85	71	75	-0.25	68
3-2b	0.10	1.85	72	72		66
3-3a	0.10	1.85	70	70	-0.25	64
3-3b	0.10	1.85	71	72		65
Averages	**0.287** (AVG. SQ.RT.)	**1.542**	**70.6**		**-0.23**	**70.3**

AP

MAGNITUDE 7 METALS, LLC
METHOD 14 DATA
ROOF MONITOR

Run Start Date 2-4-20
Run End Date 2/5/20
Run # 1
Run Start Time 10:00
Run End Time 9:15
Probe Tip SN 2073
Avg. Tip Diameter .3681
Delta H 1.74 2% Moisture
Duct Area = 1.25 sq.ft. (assumed)

Line: 1 2 3 East 3 West

Operators
Joe Elmendorf
Alicia Powell

Chemist

Digital meter used 2161

Initial L.C. @ 15.0 = .001
Final L.C. @ 5.0 = .001

Initial Pitot L.C. = N.L
Final Pitot L.C. = NIL

POINT #	SAMP. TIME Min.	METER VOLUME Cu. Ft.	DELTA P in. H_2O	DELTA H in. H_2O	METER TEMP F IN	METER TEMP F OUT	STATIC PRESS. in. H_2O	STACK TEMP. °F	IMP. TEMP. °F	HOT BOX TEMP. °F	PUMP VAC. in. Hg	SET PT.
1-1	155	142.100	.06	1.10	66	66	-.21	78	58	155	2.1	18.07
			.06	1.10	73	70		79	57	155	1.6	18.22
1-2	155	237.160	.07	1.25	74	71	-.22	83	58	155	2.0	18.12
			.07	1.30	75	72		74	57	155	2.0	18.46
1-3	155	340.450	.06	1.10	71	69	-.23	72	55	155	1.8	18.41
			.06	1.10	72	70		68	55	155	1.8	18.58
2-1	155	445.200	.08	1.50	72	70	-.23	71	55	155	2.4	18.48
			.08	1.50	72	73		71	56	155	2.4	18.53
2-2	155	556.270	.10	1.85	69	65	-.25	71	53	155	2.5	18.34
			.10	1.85	70	67		69	53	155	2.5	18.57
2-3	155	666.125	.10	1.85	70	69	-.23	69	54	156	2.5	18.50
			.10	1.85	71	67		67	52	155	2.5	18.55
3-1	155	784.760	.08	1.50	70	72	-.23	66	52	156	2.5	18.66
			.08	1.50	71	70		65	52	156	2.4	18.67
3-2	155	894.080	.10	1.85	71	75	-.25	68	52	155	2.5	18.65
			.10	1.85	72	72		66	53	154	2.6	18.69
3-3	155	999.510	.10	1.85	70	70	-.25	64	51	155	2.6	18.69
			.10	1.85	71	72		65	52	155	3.0	18.71
FINAL		134.370										
S/N		8131064					61	3-5	1-A	1-H		

Nomograph factor: 18.48

Form: SS M14 Raw Data.xls 9/17/18

2061

MAGNITUDE 7 METALS, LLC
METHOD 14 RAW DATA
ROOF MONITOR

Line: 1 Start Date: 2/4/2020 Run: 1 Filter: 1B

PROBE TIP

SN 2673

DIAMETER MEASUREMENT (in.)

1. .3675
2. .3670
3. .3690
4. .3680
5. .3675
6. .3690
7. .3695
8. .3670

If previous calibration referenced, circle Yes to document visual inspection.

Out of round max. 0.004 in.

CAL. BY: JS

CALIPER: MITUTOYO S/N 7002015

NORANDA 0.5" THICKNESS STD # 1 .5000

SAMPLER OPERATION

PROBE HEAT SETTING	HEATER BOX SETTING
248 deg. F. +/- 25 deg. F.	165 deg. F. +/- 15 deg. F.
Range: 223 - 273 deg. F.	Range: 150 - 180 deg. F.

PITOT TUBE

SN D755 ~~N9061~~

Circle to document visual inspection.

Visually inspected? Yes

BAROMETER READING 29.76 (in. Hg)

CORRECTION FACTOR -.14 (in. Hg)

ORIGINAL GASEOUS FLUORIDE SAMPLE VOLUME 1 (liter)

		INITIAL WEIGHT (g)	FINAL WEIGHT (g)
IMPINGER #	+ 200 ml water	795.6	731.0
IMPINGER #	+ 100 ml water	715.6	742.6
IMPINGER #	+ EMPTY	647.8	683.1
IMPINGER #	+ SILICA GEL	1155.9	1276.7
IMPINGER #	+ SILICA GEL		
IMPINGER #	+ SILICA GEL		
IMPINGER #	+ SILICA GEL		
IMPINGER #	+ SILICA GEL		

BALANCE: METTLER PJ6000 SNR K59603 WEIGHED BY: JS

2 Kg Class S-1 Calibration Wt. 2000.0 Balance check must be +/- 0.5 grams.

COMMENTS:

Form: Impinger Report M14.xls 9/17/18

Magnitude 7 Metals LLC

GAS ANALYSIS REPORT

Location PR Line 1 Date 2-4-20

Run 1

Room B Analyzed by AP

Run	Time	Percent Carbon Dioxide (CO_2)	Percent Oxygen (O_2)
1	10:45	0.00	20.8
2	10:50	0.00	20.8
3	11:00	0.00	20.7

Potline 1 Roof Exit Velocities and Temperatures

	Manifold (B-66) Averages		Roof Averages	
2/4/2020 10:00	WS (ft/min)	Temp (Deg. F)	WS (ft/min)	Temp (Deg. F)
2/5/2020 09:15	109.5	82.0	124.8	80.0

2/4/2020 10:00 2/5/2020 9:15	B-51			B-66			B-82		
Date/Time	WS (ft/min)	WD (Deg.)	Temp (Deg. F	WS (ft/min)	WD (Deg.)	Temp (Deg. F	WS (ft/min)	WD (Deg.)	Temp (Deg. F)
	_WS_AV	_WD_AV	_TEMP_	_WS_AV	_WD_AV	_TEMP_	_WS_AV	_WD_AV	_TEMP_
Averages:	104.3	226.6	82.2	109.5	213.5	82.0	160.5	210.1	75.9
2/4/20 10:00	140.6	207.1	104.9	125.9	217.7	93.7	142.2	215.9	88.2
2/4/20 10:15	97.8	206.8	100.6	131.4	217.9	98.6	146.2	220.5	89.5
2/4/20 10:30	87.0	219.4	98.0	120.5	223.2	95.9	154.9	218.0	87.7
2/4/20 10:45	86.9	231.6	97.4	130.3	218.8	96.0	157.7	215.7	88.5
2/4/20 11:00	89.2	219.4	97.8	123.1	217.3	96.9	168.0	214.1	90.3
2/4/20 11:15	83.6	221.5	96.8	116.9	222.7	96.7	161.4	210.2	89.5
2/4/20 11:30	95.7	215.5	96.8	112.6	223.7	95.7	162.1	211.5	90.1
2/4/20 11:45	81.3	219.1	96.9	120.1	221.2	96.2	160.8	204.5	91.2
2/4/20 12:00	89.0	224.4	96.0	115.9	224.1	96.1	152.9	215.2	89.8
2/4/20 12:15	85.4	226.2	96.6	119.7	220.2	95.3	160.2	210.5	88.5
2/4/20 12:30	97.4	212.3	98.4	122.9	204.2	95.3	155.3	202.2	86.8
2/4/20 12:45	75.8	223.2	97.0	125.2	218.0	96.3	162.6	208.8	88.9
2/4/20 13:00	100.9	221.1	96.6	107.7	195.8	92.1	178.5	204.6	86.6
2/4/20 13:15	79.5	229.9	94.6	103.2	191.2	92.5	177.0	206.4	87.9
2/4/20 13:30	88.5	221.3	95.2	126.3	196.7	93.0	179.7	192.3	87.7
2/4/20 13:45	93.9	223.8	92.9	137.0	189.0	94.2	162.6	180.9	85.9
2/4/20 14:00	85.3	223.8	93.0	115.7	194.3	92.5	182.5	203.6	86.8
2/4/20 14:15	93.3	220.3	93.8	123.3	225.2	95.5	168.6	217.6	86.7
2/4/20 14:30	105.5	222.9	90.8	130.2	225.2	91.4	157.7	223.1	81.2
2/4/20 14:45	116.9	220.5	88.8	122.7	229.8	88.2	140.8	226.9	78.0
2/4/20 15:00	104.8	229.9	87.0	111.6	226.4	86.1	153.5	219.1	76.9
2/4/20 15:15	103.8	227.6	86.4	116.4	224.1	85.5	152.5	216.0	77.0
2/4/20 15:30	104.9	226.4	86.4	126.1	220.5	85.6	153.3	219.8	76.2
2/4/20 15:45	115.7	224.4	84.6	116.0	223.3	83.4	152.3	215.1	75.3
2/4/20 16:00	123.5	220.5	83.2	112.7	221.0	82.1	143.5	218.6	74.7
2/4/20 16:15	103.4	225.2	83.7	113.3	220.1	83.5	161.2	213.8	76.2
2/4/20 16:30	116.5	221.7	83.2	116.1	221.3	82.1	160.1	216.8	73.5
2/4/20 16:45	123.0	222.1	82.3	112.6	221.3	82.2	142.5	220.2	74.0
2/4/20 17:00	131.8	221.1	82.3	115.1	222.2	81.6	146.1	217.6	73.5
2/4/20 17:15	118.5	225.8	81.6	102.1	215.5	80.4	182.6	202.3	75.2
2/4/20 17:30	118.6	224.0	81.1	113.7	211.9	80.8	152.6	215.1	75.1
2/4/20 17:45	117.1	224.2	82.0	115.8	221.5	82.1	150.1	220.2	73.4
2/4/20 18:00	113.1	220.7	82.7	114.3	214.8	82.0	157.4	216.3	74.4
2/4/20 18:15	127.3	219.2	82.8	111.1	214.4	81.9	154.8	216.2	73.8
2/4/20 18:30	114.8	223.2	82.0	99.7	214.0	80.8	176.1	203.0	75.5
2/4/20 18:45	107.3	222.5	83.2	116.1	221.7	82.1	156.4	215.6	74.8
2/4/20 19:00	100.5	218.2	83.8	112.2	221.4	82.1	161.9	217.7	74.0
2/4/20 19:15	110.8	216.5	83.9	117.3	217.5	82.2	152.6	219.5	73.5
2/4/20 19:30	120.0	218.5	83.1	115.9	215.4	81.4	157.5	216.1	73.4
2/4/20 19:45	120.1	220.2	81.8	120.9	216.5	81.2	144.8	219.6	73.2
2/4/20 20:00	111.8	225.4	81.8	112.8	211.4	81.8	154.8	215.0	73.8
2/4/20 20:15	116.8	225.1	80.9	116.1	217.2	82.0	133.8	222.8	72.9
2/4/20 20:30	121.4	225.9	81.0	110.8	217.6	81.0	154.2	212.9	73.5
2/4/20 20:45	113.7	225.8	80.2	109.7	213.9	81.1	140.2	220.2	73.3
2/4/20 21:00	100.5	221.4	82.2	122.2	217.1	81.2	147.8	218.2	73.2
2/4/20 21:15	113.3	217.0	83.0	120.8	222.2	80.8	149.0	217.3	72.6

2/4/2020 10:00
2/5/2020 9:15

Date/Time	B-51 WS (ft/min)	B-51 WD (Deg.)	B-51 Temp (Deg. F	B-66 WS (ft/min)	B-66 WD (Deg.)	B-66 Temp (Deg. F	B-82 WS (ft/min)	B-82 WD (Deg.)	B-82 Temp (Deg. F)
2/4/20 21:30	115.2	221.5	80.8	111.7	216.7	80.2	148.9	214.5	72.8
2/4/20 21:45	115.3	227.0	80.8	100.8	211.2	80.2	136.2	215.7	73.3
2/4/20 22:00	111.6	228.6	79.9	97.4	203.8	78.8	166.6	205.8	74.0
2/4/20 22:15	114.7	225.4	80.1	103.3	204.6	79.2	169.2	205.8	73.8
2/4/20 22:30	110.0	226.1	80.2	105.8	214.9	80.1	158.7	211.0	73.7
2/4/20 22:45	111.2	225.7	80.4	98.2	212.0	80.0	172.1	204.0	73.5
2/4/20 23:00	107.6	225.4	80.5	127.7	210.8	80.0	156.3	215.2	72.8
2/4/20 23:15	103.8	222.6	80.7	109.5	220.9	79.4	145.1	218.8	71.2
2/4/20 23:30	100.4	227.4	79.5	111.0	210.8	80.0	143.9	218.6	72.1
2/4/20 23:45	117.1	223.7	79.6	107.4	216.1	79.9	158.9	211.6	72.5
2/5/20 0:00	101.8	230.0	79.1	96.2	215.3	78.2	143.3	214.5	72.4
2/5/20 0:15	99.5	229.9	77.2	92.7	208.5	77.8	149.2	209.0	73.0
2/5/20 0:30	103.3	228.7	76.6	96.2	215.7	76.7	151.8	211.1	72.4
2/5/20 0:45	100.3	231.2	75.9	96.4	212.8	76.7	133.1	220.7	72.4
2/5/20 1:00	102.8	229.8	76.9	100.4	209.0	77.4	167.0	205.2	72.4
2/5/20 1:15	101.3	226.1	76.8	90.9	209.3	77.3	175.6	203.0	72.9
2/5/20 1:30	105.2	230.4	75.7	96.9	209.6	76.4	163.3	210.3	72.9
2/5/20 1:45	101.3	228.3	75.9	88.5	206.8	76.3	167.0	205.9	72.9
2/5/20 2:00	103.5	232.8	75.1	89.2	205.7	75.5	170.1	203.6	72.8
2/5/20 2:15	98.5	235.0	75.1	90.8	210.0	76.4	169.0	203.8	72.9
2/5/20 2:30	107.1	232.2	75.0	99.4	213.9	76.4	170.8	203.1	72.4
2/5/20 2:45	113.7	230.0	75.5	103.5	212.6	76.4	154.6	207.1	72.3
2/5/20 3:00	109.2	233.0	76.0	99.6	212.8	75.5	151.3	210.8	71.1
2/5/20 3:15	94.4	239.2	75.9	100.5	211.2	75.3	169.7	206.3	72.0
2/5/20 3:30	105.1	230.4	76.9	104.3	213.0	76.1	171.9	205.4	72.1
2/5/20 3:45	107.5	230.2	75.1	98.9	213.7	76.2	163.3	210.6	72.1
2/5/20 4:00	99.5	230.0	76.6	90.3	213.6	76.4	166.8	204.6	72.2
2/5/20 4:15	100.4	229.8	76.7	100.2	207.9	76.5	156.1	204.8	71.7
2/5/20 4:30	111.6	228.0	74.8	94.3	206.2	76.6	177.0	201.3	72.5
2/5/20 4:45	106.0	230.0	75.2	91.5	209.2	76.7	160.5	206.0	71.9
2/5/20 5:00	98.1	238.8	73.2	104.6	210.7	76.6	152.1	206.7	71.8
2/5/20 5:15	100.8	239.1	73.0	101.6	209.3	75.4	183.4	199.9	72.7
2/5/20 5:30	88.4	242.5	72.7	99.3	211.2	75.3	166.1	204.7	71.8
2/5/20 5:45	103.8	235.5	73.6	96.9	206.6	76.1	173.7	200.6	71.3
2/5/20 6:00	99.7	235.7	73.2	99.3	209.5	75.0	183.8	201.0	71.3
2/5/20 6:15	96.6	237.4	73.3	105.9	209.2	74.9	165.2	203.9	70.2
2/5/20 6:30	98.4	239.1	71.8	100.4	209.0	74.4	162.7	205.6	71.0
2/5/20 6:45	96.7	239.4	72.5	96.8	215.7	75.2	171.0	199.6	71.5
2/5/20 7:00	96.1	236.5	73.0	111.7	205.6	74.4	148.4	209.7	70.4
2/5/20 7:15	101.2	236.5	73.1	114.7	205.4	75.1	168.5	204.1	70.4
2/5/20 7:30	107.0	223.4	75.4	111.8	217.4	75.3	156.8	211.1	70.5
2/5/20 7:45	97.1	233.8	73.9	115.8	208.7	74.4	165.9	207.7	70.5
2/5/20 8:00	101.4	230.2	74.0	106.3	204.8	75.0	178.0	197.0	70.1
2/5/20 8:15	102.9	229.9	74.1	107.0	209.3	74.9	190.2	200.9	70.2
2/5/20 8:30	91.4	233.2	73.7	106.7	212.3	74.8	176.9	199.9	70.4
2/5/20 8:45	100.4	233.0	73.5	102.4	208.4	74.7	181.9	199.8	71.5
2/5/20 9:00	106.6	224.7	75.2	108.7	207.5	75.3	183.0	199.8	71.3
2/5/20 9:15	95.0	237.2	72.7	106.1	205.7	73.7	172.6	202.9	70.7