Magnitude 7 Metals LLC

STACK SAMPLE RESULTS

METHOD 14
LINE 2

Run Number 3 | 2/18/2020 - 2/19/2020 | EPA Method # 5 & 14

METER VOLUME	1011.625	CU. FT.
SQUARE ROOT OF DELTA P	0.399	SQ. ROOT IN. WATER
AVERAGE DELTA H	1.828	IN. WATER
METERED GAS TEMPERATURE	73.2	DEG. F
STATIC PRESSURE IN STACK	-0.71	IN. WATER
STACK TEMPERATURE	69.2	DEG. F
BAROMETRIC PRESSURE	30.14	IN. Hg
PROBE TIP DIAMETER	0.3176	INCHES
GAS METER CORRECTION FACTOR	0.996	
TOTAL SAMPLING TIME	1395.0	MINUTES
TOTAL WATER COLLECTED	-20.8	GRAMS
MOLECULAR WEIGHT	28.8	LB/LB-MOLE
SAMPLING DUCT AREA	1.25	SQ. FT.
TOTAL PARTICULATE COLLECTED	0.0493	GRAMS
GASEOUS FLUORIDE COLLECTED	0.03224	GRAMS
PARTICULATE FLUORIDE COLLECTED	0.01151	GRAMS
AVG ALUMINUM PRODUCTION RATE	461861	LBS./DAY/LINE
MANIFOLD ANEMOMETER VELOCITY	96.7	FT./MIN.
MANIFOLD THERMOCOUPLE TEMPERATURE	84.0	DEG. F
AVERAGE ROOF EXIT VELOCITY	96.0	FT./MIN.
AVERAGE ROOF EXIT TEMPERATURE	81.5	DEG. F
VOLUMETRIC FLOWRATE OUT ROOF	6131328	ACFM/LINE
VOLUME GAS SAMPLED	1009.568	SCF
MOISTURE IN STACK GAS	-0.097	%
VELOCITY OF STACK GAS (ACTUAL)	1343	FT./MIN.
VOLUMETRIC FLOWRATE IN DUCT	1686	SCFM
PERCENT ISOKINETIC - TRAIN TO DUCT	97.55	%
VOLUMETRIC FLOWRATE OUT ROOF	6028255	SCFM/LINE
PERCENT ISOKINETIC - MANIFOLD TO ROOF	125.98	%
SECONDARY PARTICULATE CONCENTRATION	0.0018	GRAMS/SCM
SECONDARY PARTICULATE CONCENTRATION	0.00078	GRAINS/SCF
SECONDARY PARTICULATE EMISSION	40.10	LBS./HR.
SECONDARY PARTICULATE EMISSION	4.17	LBS./TON
PRIMARY PARTICULATE EMISSION	3.99	LBS./TON
PRIMARY AND SECONDARY PARTICULATE EMITTED	8.16	LBS./TON
GASEOUS FLUORIDE CONCENTRATION	1.161	MG./SCM
GASEOUS FLUORIDE CONCENTRATION	0.000508	GRAINS/SCF
PARTICULATE FLUORIDE CONCENTRATION	0.415	MG./SCM
PARTICULATE FLUORIDE CONCENTRATION	0.000181	GRAINS/SCF
TOTAL FLUORIDE CONCENTRATION	1.576	MG./SCM
TOTAL FLUORIDE CONCENTRATION	0.000689	GRAINS/SCF
TOTAL FLUORIDE EMISSION	35.589	LBS./HR./LINE
AVG. ALUMINUM PRODUCTION RATE	9.62	TON/HR./LINE
TOTAL SECONDARY FLUORIDE EMITTED	3.699	LBS./TON
TOTAL PRIMARY FLUORIDE EMITTED	0.826	LBS./TON
TOTAL PRIMARY AND SECONDARY FLUORIDE EMITTED	4.525	LBS./TON

Printed
2/19/2020 10:08 AM

Stack Sample Results
Raw Data Averages
METHOD 14 LINE 2

Start Date: 2/18/2020 **Stop Date:** 2/19/2020 **Run #:** 3

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	0.15	1.70	74	74	-0.68	79
1-1b	0.15	1.70	76	71		76
1-2a	0.20	2.25	78	73	-0.72	78
1-2b	0.20	2.25	75	70		69
1-3a	0.21	2.35	73	69	-0.75	74
1-3b	0.21	2.35	75	72		74
2-1a	0.16	1.80	73	71	-0.69	73
2-1b	0.16	1.80	77	72		71
2-2a	0.18	2.05	75	72	-0.73	72
2-2b	0.18	2.05	78	73		70
2-3a	0.16	1.80	74	69	-0.74	67
2-3b	0.16	1.80	74	72		68
3-1a	0.13	1.50	73	72	-0.69	63
3-1b	0.13	1.50	76	72		65
3-2a	0.16	1.80	72	71	-0.71	64
3-2b	0.16	1.80	74	70		63
3-3a	0.10	1.20	75	71	-0.71	58
3-3b	0.10	1.20	75	75		62
Averages	**0.399** (AVG. SQ.RT.)	**1.828**	**73.2**		**-0.71**	**69.2**

MAGNITUDE 7 METALS, LLC
METHOD 14 DATA

Run Start Date 2/18/20
Run End Date 2/19/20
Run # 3
Run Start Time ~~10:05~~ 10:10 AM
Run End Time 9:25 AM
Probe Tip SN 3164
Avg. Tip Diameter .3176
Delta H **1.91** 2% Moisture
Duct Area = 1.25 sq.ft. (assumed)

Line: 1 **2** 3 East 3 West
ROOF MONITOR

Operators
Joe Schneider
Alicia Powell

Chemist

Digital meter used **2076**

Initial L.C. @ 15.0 = .008
Final L.C. @ 5.0 = .003

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

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	554.000	.15	1.70	74	74	-.68	79	63	155	.7	11.18
			.15	1.70	76	71		76	63	155	.7	11.23
1-2	155	656.980	.20	2.25	78	73	-.72	78	65	155	1.3	11.23
			.20	2.25	75	70		69	60	155	1.3	11.35
1-3	155	783.860	.21	2.35	73	69	-.75	74	57	155	1.3	11.22
			.21	2.35	75	72		74	61	155	1.3	11.27
2-1	155	912.00	.16	1.80	73	71	-.69	73	58	155	1.0	11.26
			.16	1.80	77	72		71	61	155	1.0	11.35
2-2	155	26.640	.18	2.05	75	72	-.73	72	60	155	1.2	11.31
			.18	2.05	78	73		70	59	155	1.2	11.40
2-3	155	150.000	.16	1.80	74	69	-.74	67	57	155	1.3	11.38
			.16	1.80	74	72		68	60	155	1.3	11.39
3-1	155	262.970	.13	1.50	73	72	-.69	63	60	155	1.3	11.48
			.13	1.50	76	72		65	61	155	1.3	11.47
3-2	155	365.700	.16	1.80	72	71	-.71	64	58	154	1.2	11.44
			.16	1.80	74	70		63	58	155	1.2	11.47
3-3	155	457.795	.10	1.20	75	71	-.71	58	58	155	1.2	11.61
			.10	1.20	75	75		62	61	156	1.0	11.56
FINAL		565.625										
S/N		17791782					**76**	3-5	**2-A**	**2-H**		

Nomograph factor: 11.28

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

MAGNITUDE 7 METALS, LLC
METHOD 14 RAW DATA
ROOF MONITOR

Line: 2 Start Date: 2/19/20 Run: 3 Filter: 3C

PROBE TIP

SN _____

DIAMETER MEASUREMENT (in.)

1. 3164
2. _____
3. Alg.
4. 0.3176
5. _____
6. _____
7. _____
8. _____

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 —

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 — Circle to document visual inspection.

SN D755

Visually inspected? Yes

BAROMETER READING 30.28 (in. Hg)

CORRECTION FACTOR -.14 (in. Hg)

ORIGINAL GASEOUS FLUORIDE SAMPLE VOLUME 1 (liter)

		INITIAL WEIGHT (g)	FINAL WEIGHT (g)
IMPINGER #	+ 200 ml water	670.1	524.2
IMPINGER #	+ 100 ml water	727.5	746.1
IMPINGER #	+ EMPTY	642.5	673.3
IMPINGER #	+ SILICA GEL	1121.9	1197.6
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: _____

Magnitude 7 Metals

GAS ANALYSIS REPORT

Location Line2

Date 2-18-20

Run 3

Room C

Analyzed by AP

Run	Time	Percent Carbon Dioxide (CO_2)	Percent Oxygen (O_2)
1	11:50	0.00	20.8
2	11:53	0.00	20.8
3	11:58	0.00	20.3

Potline 2 Roof Exit Velocities and Temperatures

Manifold (C-66) Averages		Roof Averages	
WS (ft/min)	Temp (Deg. F)	WS (ft/min)	Temp (Deg. F)
96.7	84.0	96.0	81.5

	C-51			C-66			C-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:	98.2	163.2	80.9	96.7	142.1	84.0	93.2	155.8	79.7
2/18/20 10:10	105.4	172.8	88.9	124.7	140.8	95.6	120.3	148.8	89.8
2/18/20 10:25	106.4	165.7	88.3	114.1	139.5	94.0	116.1	151.2	87.7
2/18/20 10:40	106.2	167.8	90.3	116.4	143.0	94.2	119.8	152.2	87.6
2/18/20 10:55	104.9	166.1	88.8	100.1	139.7	92.2	112.8	148.7	87.1
2/18/20 11:10	114.1	166.4	88.4	94.0	137.9	91.3	105.9	151.4	86.3
2/18/20 11:25	105.5	169.7	86.8	92.0	147.3	90.0	101.2	150.6	87.1
2/18/20 11:40	109.9	167.4	87.4	89.1	136.6	90.0	105.1	148.0	86.3
2/18/20 11:55	103.6	167.6	87.4	82.3	134.9	90.9	95.6	150.9	87.0
2/18/20 12:10	107.9	169.6	88.4	91.5	139.4	90.7	110.1	155.0	87.4
2/18/20 12:25	104.3	169.5	88.3	103.8	138.2	91.6	120.2	154.1	86.9
2/18/20 12:40	104.2	166.8	87.0	122.7	140.4	93.6	104.1	155.2	86.8
2/18/20 12:55	115.4	170.8	87.6	106.1	138.3	91.9	130.0	162.0	85.4
2/18/20 13:10	106.1	168.4	87.8	95.4	139.4	90.1	112.7	155.8	85.3
2/18/20 13:25	104.2	172.0	87.9	100.0	137.8	90.8	118.5	149.2	84.6
2/18/20 13:40	107.2	168.5	87.5	109.5	140.7	91.0	114.6	152.4	84.6
2/18/20 13:55	97.1	168.2	86.4	112.9	136.8	91.1	108.7	152.5	83.3
2/18/20 14:10	91.6	172.8	83.5	106.9	139.0	89.0	122.2	151.2	83.1
2/18/20 14:25	99.1	171.4	84.6	99.1	140.5	88.9	130.4	156.9	82.0
2/18/20 14:40	108.3	169.6	85.3	102.6	141.4	87.3	115.2	155.9	81.5
2/18/20 14:55	112.5	165.2	85.3	102.8	141.8	88.2	106.4	164.0	82.3
2/18/20 15:10	110.4	161.5	85.3	99.0	143.7	88.2	79.9	155.8	82.3
2/18/20 15:25	110.5	163.4	86.3	107.7	143.9	89.1	95.8	160.8	82.4
2/18/20 15:40	108.9	167.7	86.4	101.7	144.1	89.1	100.1	152.7	83.2
2/18/20 15:55	105.9	167.4	86.4	90.1	135.0	89.1	112.3	157.1	83.4
2/18/20 16:10	107.0	168.6	85.7	99.7	138.5	89.1	103.6	151.8	83.6
2/18/20 16:25	106.0	170.4	85.9	97.2	138.6	89.0	118.3	150.1	82.9
2/18/20 16:40	98.2	166.7	84.8	100.5	141.6	88.2	97.1	151.4	83.4
2/18/20 16:55	103.9	169.7	85.9	94.6	139.1	88.4	113.2	151.2	83.5
2/18/20 17:10	97.0	163.9	85.4	91.6	138.9	89.0	114.4	147.5	82.9
2/18/20 17:25	105.9	163.8	85.3	83.6	135.1	88.1	111.1	145.1	82.8
2/18/20 17:40	105.7	168.0	85.2	81.4	138.4	88.5	110.2	146.2	82.6
2/18/20 17:55	106.4	166.8	85.0	84.1	135.0	89.4	107.0	149.0	83.3
2/18/20 18:10	108.3	167.1	84.9	88.0	140.7	89.3	106.2	152.1	82.9
2/18/20 18:25	91.5	159.8	84.3	92.5	143.9	86.7	83.8	153.9	83.4
2/18/20 18:40	87.3	154.4	82.6	95.6	142.9	85.1	77.0	150.2	83.5
2/18/20 18:55	90.5	163.7	82.6	101.1	139.7	85.1	96.5	144.3	83.0
2/18/20 19:10	100.0	163.7	83.5	100.0	139.9	86.1	95.7	154.1	82.8
2/18/20 19:25	103.6	163.7	84.8	97.1	137.9	88.0	111.9	151.1	81.6
2/18/20 19:40	92.9	162.6	83.1	107.0	144.5	86.8	114.1	148.1	81.4
2/18/20 19:55	87.9	163.8	82.4	100.8	143.4	86.1	89.1	155.3	81.8
2/18/20 20:10	100.5	161.0	83.5	98.3	143.8	86.6	97.1	158.8	82.2
2/18/20 20:25	92.2	167.4	83.4	109.5	145.8	86.5	94.8	153.2	81.1
2/18/20 20:40	88.5	164.8	83.4	103.7	147.4	86.4	88.0	152.2	81.2
2/18/20 20:55	96.1	164.6	83.4	106.4	145.6	86.4	100.3	151.8	81.3
2/18/20 21:10	92.5	160.0	82.7	111.6	146.3	86.3	87.7	161.5	82.6
2/18/20 21:25	94.4	163.6	82.0	104.7	145.0	85.0	95.6	159.4	79.8

	C-51			C-66			C-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)
2/18/20 21:40	91.5	158.2	82.0	105.6	149.8	84.6	84.0	159.3	78.6
2/18/20 21:55	97.4	163.1	82.0	110.0	147.5	84.6	102.2	160.4	78.5
2/18/20 22:10	96.4	160.5	82.0	112.0	146.5	84.7	93.4	160.3	78.4
2/18/20 22:25	91.4	158.4	81.6	110.3	147.3	83.9	95.2	161.8	78.3
2/18/20 22:40	88.6	160.8	82.0	110.3	147.1	83.3	89.2	159.3	78.3
2/18/20 22:55	89.5	157.9	81.5	103.2	142.5	83.3	84.5	159.5	78.2
2/18/20 23:10	84.7	166.6	81.1	100.8	144.7	83.3	86.4	154.4	78.2
2/18/20 23:25	93.9	174.4	82.0	98.5	141.9	82.0	98.2	150.3	77.7
2/18/20 23:40	87.5	171.2	81.5	95.5	143.4	82.4	92.8	155.5	78.2
2/18/20 23:55	92.8	163.9	80.3	87.0	141.1	81.8	91.4	155.3	78.3
2/19/20 0:10	84.8	162.7	79.4	92.9	136.3	82.3	78.3	156.4	78.4
2/19/20 0:25	92.9	162.9	79.4	92.0	139.7	82.4	89.3	151.4	79.1
2/19/20 0:40	90.9	170.3	78.3	103.4	138.7	82.5	89.1	153.4	78.1
2/19/20 0:55	101.8	168.8	78.3	89.2	136.2	81.7	81.7	153.6	77.6
2/19/20 1:10	101.0	168.7	78.2	90.1	141.8	81.0	91.5	153.7	77.6
2/19/20 1:25	96.5	164.0	77.2	87.1	139.7	80.3	83.8	152.6	77.2
2/19/20 1:40	107.7	160.0	76.7	83.3	139.4	79.6	77.3	157.5	77.1
2/19/20 1:55	100.1	157.2	76.2	85.2	140.5	79.2	77.3	157.6	77.1
2/19/20 2:10	96.6	161.0	76.1	85.3	140.5	79.2	80.8	158.9	77.0
2/19/20 2:25	91.9	154.9	75.4	92.1	137.6	78.4	78.1	156.2	77.0
2/19/20 2:40	94.2	160.2	75.6	89.9	139.1	79.1	78.3	161.2	76.6
2/19/20 2:55	104.3	159.9	76.6	92.0	144.5	79.7	82.8	164.2	75.4
2/19/20 3:10	100.8	159.7	76.5	97.1	144.7	79.8	81.3	159.5	74.9
2/19/20 3:25	93.7	155.2	75.3	86.6	141.4	78.9	67.0	155.3	75.5
2/19/20 3:40	100.3	161.3	75.9	83.1	140.5	78.7	76.3	158.8	75.6
2/19/20 3:55	93.1	158.9	75.2	91.1	146.0	78.5	77.6	160.2	74.7
2/19/20 4:10	86.2	163.0	74.6	98.9	146.3	77.7	84.6	161.0	73.4
2/19/20 4:25	92.5	155.9	75.1	89.2	140.3	77.9	73.9	154.6	74.4
2/19/20 4:40	90.8	154.0	74.5	91.4	144.8	77.7	77.6	154.4	74.8
2/19/20 4:55	89.3	157.6	74.9	93.6	144.6	78.2	77.8	160.5	73.6
2/19/20 5:10	95.9	157.5	75.0	91.0	141.5	78.0	83.1	154.9	74.2
2/19/20 5:25	98.7	154.1	74.2	96.9	146.0	77.8	85.8	162.8	73.2
2/19/20 5:40	93.5	154.9	74.2	94.8	142.9	77.6	75.3	160.8	73.4
2/19/20 5:55	90.1	162.6	74.2	90.8	141.7	77.3	77.3	156.1	73.6
2/19/20 6:10	95.7	159.5	74.2	80.3	139.1	76.2	77.5	159.5	73.8
2/19/20 6:25	91.7	155.4	72.6	87.9	138.1	75.6	75.5	157.2	73.9
2/19/20 6:40	95.0	155.1	73.0	89.7	140.7	75.5	77.1	158.3	74.0
2/19/20 6:55	86.2	159.6	72.1	89.7	136.6	75.4	76.9	153.7	73.9
2/19/20 7:10	96.6	155.7	72.3	91.6	134.9	75.4	70.8	158.6	73.9
2/19/20 7:25	96.6	158.5	71.6	87.6	139.3	75.3	74.4	161.4	72.7
2/19/20 7:40	91.4	155.0	73.1	94.8	148.3	76.1	72.9	162.4	72.7
2/19/20 7:55	89.7	156.6	73.2	90.7	146.6	76.3	78.1	155.3	72.7
2/19/20 8:10	92.3	159.6	73.3	95.0	154.1	76.6	72.4	165.5	73.1
2/19/20 8:25	96.6	159.3	74.2	89.1	154.3	76.2	76.5	169.2	73.0
2/19/20 8:40	94.8	162.7	71.6	95.2	144.9	76.7	76.3	165.0	74.2
2/19/20 8:55	93.9	156.7	71.7	88.9	155.2	76.1	68.8	165.1	74.2
2/19/20 9:10	95.5	151.2	72.6	87.8	147.5	76.2	76.4	166.5	74.6
2/19/20 9:25	106.6	157.3	72.6	90.4	155.2	76.8	74.6	168.1	74.7