Grayling Generating Station

4400 West Four Mile Road
Grayling, Michigan 49738
(989) 348-4575

July 21, 2021

Mr. Jeremy Howe
Environmental Air Quality Analyst
Michigan Department of Environment, Energy, and Great Lakes (EGLE)
Cadillac District Office
120 West Chapin Street
Cadillac, MI 49601-2158

Via e-mail (howej1@Michigan.gov) and UPS

RE: Response to Violation Notice issued June 18, 2021
Grayling Generating Station Limited Partnership [SRN: N2388]
Failure to Continuously Monitor Emissions Utilizing Flow CEMS

Dear Mr. Howe:

Grayling Generating Station, LP (GGS) is providing this response to the Violation Notice (VN) issued by Michigan Department of Environment, Energy, and Great Lakes (EGLE) on June 18, 2021 that alleges failure to properly operate and maintain a flow monitoring system, as well as a failure to continuously monitor emissions, and timely report such as deviations. Also contained in the VN is an indication that EGLE considers GGS flow data "suspect" from the time that the current flow monitor was installed in October 2017 through the most recent flow Relative Accuracy Test Audit (RATA) in April and May 2021. The initial VN response due date was July 9, 2021 and EGLE approved an extension request to July 21, 2021 in recognition of limited staff resources in July due to various state and federal quarterly reporting activities. EGLE further indicated that the July submission should be more of an "initial response" that declares GGS's position on the allegations, as well as laying out a timeframe for a "follow-up" submission which will provide further support for GGS's position on these matters. This response therefore outlines GGS's position as well as proposes that a follow-up response be submitted to EGLE by August 20, 2021.

Background

EGLE has observed an inconsistency of stack flow rates in two separate test reports for the annual flow RATA and the 5-year Renewable Operating Permit (ROP) stack tests conducted in November of 2020. Specifically, EGLE noted that the stack flow during the 2020 Reference Method (RM) testing for ROP constituents was reading higher than the previous day during the 2020 flow RATA

testing. EGLE further investigated clock hour average Continuous Emission Monitoring System (CEMS) flow readings overlapping the ROP stack testing times and did a "RATA like" comparison to calculate a Relative Accuracy (RA) of about 20%. EGLE brought this comparison to the attention of GGS on February 5, 2021 via email from Mr. Jeremy Howe. GGS investigated reasons that may have caused the difference in readings and presented sound, engineering based plausible explanations to EGLE in a presentation during a teleconference meeting on February 19, 2021 (see attached). The outcome of that meeting was an agreement to conduct a new flow RATA for the stack flow CEMS. GGS decided to conduct the gaseous RATA during the same test event to align the gas and flow RATA testing frequency to second quarter as opposed to the fourth quarter based on the timing of the 2020 RATAs. The RATA was scheduled for the end of April 2021, per test team availability and compliance with the 30-day notice requirement.

The 2021 RATAs utilized Consumers Energy Company's Regulatory and Compliance Testing Services (RCTS) in lieu of the previous testing/RATA contractor (Network Environmental, Inc.) and commenced on April 27, 2021. The RATA testing was witnessed by K. Cunningham of CMS Enterprises and Rebecca Radulski (District Inspector), Jeremy Howe (Technical Programs Unit, or TPU) and Lindsey Wells (TPU) from EGLE. Initial flow RATA testing was performed using allowable (see 40 CFR Part 75, Appendix B 2.3.2) three run trial tests at each operating level (low, medium, and high) to help determine if adjustment of the flow CEMS was needed. Flow monitors often incorporate mathematical adjustments of their output to ensure better alignment with the RM readings. These adjustments take different forms depending upon the make/model of the flow CEMS and include lookup tables, polynomial equations, and K-factors, with the latter being applicable to the FLOWSIC100 PR installed at GGS.

It became apparent during the trial flow RATA runs that a change to the K-factor was required at all three operating levels to ensure better alignment with the RM values. Changes to the flow system was contracted to the flow CEMS vendor, SICK. Flow testing re-commenced on April 29. 2021 after adjusting the K-factor associated with the flow CEMS. A probationary calibration was first passed, and then the official 3-load flow RATA was conducted and completed on May 3, 2021, with flow passing at all loads at less than 7.5% relative accuracy (RA), thus qualifying for annual flow RATA testing. The RATA report was submitted on June 11, 2021, and EGLE issued the Violation Notice on June 18, 2021. A teleconference meeting was held between CMS Energy subsidiary Environmental support, GGS personnel, and EGLE on June 23, 2021 to discuss the VN as well as to verbally request an extension to respond to the VN. A written extension request was submitted by GGS on June 25, 2021, with an EGLE response on June 30, 2021 extending the initial response deadline to July 21, 2021.

Current Allegations

EGLE observations suggest the flow data is "invalid" from October 2017 to April 2021, which corresponds back to the date of GGS flow monitor installation up to the current RATA. EGLE alleges that the flow monitor may not have been properly installed in 2017 and has been reading low since then; thus, potentially compromising reported emissions data. As listed in the VN, EGLE has alleged 3 violations:

1. *Failure to continuously monitor with a properly installed, calibrated, maintained, and operated flow CEMS.*

2. *Failure to monitor and record NO_x, SO_2, and CO emissions on a continuous basis (lb/hr emission rates utilize flow in their calculation),*
3. *Failure to report and certify deviations in the semi-annual reports and annual compliance certification.*

Initial Regulatory Assessment

As discussed during the February 19, 2021 conference call, GGS and EGLE are in alignment that the corrective action has already been implemented via adjustment of the K-factor and other minor changes to the flow monitor configuration on April 29, 2021. Furthermore, the plant has been operating in compliance with permit limits and monitoring requirements since the probationary calibration on April 29, 2021 (after the preceding changes were completed) and subsequent passing of the 3-load flow RATA.

GGS disputes EGLEs claim that the flow monitor was not reading correctly since the date of its installation in October of 2017. Certification of the current flow monitoring system was completed on November 1, 2017, with submission of the certification report to the U.S. Environmental Protection Agency (EPA) and EGLE on December 22, 2017. The flow CEMS has been properly maintained since that time, with passing quality assurance (QA) checks including required daily calibration error tests, quarterly flow-to-load ratio checks and periodic RATAs. Both EPA and EGLE have been provided RATA test notices and protocols, and the RATAs have generally been witnessed by EGLE, with no dispute over previously submitted RATA reports or EDR QA submissions. GGS will provide further information on the flow monitor operation in our next submission.

1. Failure to continuously monitor with a properly installed, calibrated, maintained, and operated flow CEM

GGS disputes this claim, as GGS followed EPA (40 CFR Part 75) requirements for installation and certification of the flow monitor in 2017. GGS has continuously operated and maintained the flow CEMS in accordance with Part 75 regulations which include daily calibrations, quarterly flow-to-load ratio checks and periodic RATA testing.

Prior RATA tests indicated that there was not an issue with the flow CEMS until EGLE questioned the stack test report flows via email correspondence from J. Howe on February 5, 2021. GGS provided plausible explanations for EGLE's observed differences in flow during the 2020 testing activities. EGLE was on site to witness the stack testing in November of 2020, and no issues were raised at the time of testing. GGS subsequently confirmed the flow CEMS needed calibrating during the April 2021 RATA, as well as amended the stack diameter and pressure values within the flow CEMS to match current conditions. From the point of the failed initial flow trials, GGS followed prescribed regulatory actions to adjust the K-factor as well as other allowed changes (stack dia./pressure), and then proceeded to run proper calibrations and full 3-load flow RATA. Changes to the stack diameter in the Emissions Collection and Monitoring Plan System (ECMPS) will be implemented during the 2021 Q2 Electronic Data Report (EDR) data submission. Flow monitor downtime will be reported accordingly in the next excess emission report due July 30, 2021 (as described in Item 3). Monitoring requirements in

Part 75, Appendix B, 2.3.2 (f) stipulate that downtime is acquired prospectively from the time of a failed flow RATA attempt, not retroactively as suggested by EGLE.

GGS is in the process of reviewing historical passed flow RATA test results, daily calibrations, and the quarterly system reviews provided by Data Acquisition and Handling System (DAHS) vendor (VIM Technologies, Inc.). GGS is also analyzing stack flow trends, flow to load and heat input to load ratios, and control charts before and after the 2017 new flow CEMS installation. The results of that review will be included in our subsequent response.

2. ***Failure to monitor and record NO_x, SO_2, and CO emissions on a continuous basis (lb/hr emission rates that utilize flow in their calculation)***

Within this citation, it is presumed that EGLE is referring to the mass emission limits for the noted pollutants, as the flow CEMS data is not used to arrive at lb/mmBtu emission rates for these pollutants. Our explanation above for Item 1 covers this allegation as well. Except for any previously reported flow monitor or gaseous CEMS downtime, which was minimal, GGS did continuously monitor and record the emissions of these pollutants.

3. ***Failure to report and certify deviations in the semi-annual reports and annual compliance certification***

GGS has followed 40 CFR Part 75 regulatory requirements for quality assurance and quality control of our flow CEMS since installation in 2017. GGS did not have any evidence that suggested non-compliance or see any reason to report flow monitoring deviations historically. We have a robust process for identifying deviations at GGS and certified all reports with the best available data at the time of the submittal. Potential flow CEMS anomalies were pointed out in February of 2021. As a result, GGS undertook RATAs several months earlier than required, completing said RATAs in late April and early May 2021. Even if EGLE presumes deviations existed, we cannot reasonably be expected to report a deviation we were unaware of at the time.

There can be only speculation and conjecture as to exactly when the flow CEMS began to consistently read low relative to RM (if that is indeed the case). GGS is not aware of a prescribed evaluation tool that can determine when the CEMS flow probe lost its calibration. GGS followed the regulations and prescribed methodology on correcting the flow probe problem once the evidence became apparent during the trial RATA. In the next excess emissions and downtime monitoring report due to the agency by July 30, 2021, GGS will report flow CEMS monitoring downtime from the time of the failed trial RATAs on April 27, 2021, up through the time of the probationary calibration following changes to the K-factor, in accordance with 40 CFR Part 75, Appendix B.

Summary

As previously stated, Grayling Generating Station does not believe that a Violation Notice was warranted for the reasons explained above. GGS desires additional time to review several years' worth of historic data to provide additional context for the trends EGLE has observed since installation of the current flow CEMS back in October of 2017. We firmly believe that the historic flow data is valid based upon the prescribed QA procedures, and we are confident that additional data review will help to alleviate EGLE's concerns. As discussed previously, GGS

respectfully requests a submission deadline of August 21, 2021 to compile and review this additional information and submit the analysis to EGLE.

If you have questions regarding this initial response, please contact me at (989) 348-4575 Ext. 111 or Kathryn Cunningham at (517) 375-3043. Thank you for your consideration in this matter.

Sincerely,

Edward A. Going
Plant Manager
Grayling Generating Station, LP

cc: Ms. Karen Kajiya-Mills, EGLE-AQD (via email)
Mr. Shane Nixon, EGLE – AQD (via email)
Mr. Richard Laur, GGS
Ms. Kathryn Cunningham, CMS Enterprises

Attachment – Stack Test Meeting PowerPoint (Feb.23, 2021)

CMS ENERGY
Enterprises

Grayling Generating Station
November 2020 Stack Test Events

Meeting with Michigan Department of
Environment, Great Lakes, and Energy (EGLE)
February 23, 2021

Introduction

Purpose

- Meeting with EGLE and GGS personnel to discuss questions regarding stack flow measurements during annual RATA and ROP required testing (every 5 years)

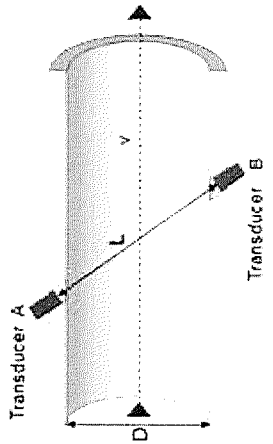
Background

- Biomass boiler unit came down in March 2020 for planned outage which was extended for turbine LP rotor repair. Unit came back on-line at end of June; however, the generator experienced a ground fault in early July which kept the unit off-line until the end of October.
- New gaseous CEMS were installed in April 2020, during the planned outage (new flow CEMS were installed back in 2017)
- RATA testing for certification of the new gaseous CEMs and quality assurance for the flow CEMS was scheduled to be conducted within the 720-unit operating hour required timeframe. ROP required testing was scheduled during the same timeframe.
- The fuel quality seemed to be an issue during the week long test event as it had begun to degrade during the 7-month shutdown and had a higher than normal moisture content.

CEMS Flow Monitors - Ultrasonic

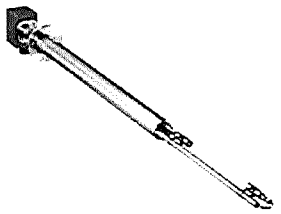
Previous Sick Flow monitor - SICK Model FLA100-D

- Cross stack guided radar (i.e., ultrasonic) – measured flow across entire stack diameter.
- Replaced in 2017 during outage due to moisture causing corrosion in upward facing signal probe.
- Step change in flow rate following the 2017 outage during which the flow CEMS was replaced due to concurrent repair of in-leakage from primary air heater.



Current Sick Maihak – 100PR "Short Path"

- Measures approximately 11 inches of flow path vs. the entire 92" diameter
- 45-degree angle down squared 90 degree to stack wall.

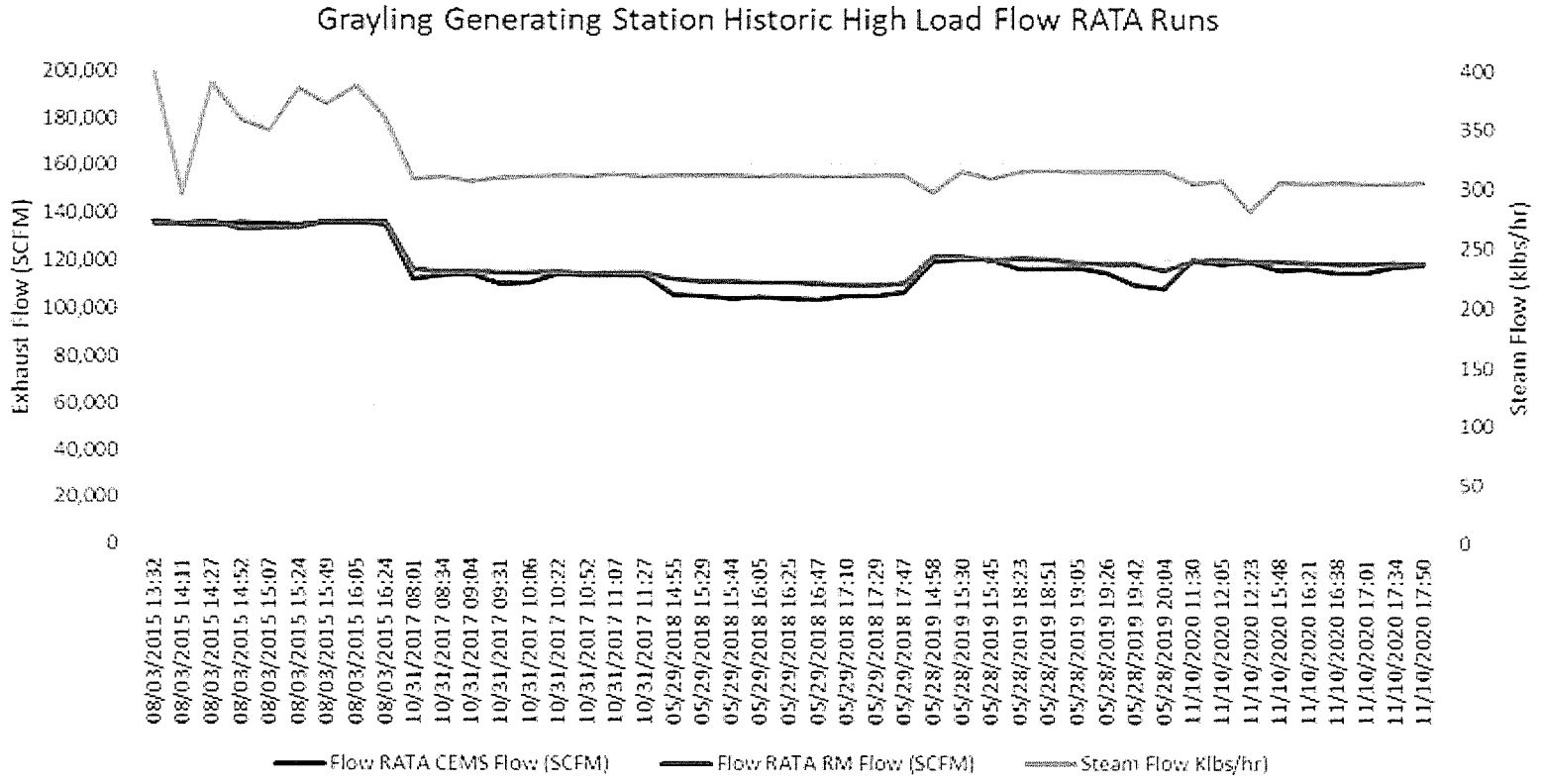


FLOWSIC100 PR
Ideal for one-sided installation with stack diameters from 1 m

Test Results

- High load flow CEMS RATA passed on 11/10/2020 at 2.54% RA
  - Flow CEMS passed 3-load RATA in 2017: 5.74% RA low, 8.70% RA mid, 2.92% RA high.
  - Flow CEMS passed 2-load RATAs in 2018 and 2019 as well. At the high level, the RA was as follows: 2018 = 6.19%; 2019 = 5.04%.
  - 2020 flow RATA flowrates are similar to those measured during 2017, 2018 and 2019 high load flow RATAs.
- ROP testing for PM, Metals, BAP, and H2SO4 are compliant with emission limits – even if flow is biased high.
  - Flows in 2020 are similar to those measured during 2015 ROP tests (were expected to be lower)
- Different flow profiles were observed between RATA and ROP measurements. These tests were not simultaneous (except for some flow RATA runs used to assign exhaust flow rates for the VOC tests on 11/10/2021).

2015-2020 High Load Flow RATA CEMS Vs. RM Results



Flow during RATA and Non-RATA Tests

	2020 Testing					Historical RATAs (High Flow)		
	RATA, High	ROP Testing				2019	2018	2017
Parameter	11/10/2021	PM (11/11)	BAP (11/11-11/12)	H2S04 (11/12/20)	All ROP Runs	5/28/2019	5/29/2018	10/31/2017
Steam (klbs/hr)	302.0	296.2	289.0	290.5	291.9	312.0	311.0	310.0
O2%	3.5	4.5	4.7	4.7		3.65	4.4	5.5
Moisture %	25.25	27.22	24.95	24.95		24.07	23	25
Excess Air	19.70	26.99	29.00	29.00		19.33	40.10	36.00
RM flow (SFCH)	7,141,889	8,582,400	8,629,980	8,630,000	8,581,920	7,179,111	6,643,667	6,910,222
CEM flow (SCFH)	7,048,000	6,915,360	7,066,467	7,136,477	7,039,435	6,957,333	6,298,000	6,789,444
RATA Calc	2.54%	21.62%	17.64%	19.28%	18.94%	5.04%	6.19%	2.92%

	2015 RATA,	2015 ROP			
Flow (SCFH)	High	PM	BAP	H2SO4	All
Steam (klbs/hr)	366.0	307.7	288.4	302.2	299.4
O2%	4.5	5.13	5.10	5.30	
Moisture %	22.6	20.69	20.01	20.53	
Excess Air		32.13	31.89	33.55	
RM flow	8,119,889	8,235,620	8,207,140	7,866,260	8,103,007
CEM flow*	8,140,000	8,006,167	7,754,833	8,105,444	7,955,481
Diff (RM-CEM)	(20,111)	229,453	452,307	(239,184)	147,525
"RATA"	1.01	6.07%	21.82%	6.38%	5.75%

* No minute flow CEMS data is available in relation to the 2015 ROP test. These averages are based upon hourly averages which overlap the ROP test run periods.

Comparison between Measurements

RATA

- Conducted 11/10/2020
- ~36 MW; ~300 klbhr
- wood fuel, 64F ambient temp
- 6 sample pts/2 ports
- Pitot 0.80 cP
- Manual traverse
- ~10 min measurement
- Orsat for diluent

- Similar flowrates as 2017 RATA test

Non-RATA (i.e., PM/Metals, BAP, H2SO4)

- Conducted 11/11, 11/12, 11/13/2020
- ~36 MW; ~291 klbhr
- wood fuel, 41F ambient temp
- 3 sample pts/4 ports
- 3 different Pitot 0.82 to 0.83 cP
- Manual traverse
- ~75 min measurement
- Orsat for diluent

- Similar flowrates as 2015 ROP test

Discussion of Differences

- Part 75 explicitly states in Section 6.5.10 of Appendix A that Reference Method (RM) 2 or its allowable alternatives (except Method 2B and 2E) are to be used for stack gas velocity and volumetric flowrate. Although similar in many respects, RM 2 and RM 5 are slightly different methods for monitoring flow.
  - Length of the flow RATA runs was approximately 11 minutes (5 minute minimum per Part 75), while the PM test runs were approximately 75 minutes (actual sampling time about 60 mins).
  - Flow RATA RM readings represent approximate 1-minute averages/intervals, whereas the PM readings represent approximate 5-minute averages/intervals.
  - The differences in intervals for recording data could contribute to poorer agreement between the CEMS and RM if the exhaust flow/velocity varies over time, as the CEMS would see all such variances. The longer 5-minute intervals for RM5 could miss some level of variance that would be observed at the 1-minute RM2 intervals.
  - Attaching the Pitot tube to the Method 5 probe assembly could introduce aerodynamic interference and/or make it more difficult to ensure that the Pitot remains perpendicular to the direction of flow.

Potential Timing or Port Bias

RATA Runs ~11 min (sample every 0.9 min)

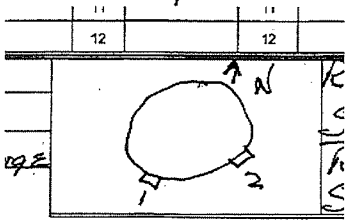
ΔP = 0.96 to 1.10 in H_2O (Run 7 & 8 ex.)

Laminar flow – consistent across traverse

CEMS steady state flow ±6500 SCFM

	BOILER STACK_FLOW_SCFH_P 75 1 min			BOILER STACK_FLOW_P75 1 min		
	SCFH	OS	MS	SCFM	OS	MS
11/10/2020 17:01	6879000	ON	GD	114658.3	ON	GD
11/10/2020 17:02	6696000	ON	GD	111604.2	ON	GD
11/10/2020 17:03	7052000	ON	GD	117525.0	ON	GD
11/10/2020 17:04	6995000	ON	GD	116581.3	ON	GD
11/10/2020 17:05	6984000	ON	GD	116395.8	ON	GD
11/10/2020 17:06	6767000	ON	GD	112787.5	ON	GD
11/10/2020 17:07	6676000	ON	GD	111260.4	ON	GD
11/10/2020 17:08	6896000	ON	GD	114929.2	ON	GD
11/10/2020 17:09	7062000	ON	GD	117693.8	ON	GD
11/10/2020 17:10	6902000	ON	GD	115039.6	ON	GD
Average	6890900			114847.5		
Maximum	7062000			117693.8		
Minimum	6676000			111260.4		
Total	68909000			1148475.1		

High Run #7



ENVIRONMENTAL INCORPORATED

High Load

Run #7 17:01–17:10 | Run #8 17:34–17:43

PITOT TRAVERSE DATA FORM			Date: 11/10/20		
Plant: Grayling Generating Station					
Source: Wood-fired Boiler			Staff: BJD/Eastman/Engelhardt		
Stack Size, Inches: 92			Barometric Pressure, "Hg: 28.42		
Gas Temperature, °F Dry:	Wet:		Static Pressure, "H_2O: -1.70 | -1.60		
Pitot Tube#: 2 6'	Standard:	X	S-Type	C_p: 0.80	

Point Location Inches	1 Port	1 Velocity Pressure "H2O Run #7	1 Velocity	2 Port	2 Velocity Pressure "H2O	2 Velocity	1 Port	1 Velocity Pressure "H2O Run #8	1 Velocity	2 Port	2 Velocity Pressure "H2O	2 Velocity
4.05	1	0.96	382	1	0.98	381	1	0.98	384	1	0.99	385
13.43	2	1.00	383	2	1.00	383	2	1.05	383	2	1.05	386
27.23	3	1.10	384	3	1.10	383	3	1.10	384	3	1.10	386
54.77	4	1.10	384	4	1.10	383	4	1.10	384	4	1.10	386
78.57	5	1.00	384	5	1.05	382	5	1.00	383	5	1.00	385
87.95	6	0.98	384	6	0.98	382	6	0.98	382	6	0.99	384

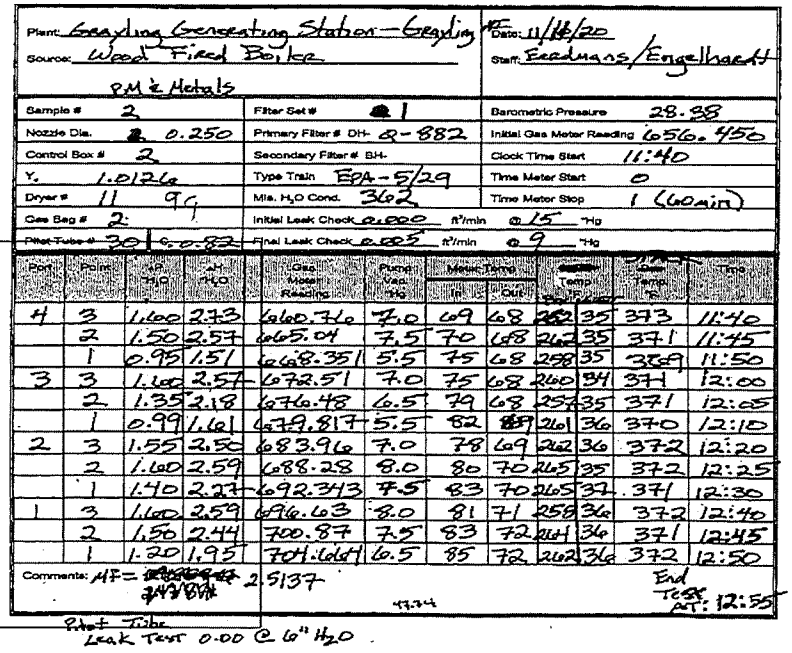
Potential Timing or Port Bias

2020 ROP

Non-RATA Runs ~75 min (sample ~5 min)

ΔP = 0.95 to **1.60** in H_2O (PM/Metals R2)

Velocity fastest in middle, slow near duct walls in all ROP runs



Plant: Grayling Generating Station – Grayling Date: 11/18/20
Source: Wood Fired Boiler Staff: Eeedmans/Engelhaedt
PM & Metals

Sample # 2			Filter Set # 1			Barometric Pressure 28.88						
Nozzle Dia. 0.250			Primary Filter # DH- Q-882			Initial Gas Meter Reading 6656.450						
Control Box # 2			Secondary Filter # BH-			Clock Time Start 11:40						
Y. 1.012			Type Train EPA-5/29			Time Meter Start 0						
Dryer # 11 9			Mis. H_2O Cond. 362			Time Meter Stop 1 (60 min)						
Gas Bag # 2			Initial Leak Check 0.000 ft³/min @ 15 "Hg									
Pitot Tube # 30	C_p 0.83		Final Leak Check 0.005 ft³/min @ 9 "Hg									
Port	Point	ΔP "H_2O	ΔH "H_2O	Gas Meter Reading	Pump Vac. "Hg	Meter Temp In	Meter Temp Out	Stack Temp °F	Box Temp °F	Temp °F	Time
4	3	1.600	2.73	6660.76	7.0	69	68	252	35	373	11:40
	2	1.50	2.57	665.04	7.5	70	68	262	35	371	11:45
	1	0.95	1.51	668.351	5.5	75	68	258	35	369	11:50
3	3	1.60	2.57	672.51	7.0	75	68	260	34	371	12:00
	2	1.35	2.18	676.48	6.5	79	68	256	35	371	12:05
	1	0.99	1.61	679.817	5.5	82	69	261	36	370	12:10
2	3	1.55	2.50	683.96	7.0	78	69	262	36	372	12:20
	2	1.60	2.59	688.28	8.0	80	70	265	35	372	12:25
	1	1.40	2.27	692.343	7.5	83	70	265	37	371	12:30
1	3	1.600	2.59	696.63	8.0	81	71	258	36	372	12:40
	2	1.50	2.44	700.87	7.5	83	72	264	36	371	12:45
	1	1.20	1.95	704.664	6.5	85	72	262	36	372	12:50

Comments: MF = 3.0014342 2.5137 End Test AT: 12:55

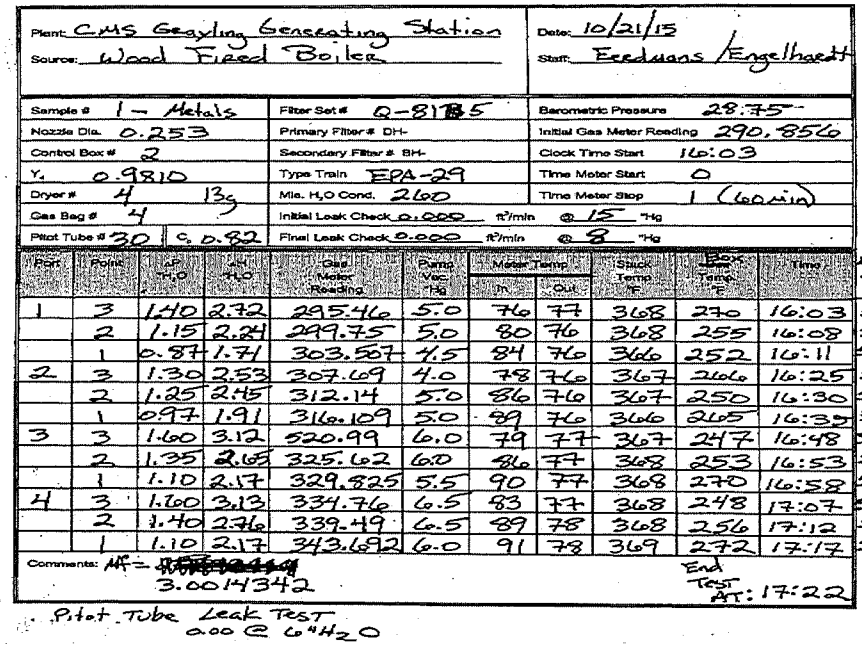
Pitot Tube Leak Test 0.00 @ 6" H_2O

2015 ROP

Non-RATA Runs ~75 min (sample ~5 min)

ΔP = 0.87 to 1.60 in H_2O (PM/Metals R1)

Same type of pressure distribution as 2020, except in 2015, GGS had cross stack transducers



Plant: CMS Grayling Generating Station Date: 10/21/15
Source: Wood Fired Boiler Staff: Eeedmans/Engelhaedt

Sample # 1 – Metals			Filter Set # Q-81[illegible]5			Barometric Pressure 28.75						
Nozzle Dia. 0.253			Primary Filter # DH-			Initial Gas Meter Reading 290.856						
Control Box # 2			Secondary Filter # BH-			Clock Time Start 16:03						
Y. 0.9810			Type Train EPA-29			Time Meter Start 0						
Dryer # 4 13			Mis. H_2O Cond. 260			Time Meter Stop 1 (60 min)						
Gas Bag # 4			Initial Leak Check 0.000 ft³/min @ 15 "Hg									
Pitot Tube # 30	C_p 0.82		Final Leak Check 0.000 ft³/min @ 8 "Hg									
Port	Point	ΔP "H_2O	ΔH "H_2O	Gas Meter Reading	Pump Vac. "Hg	Meter Temp In	Meter Temp Out	Stack Temp °F	Box Temp °F	Temp °F	Time
1	3	1.40	2.72	295.46	5.0	76	77	368	270		16:03
	2	1.15	2.24	299.75	5.0	80	76	368	255		16:08
	1	0.87	1.71	303.507	4.5	84	76	366	252		16:11
2	3	1.30	2.53	307.69	4.0	78	76	367	2066		16:25
	2	1.25	2.45	312.14	5.0	86	76	367	250		16:30
	1	0.97	1.91	316.109	5.0	89	76	366	2065		16:35
3	3	1.60	3.12	320.99	6.0	79	77	367	247		16:48
	2	1.35	2.68	325.62	6.0	86	77	368	253		16:53
	1	1.10	2.17	329.825	5.5	90	77	368	270		16:58
4	3	1.60	3.13	334.76	6.5	83	77	368	248		17:07
	2	1.40	2.76	339.49	6.5	89	78	368	256		17:12
	1	1.10	2.17	343.692	6.0	91	78	369	272		17:17

Comments: MF = 3.0014342 End Test AT: 17:22

Pitot Tube Leak Test 0.00 @ 6" H_2O

Other Considerations

- Pitot mis-alignment during non-RATA traverses? Most likely would not result in that high of an error - more likely 3-7%.

- Difference in excess air from 11/10 (20%) vs. 11/11-11/12 (27-29%) could have changed flow dynamic in the stack causing different velocities captured in a M5 traverse vs a "short path" CEMS (see slide 3).

- Plugging of the Pitot tips or moisture in the Pitot lines? This is possible with "poor" combustion and the high levels of moisture that were observed, and could cause higher velocity measurements.

Conclusion

GGS believes that the RATA and the ROP testing were successful on their own merit according to the prescribed test methods. After fixing air in-leakage from the primary air heater in 2017, the replacement flow CEMS has consistently showed acceptable agreement with the RM2 data, and the CEMS/RM data for 2020 was consistent with the prior data for similar loads.

Any number or all of described issues combined could have caused the difference in the RM flowrates between the ROP test and the RATA test. They are different methods; however, both RM2 and RM5 traverse the stack – vs. the CEM, that has a short/fixed path.

The boiler obviously had operational issues due to degraded fuel and operators were battling to keep a steady high load for the flow RATA and the ROP test. This may have caused unusual stack flow path conditions. Due to these issues, the RM5 flow data may exhibited a "high bias", causing mass loading emission rates to be conservatively higher; however still in compliance with ROP limits.

GGS has scheduled the next RATA for week of April 26th.