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Mr. Randy Matty, P.E.
Air Management Engineer
Wisconsin Department of Natural Resources
2984 Shawano Ave.
Green Bay, WI 54313-6727

October 13, 2014

RE: Boiler B28 and B09 Stack Test Reports, Report No. 4784C supplemental data

Dear Mr. Matty:

Enclosed are two copies of the Boiler Stack Test Operating Data missing from the stack test Report No. 4784C, dated October 7, 2014 previously submitted to the Department. Please insert this data at the end of the provided reports and we apologize for the inconvenience.

If you have any questions regarding the stack test report, or require additional information, please contact me.

Sincerely,

Thomas E. Reed, P.E.
Environmental Engineer
Manitowoc Public Utilities
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Brian Fassbender – MPU
Tim Harding – MPU
Scott Karbon – MPU
Adam Becker – MPU

Source: Y:\Group File Folders\Reed\1-Tom Reed\Air\stack testing\2014 B28 & B09 Test\September Retest\Test Report\WDNR stack test report cover letter for test supplement.docx

File: PowerPlant/Regulatory - Environmental/Correspondence/WDNR
Document: 2014-10-13 (WDNR) B8 and B9 Stack Test Report Cover Letter for test supplement

10/13/2014

Boiler Stack Test Operating Data

Date: September 9, 2014	Boiler: B-28	Recorded by: Tom Reed & Adam Becker		
Test: Total PM	Run: No. 1	Testing by: Airtech Environmental Services, Inc.		
Methods: USEPA Methods 1, 2, 3, 4, 5, 202, 40CFR Part 60, Appendix A				

Parameter	Start	Mid	Stop	AVG.	Net
Time	8:02	9:04	10:18		**2:16**
Coal Scale B (lbs.)	614051		640388		**26,337**
Paper Scale A (lbs.)	894932		921312		**26,380**
Pounds of Fuel Used					**52,717**
Pounds of fuel per hour					**23,258**
Limestone Scale (lbs)	685530		694515		**8,985**
Steam integrator(Klbs)	715.71		1165.86		**450.15**
Limestone (Klbs/hr)	3.8	4.1	3.7	3.9	
Steam Flow (Klbs/hr)	198.1	194.2	194.2		**198.6**
Percent of MCR	99%	97%	97%		**99%**
Feeder B (Klbs/hour)	10.83	10.80	10.81	10.81	
Feeder A (Klbs/hour)	10.80	10.84	10.82	10.82	
Percent Bio (%)	49.9%	50.1%	50.0%		**50.0%**
Feed Water (Klbs/hr)	188.3	181.9	185.1	185.1	
Differential freeboard	6.53	7.16	6.44	6.71	
Bed Temperature	1605	1611	1605	1607	
Bed Level	14.23	14.19	15.20	14.54	
Total Air Flow (Klb/hr)	223.0	230.7	220.4	224.7	
PA Air Flow (Klb/hr)	134	145	135	138	
Overfire Air (Klbs/hr)	55.2	53.2	53.8	54.1	
Bag house dp (inches)	4.79	5.04	5.00	4.94	
Opacity (%)	0.5	0.5	0.1	0.4	
Oxygen (%)	3.3	2.9	3.0	3.1	
CO (%)	58	33	33	41	
Net MW	19.41	19.77	19.74	19.64	
Gross MWh Generation	83973.0		84023.9		**50.90**
Avg. Production MWh/hr					**22.46**
MPU Fireman:	Greg Schmidt				

NOTES: 1. Steam integrator value from Trend #5,(TST). B8 graphic is 8.

2. Turbine #5 online. B10 is On OFF and B9 is providing steam sales with controlled extraction.

Boiler Stack Test Operating Data

Date: September 9, 2014	Boiler: B-28	Recorded by: Adam Becker		
Test: Total PM	Run: No. 2	Testing by: Airtech Environmental Services, Inc.		
Methods: USEPA Methods 1, 2, 3, 4, 5, 202, 40CFR Part 60, Appendix A				

Parameter	Start	Mid	Stop	AVG.	Net
Time	10:45	11:46	12:57		**2:12**
Coal Scale B (lbs.)	645951		670940		**24,989**
Paper Scale A (lbs.)	926880		951870		**24,990**
Pounds of Fuel Used					**49,979**
Pounds of fuel per hour					**22,718**
Limestone Scale (lbs)	5696199		5703340		**7,141**
Steam integrator(Klbs)	1250.68		1679.12		**428.44**
Limestone (Klbs/hr)	3.1	3.2	3.4	3.2	
Steam Flow (Klbs/hr)	192.2	191.2	193.2		**194.7**
Percent of MCR	96%	96%	97%		**97%**
Feeder B (Klbs/hour)	10.80	10.79	10.81	10.80	
Feeder A (Klbs/hour)	10.86	10.87	10.86	10.86	
Percent Bio (%)	50.1%	50.2%	50.1%		**50.0%**
Feed Water (Klbs/hr)	183.4	182.8	185.2	183.8	
Differential freeboard	6.25	6.95	6.39	6.53	
Bed Temperature	1599	1590	1594	1594	
Bed Level	15.30	15.00	15.44	15.25	
Total Air Flow (Klb/hr)	223.2	217.9	221.6	220.9	
PA Air Flow (Klb/hr)	138	137	135	137	
Overfire Air (Klbs/hr)	55.2	49.0	53.3	52.5	
Bag house dp (inches)	4.92	4.73	4.74	4.80	
Opacity (%)	0.3	0.3	0.0	0.2	
Oxygen (%)	3.2	3.0	3.0	3.1	
CO (%)	33	33	30	32	
Net MW	19.35	19.29	19.47	19.37	
Gross MWh Generation	84034.5		84081.8		**47.30**
Avg. Production MWh/hr					**21.50**
MPU Fireman:	Greg Schmidt				

NOTES: 1. Steam integrator value from Trend #5,(TST). B8 graphic is 8.

2. Turbine #5 online. B10 is On OFF and B9 is providing steam sales with controlled extraction.

Boiler Stack Test Operating Data

Date: September 9, 2014	Boiler: B-28	Recorded by: Adam Becker		
Test: Total PM	Run: No. 3	Testing by: Airtech Environmental Services, Inc.		
Methods: USEPA Methods 1, 2, 3, 4, 5, 202, 40CFR Part 60, Appendix A				

Parameter	Start	Mid	Stop	AVG.	Net
Time	13:20	14:19	15:31		**2:11**
Coal Scale B (lbs.)	675120		701385		**26,265**
Paper Scale A (lbs.)	956080		982390		**26,310**
Pounds of Fuel Used					**52,575**
Pounds of fuel per hour					**24,080**
Limestone Scale (lbs)	704595		712462		**7,867**
Steam integrator(Klbs)	1746.68		2189.23		**442.55**
Limestone (Klbs/hr)	3.1	3.7	3.5	3.4	
Steam Flow (Klbs/hr)	191.4	186.9	189.5		**202.7**
Percent of MCR	96%	93%	95%		**101%**
Feeder B (Klbs/hour)	10.82	10.79	10.81	10.81	
Feeder A (Klbs/hour)	10.80	10.92	10.91	10.88	
Percent Bio (%)	50.0%	50.3%	50.2%		**50.0%**
Feed Water (Klbs/hr)	181.8	177.6	179.1	179.5	
Differential freeboard	7.05	7.20	6.96	7.07	
Bed Temperature	1592	1592	1592	1592	
Bed Level	14.22	14.18	13.99	14.13	
Total Air Flow (Klb/hr)	221.3	226.0	223.9	223.7	
PA Air Flow (Klb/hr)	137	144	145	142	
Overfire Air (Klbs/hr)	51.7	48.6	49.0	49.8	
Bag house dp (inches)	4.78	5.07	4.70	4.85	
Opacity (%)	0.0	0.2	0.2	0.1	
Oxygen (%)	2.8	2.8	3.1	2.9	
CO (%)	31	34	30	32	
Net MW	19.19	18.96	19.09	19.08	
Gross MWh Generation	84089.8		84139.7		**49.90**
Avg. Production MWh/hr					**22.85**
MPU Fireman:	Greg Schmidt and Derrick Buchner				

NOTES: 1. Steam integrator value from Trend #5,(TST). B8 graphic is 8.

2. Turbine #5 online. B10 is On OFF and B9 is providing steam sales with controlled extraction.

Boiler Stack Test Operating Data

Date: September 10, 2014	Boiler: B-09	Recorded by: Tom Reed & Adam Becker		
Test: Total PM	Run: No. 1	Testing by: Airtech Environmental Services, Inc.		
Methods: USEPA Methods 1, 2, 3, 4, 5, 202, 40CFR Part 60, Appendix A				

Parameter	Start	Mid	Stop	Avg.	Net
Time	7:56	8:52	10:14		**2:18**
Coal Scale (A.)	---		---		**37,357**
Coal Scale (B.)	537302		575168		**37,066**
Coal Scale (C.)	754958		792606		**37,648**
Total Pounds of Fuel					**112,071**
Pounds of fuel per hour					**48,376**
Limestone (Klbs/hr)	9.9	11.7	11.9	11.2	
Limestone Scale (lbs)	739391		765513		**26,122**
MW Totals (MWh)	983200		983335		**135**
Output (MWh-gross)	58.38	58.25	58.33	58.32	
Output (MWh-net)	53.84	53.44	53.86	53.71	
Steam Flow (Klbs/hour)	463	458	461	461	
Percent of MCR	97%	96%	97%	97%	
Feed Water (Klbs/hr)	444	442	442	443	
Fuel Master (Klbs/hr)	48.4	48.4	48.4	48.4	
BARI (Klbs/hr)	--	--	--	#DIV/0!	
Differential Freeboard	7.2	5.9	5.8	6.3	
Bed Temperature (F)	1599	1604	1611	1605	
Bed Depth (in.)	22.0	20.0	22.5	21.5	
PA Flow (Klbs/hr)	350	358	355	354	
SA Flow (Klbs/hr)	205.6	201.6	205.2	204.1	
Oxygen (%)	3.13	3.30	3.12	3.18	
Opacity (%)	0	0	0	0	
Bag house (Dp inches)	3.6	3.6	4.4	3.9	
Exit gas Temperature	327	323	324	325	
Furnace Pressure (in.)	-1.43	-1.76	-1.54	-1.58	
Soot Blowing	--		--		
Ammonia Flow	--	--	--	#DIV/0!	
MPU Fireman	Charlie Wagner				

NOTES: B9 is found on graphic 103, turbine is on graphic 140.

B9 suppling all extraction steam, the Diesel was not online.

Boiler Stack Test Operating Data

Date: September 10, 2014	Boiler: B-09	Recorded by: Tom Reed & Adam Becker		
Test: Total PM	Run: No. 2	Testing by: Airtech Environmental Services, Inc.		
Methods: USEPA Methods 1, 2, 3, 4, 5, 202, 40CFR Part 60, Appendix A				

Parameter	Start	Mid	Stop	Avg.	Net
Time	10:43	11:34	13:00		**2:17**
Coal Scale (A.)	---		---		**37,257**
Coal Scale (B.)	583155		620816		**37,661**
Coal Scale (C.)	800505		837958		**37,453**
Total Pounds of Fuel					**112,371**
Pounds of fuel per hour					**49,214**
Limestone (Klbs/hr)	11.8	13.3	13.9	13.0	
Limestone Scale (lbs)	771260		800318		**29,058**
MW Totals (MWh)	983363		983499		**136**
Output (MWh-gross)	59.25	58.85	59.98	59.36	
Output (MWh-net)	54.64	54.36	55.61	54.87	
Steam Flow (Klbs/hour)	468	469	471	469	
Percent of MCR	99%	99%	99%	99%	
Feed Water (Klbs/hr)	447	450	451	449	
Fuel Master (Klbs/hr)	49.4	49.5	48.8	49.2	
BARI (Klbs/hr)	--	--	--	#DIV/0!	
Differential Freeboard	6.5	5.35	5.4	5.8	
Bed Temperature (F)	1616	1616	1626	1619	
Bed Depth (in.)	17.2	17.5	18.2	17.6	
PA Flow (Klbs/hr)	370	366	360	365	
SA Flow (Klbs/hr)	206.1	202.6	218.2	209.0	
Oxygen (%)	3.21	3.14	3.03	3.13	
Opacity (%)	0	0	0	0	
Bag house (Dp inches)	3.4	4.1	3.5	3.7	
Exit gas Temperature	325	325	325	325	
Furnace Pressure (in.)	-1.25	-1.64	-1.39	-1.43	
Soot Blowing	--		--		
Ammonia Flow	--	--	--	#DIV/0!	
MPU Fireman	Charlie Wagner				

NOTES: B9 is found on graphic 103, turbine is on graphic 140.

B9 suppling all extraction steam, the Diesel was not online.

Boiler Stack Test Operating Data

Date: September 10, 2014	Boiler: B-09	Recorded by: Tom Reed & Adam Becker		
Test: Total PM	Run: No. 3	Testing by: Airtech Environmental Services, Inc.		
Methods: USEPA Methods 1, 2, 3, 4, 5, 202, 40CFR Part 60, Appendix A				

Parameter	Start	Mid	Stop	Avg.	Net
Time	13:29	14:33	15:39		**2:10**
Coal Scale (A.)	---		---		**35,183**
Coal Scale (B.)	628508		663616		**35,108**
Coal Scale (C.)	845603		880461		**34,858**
Total Pounds of Fuel					**105,149**
Pounds of fuel per hour					**48,530**
Limestone (Klbs/hr)	14.2	11.4	16.2	13.9	
Limestone Scale (lbs)	807077		833100		**26,023**
MW Totals (MWh)	983527		983654		**127**
Output (MWh-gross)	59.42	58.9	58.48	58.93	
Output (MWh-net)	54.71	54.2	54.12	54.34	
Steam Flow (Klbs/hour)	473	458	459	463	
Percent of MCR	100%	96%	97%	98%	
Feed Water (Klbs/hr)	450	439	436	442	
Fuel Master (Klbs/hr)	48.5	48.5	48.4	48.5	
BARI (Klbs/hr)	--	--	--	#DIV/0!	
Differential Freeboard	5.1	5.5	5.5	5.4	
Bed Temperature (F)	1631	1621	1621	1624	
Bed Depth (in.)	15.7	17.3	17.8	16.9	
PA Flow (Klbs/hr)	358	353	351	354	
SA Flow (Klbs/hr)	222.5	209.7	207.5	213.2	
Oxygen (%)	3.47	3.45	3.24	3.39	
Opacity (%)	0	0	0	0	
Bag house (Dp inches)	3.7	4.3	3.8	3.9	
Exit gas Temperature	324	312	314	317	
Furnace Pressure (in.)	-1.61	-1.39	-1.60	-1.53	
Soot Blowing	13:25		14:11		
Ammonia Flow	--	--	--	#DIV/0!	
MPU Fireman	Charlie Wagner and Derrick Buchner				

NOTES: B9 is found on graphic 103, turbine is on graphic 140.

B9 suppling all extraction steam, the Diesel was not online.