Attachment 1 – 11/2/18 0:54 and 1:00 Opacity

AVC Voltages

Dust Density Levels and Water Flow

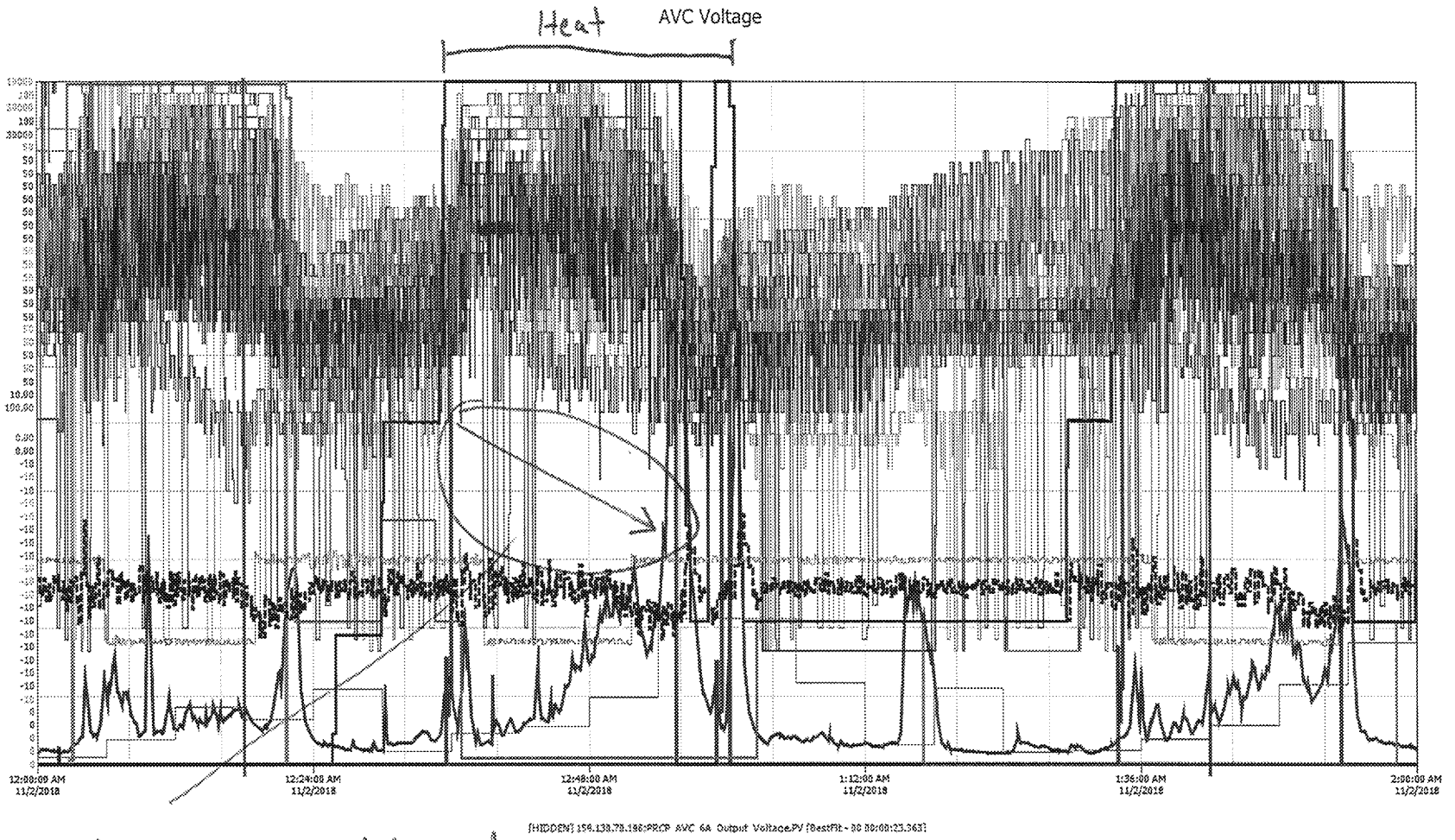
ESP Fan Amps and Position

BOF ESP Operations Shift Checklist

Check sheet for 6-Minute >15% Opacity

11/2/18 054 and 100 events

AVC Voltages



1.) Note AVC Voltages declining but none drop out completely
8C, 8D, 7E Out of Service - Not indicated on trend since shared fields are in service

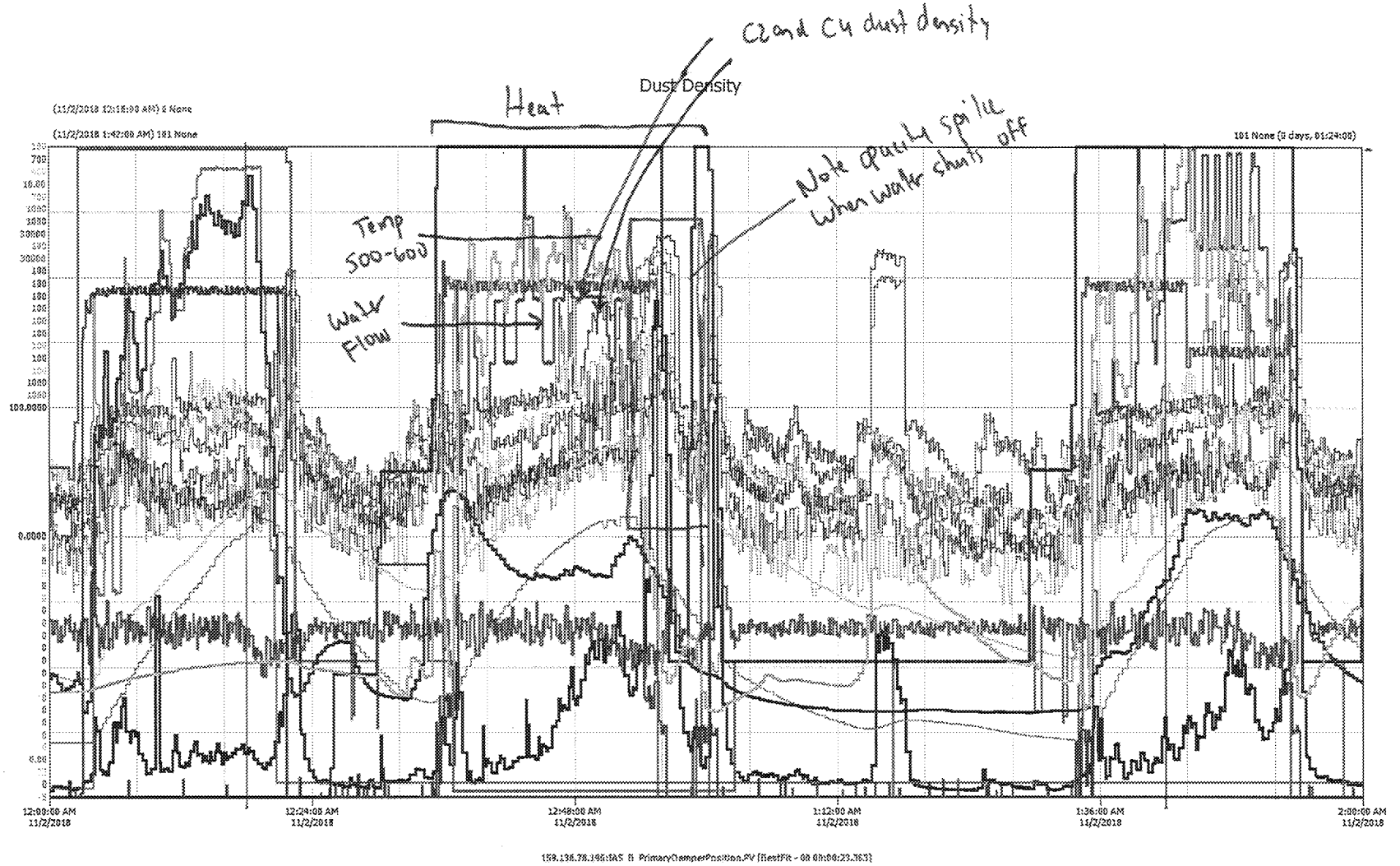
2.) Overall field performance indicative of external cause. Ambient condition very wet.

1/15/2019 1:49:22 PM
C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\AVC Voltage.aaTrend

ED_003040_00000097-00002

11/2/18 054 and 100 events

Dust Density Levels and Water Flow



1.) Temp profile steady. ~500-600° entire heat.

2.) Water flow off and on as needed.

3.) Conditioning a factor at end of heat. Temperature rapidly declines, All dust density levels spike

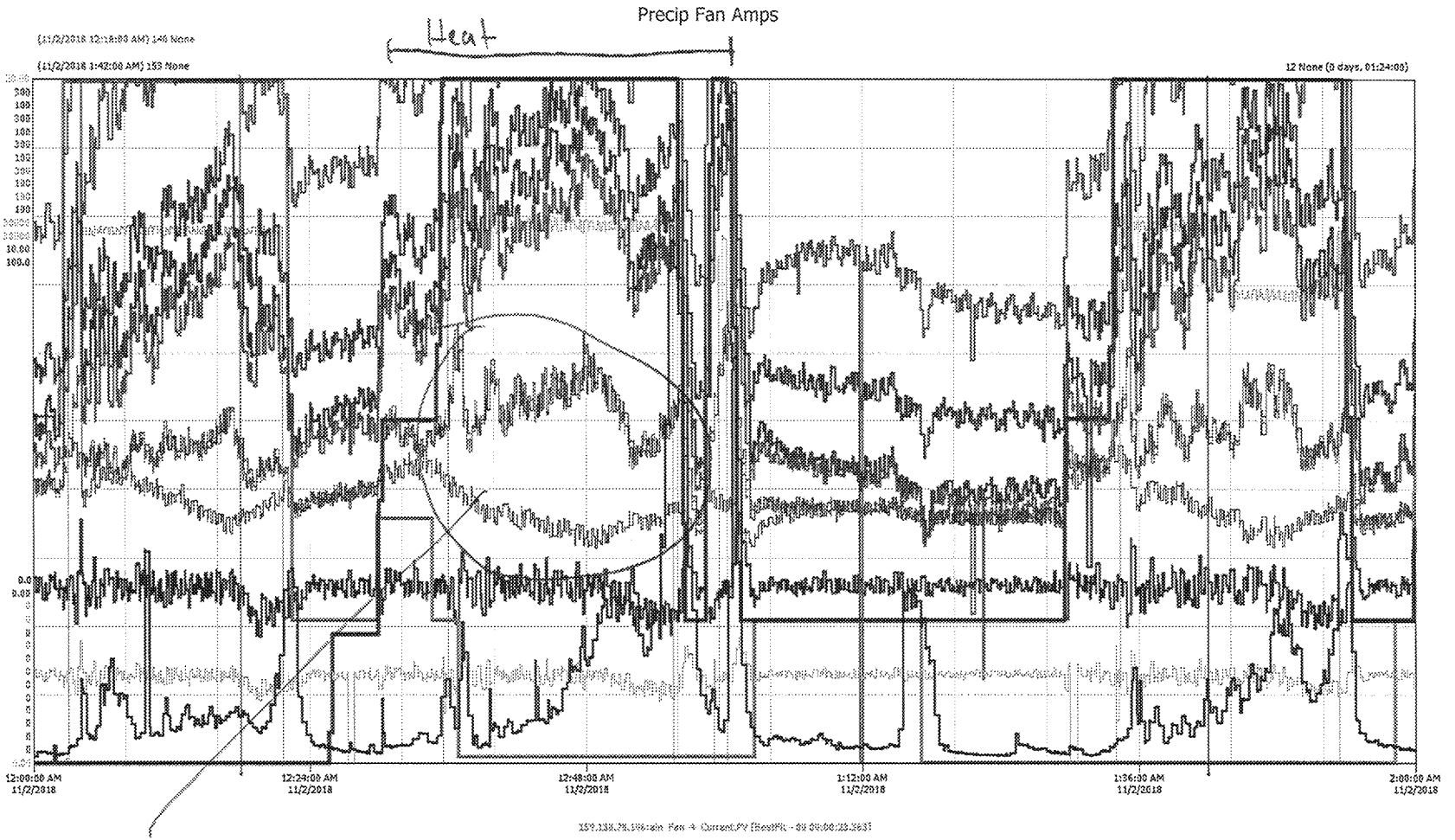
4.) C2 and C4 dust density spike suddenly. No Apparent cause, AUC's did not decline at this time

1/15/2019 1:59:42 PM

C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\Dust Density.aaTrend

ED_003040_00000097-00003

11/2/18 054 and 100 events
Precip Fan Amps and Position



1.) No Fan Amps go to zero → No fans shut off
2.) Dip in Amps and position → No malfunction; draft ramp in place

1/15/2019 1:58:50 PM
C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\Precip Fan Amps.aaTrend

ED_003040_00000097-00004

BOF ESP Operations Shift Checksheet

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requirements of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11-01-18	2000	AM/PM
Shift End:	11-02-18	0800	AM/PM

OPERATOR: LAFRAMBOISE

PAGE # 1

FILL OUT INFORMATION INSIDE THE BOX ONCE PER SHIFT

(Note if there are any "NO" answers, note in the corresponding "Comments" section when Maintenance was contacted and known follow up)

The items within this bold box are required by an air permit, MACT Plan or O&M Plan.

EQUIPMENT TO BE INSPECTED	Yes	No	COMMENTS
Verification Manometer Reads within +/- 0.2" Water Column to Digital Pressure Transmitter:	✓		BLUE TE YELLOW
Verify All Rappers Functioning: If "NO" note numbers Note: If "NO" call BOF Maintenance		✓	30,159,139,174,206,213, 35-41 89,93,95
Verify that the PCAMS is operating properly by checking the following items:	✓		
1) Is the computer on and functioning?	✓		
2) Is the Rapper program running?	✓		
3) Are the power levels fluctuating?	✓		
Are there any opacity/COMS alarms or faults on the LED display? If yes, note the code number and notify Supervisor.		✓	

ESP Outlet Louvers - NOTIFY SUPERVISOR if outlet louver is <40% open	1	2	3	4	5	6	7	8
Time: SOS % Open	48	40	40	45	45	35	47	40

North Side		South Side	
Empty	Full	Empty	Full
Over Flows			
#5 Empty	Full	Heavy	
#7 Empty	Full	Empty	Full

Use the space below for additional comments or alarms observed during the shift

Log Sheet - Nothing Unusual Noted

PO-FM-B2-81-04E-02
Rev. 08; 08/25/2016

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11/10/18	2000	AM/PM
Shift End:	11/02/18	0800	AM/PM

OPERATOR: LAFRAMBOISE

SUPERVISOR: GT

Page # 1

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O) Aim	ESP Draft Value (inches H2O) Actual	ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
2130	53379	22.73	GT	N	NA	NA	Y	2.2	2.0	NA	N	Y	Y	Y
2136	53379	20.86	GT	N	NA	1A, 3A, 6A	Y	2.2	2.2	NA	N	Y	Y	N
0059	53383	21.38	GT	N	NA	NA	Y	2.2	2.2	NA	N	Y	Y	Y
0100	53383	21.58	GT	N	NA	1A, 3A	Y	2.6	2.5	NA	N	Y	Y	N
0154	53384	17.83	GT	N	NA	1A, 3A, 6A	Y	2.6	2.5	NA	N	Y	Y	N
0230	53385	15.94	GT	N	NA	1A, 3A, 4A 6A	Y	2.6	2.6	NA	N	Y	Y	N
0554	53387	78.8	GT	N	NA	1A	Y	2.2	2.0	NA	N	Y	Y	Y
Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)														
0548	53387	30.1	GT	N	N/A	1A, 3A, 4A	Y	2.6	2.6	N/A	N	Y	Y	Y

059/100

ESP Operator Response Sheet → POR as Needed

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

ED_003040_00000097-00006

Attachment 2 – 11/3/18 0:30 Opacity

AVC Voltages

Dust Density Levels and Water Flow

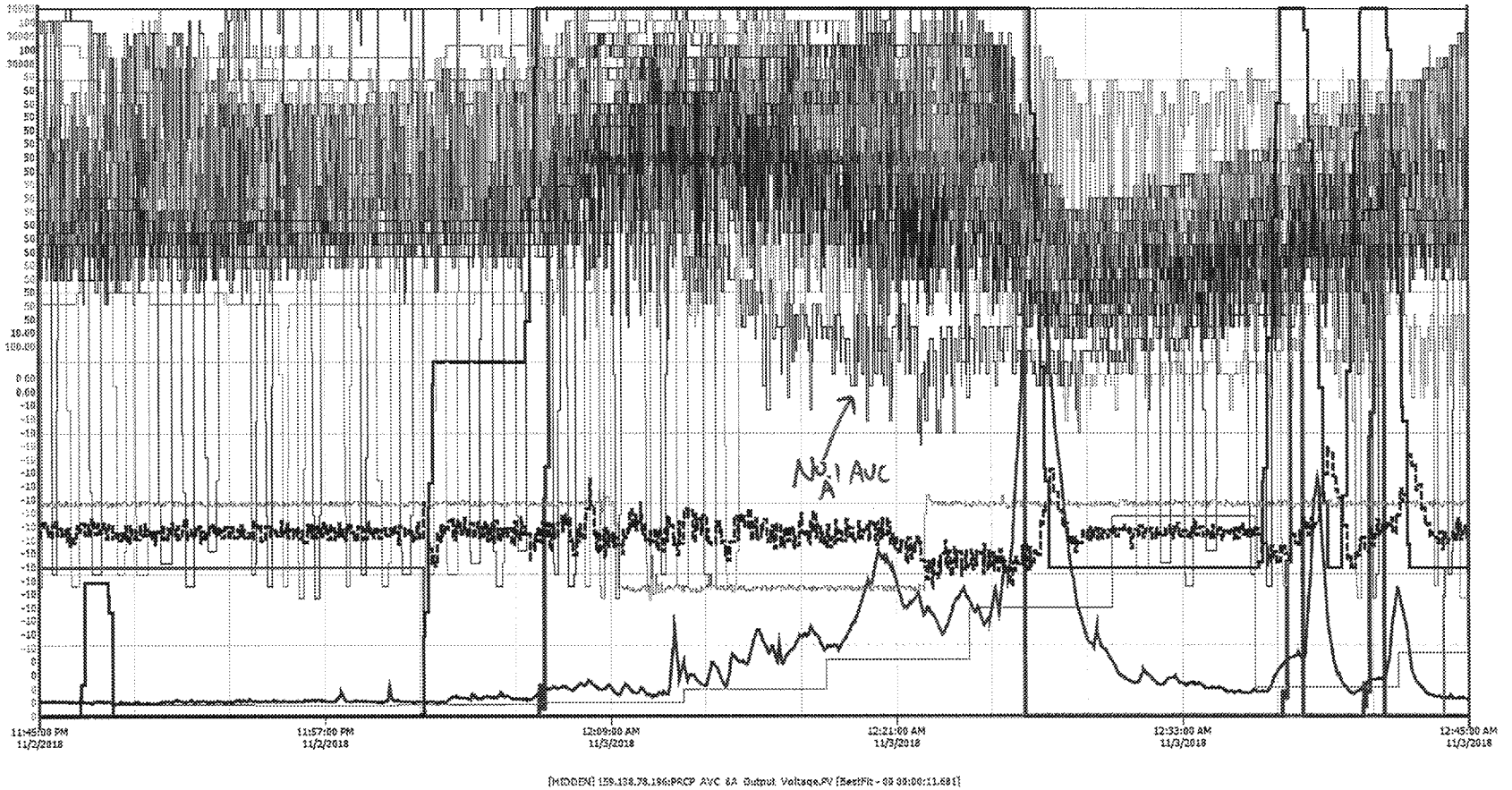
ESP Fan Amps and Position

BOF ESP Operations Shift Checklist

Check sheet for 6-Minute >15% Opacity

11/3/18 030AM (28.3%)
AVC Trends

AVC Voltage



1.) Note AVC's → 1A is Lower than others but does not go to Zero

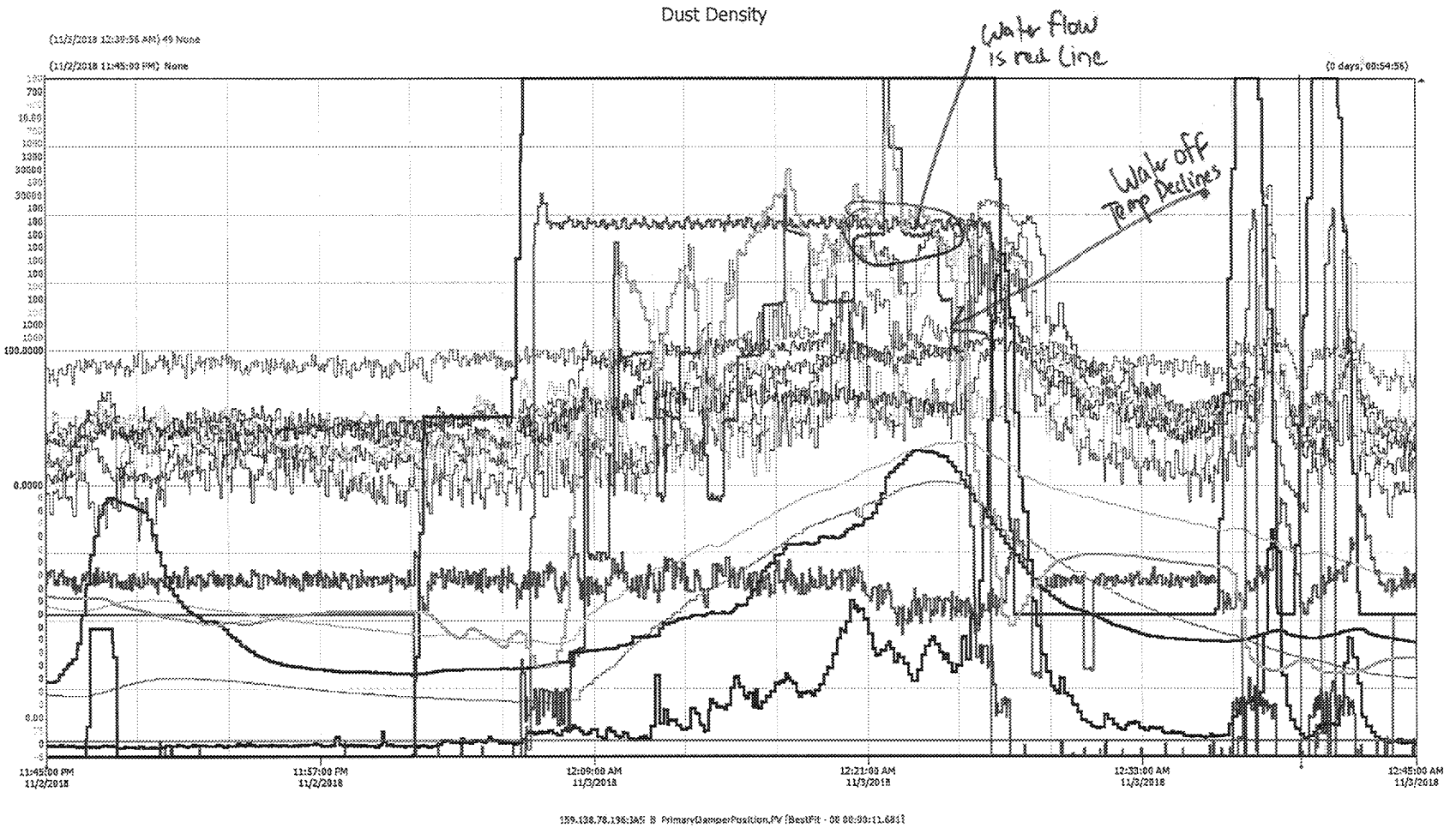
~~2.) Compartment 8 offline for maintenance~~

1/15/2019 2:21:24 PM
C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\AVC Voltage.aaTrend

ED_003040_00000097-00008

11/3/18 030AM (28.3%)

Dust Density and Water Flow



1.) Water sprays turning on and off as required

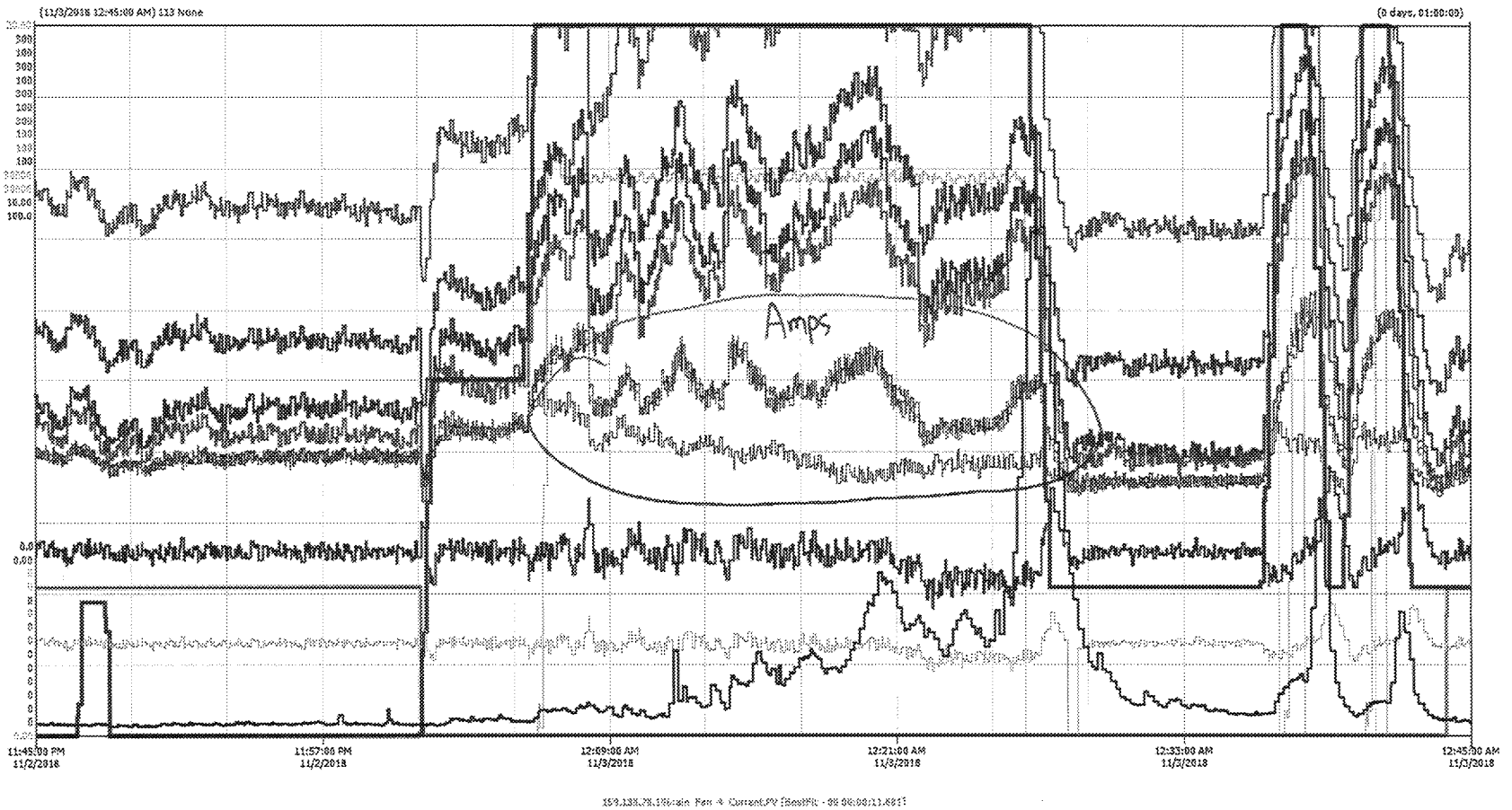
2.) Temp declines, Water off (greatly reduced), Opacity spikes

1/15/2019 2:22:38 PM

C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\Dust Density.aaTrend

11/3/18 030AM (28.3/.)
ESP Fan Parameters

Precip Fan Amps



1.) Fan Amps ok → No fans tripped on or off during heat
2.) Fan dampers moving to maintain draft, ramp in place, nothing abnormal noted

1/15/2019 2:23:33 PM
C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\Precip Fan Amps.aaTrend

ED_003040_00000097-00010

BOF ESP Operations Shift Checksheet

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requirements of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not acceptable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11-2-18	8	AM/PM
Shift End:	11-3-18	8	AM/PM

OPERATOR: PowEll

PAGE # 1

FILL OUT INFORMATION INSIDE THE BOX ONCE PER SHIFT
(Note if there are any "NO" answers, note in the corresponding "Comments" section when Maintenance was contacted and known follow up)

The items within this bold box are required by an air permit, MACT Plan or O&M Plan.

EQUIPMENT TO BE INSPECTED	Yes	No	COMMENTS
Verification Manometer Reads within +/- 0.2" Water Column to Digital Pressure Transmitter:	✓		
Verify All Rappers Functioning: If "NO" note numbers Note: If "NO" call BOF Maintenance		✓	206-213-174-167-168-20 35thru 41
Verify that the PCAMS is operating properly by checking the following items:			
1) Is the computer on and functioning?	✓		
2) Is the Rapper program running?	✓		
3) Are the power levels fluctuating?	✓		
Are there any opacity/COMS alarms or faults on the LED display? If yes, note the code number and notify Supervisor.		✓	

ESP Outlet Louvers - NOTIFY SUPERVISOR if outlet louver is <45% open	1	2	3	4	5	6	7	8
Time: SOS % Open	48	40	40	45	45	38	47	40

North Side		South Side	
Empty	Full	Empty	Full
Over Flows			
#5 Empty	Full	Heavy	
#7 Empty	Full	Empty	Full

Use the space below for additional comments or alarms observed during the shift

Nothing unusual noted

PO-FM-B2-81-04E-02
Rev. 08; 08/25/2016

Nothing Unusual Noted

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR
Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11-2-18	8	AM/PM
Shift End:	11-3-18	8	AM/PM

OPERATOR: Powell

SUPERVISOR: George

Page # 1

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (If "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (Inches H2O) Aim	ESP Draft Value (Inches H2O) Actual	ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y / N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
201 030 ~~0000~~	53398	28%	G	N	N/A	N/A	N	2.6	2.2	N/A	N	Y	Y	Y
206 311 ~~0141~~	53403	17.5%	G	N	N/A	3A	Y	2.6	2.6	N/A	N	Y	Y	Y
336 311 ~~0321~~	53402	18%	G	N	N/A	3A 6A	Y	2.3	2.1	N/A	N	Y	Y	Y
342	53402	19%	G	N	N/A	3A, 6A	Y	2.2	2.2	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

Attachment 3 – 11/10/18 5:36 Opacity

AVC Voltages

Dust Density Levels and Water Flow

ESP Fan Amps and Position

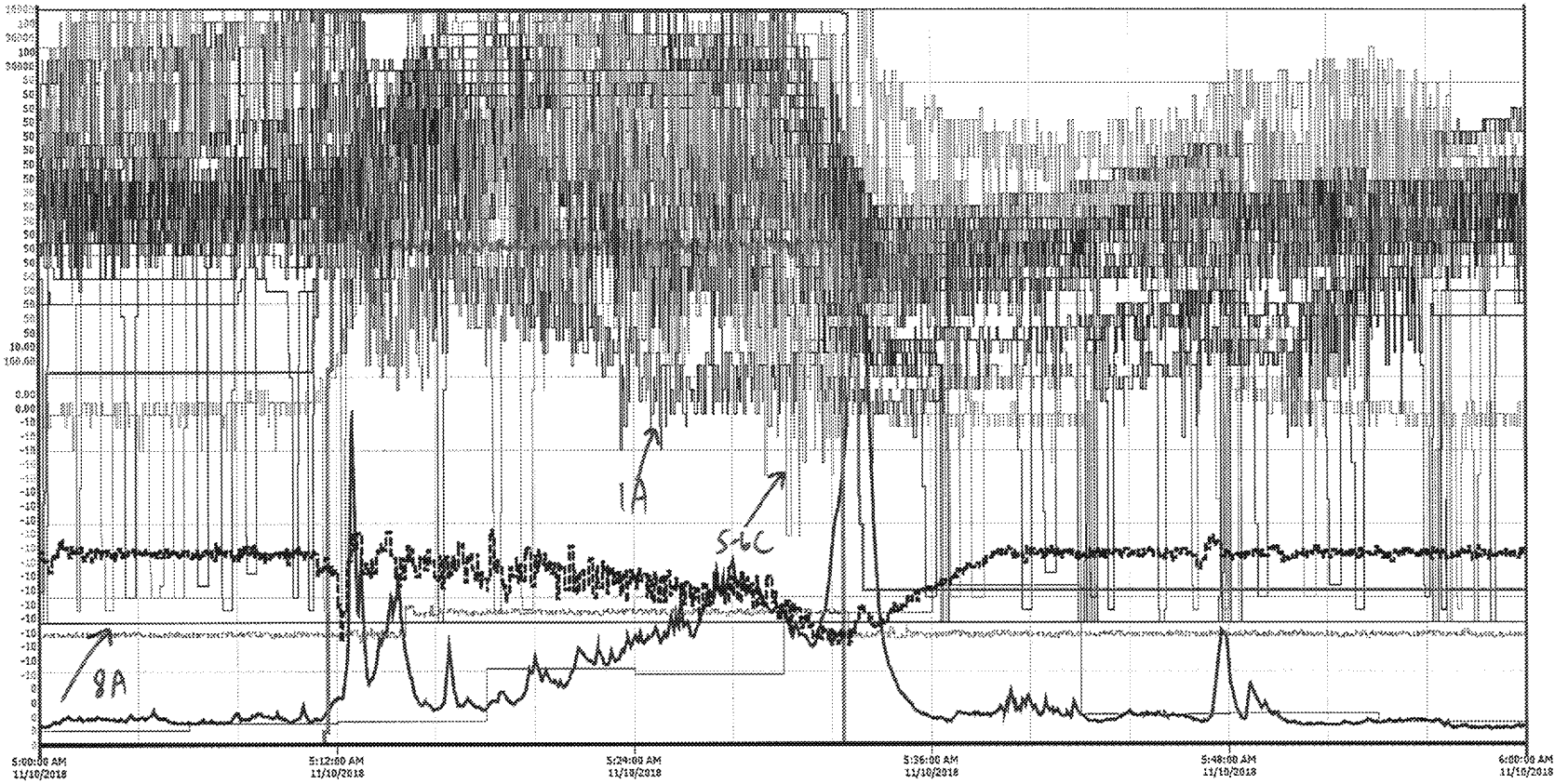
BOF ESP Operations Shift Checklist

Check sheet for 6-Minute >15% Opacity

11/10/18 536AM (2167)

AVC Voltages

AVC Voltage



[MIDDSN] 159.138.78.196:PRCP AVC 8A Output Voltage.PV [BestFit - 00 00:00:11.681]

1.) Compartment 8 offline for maintenance

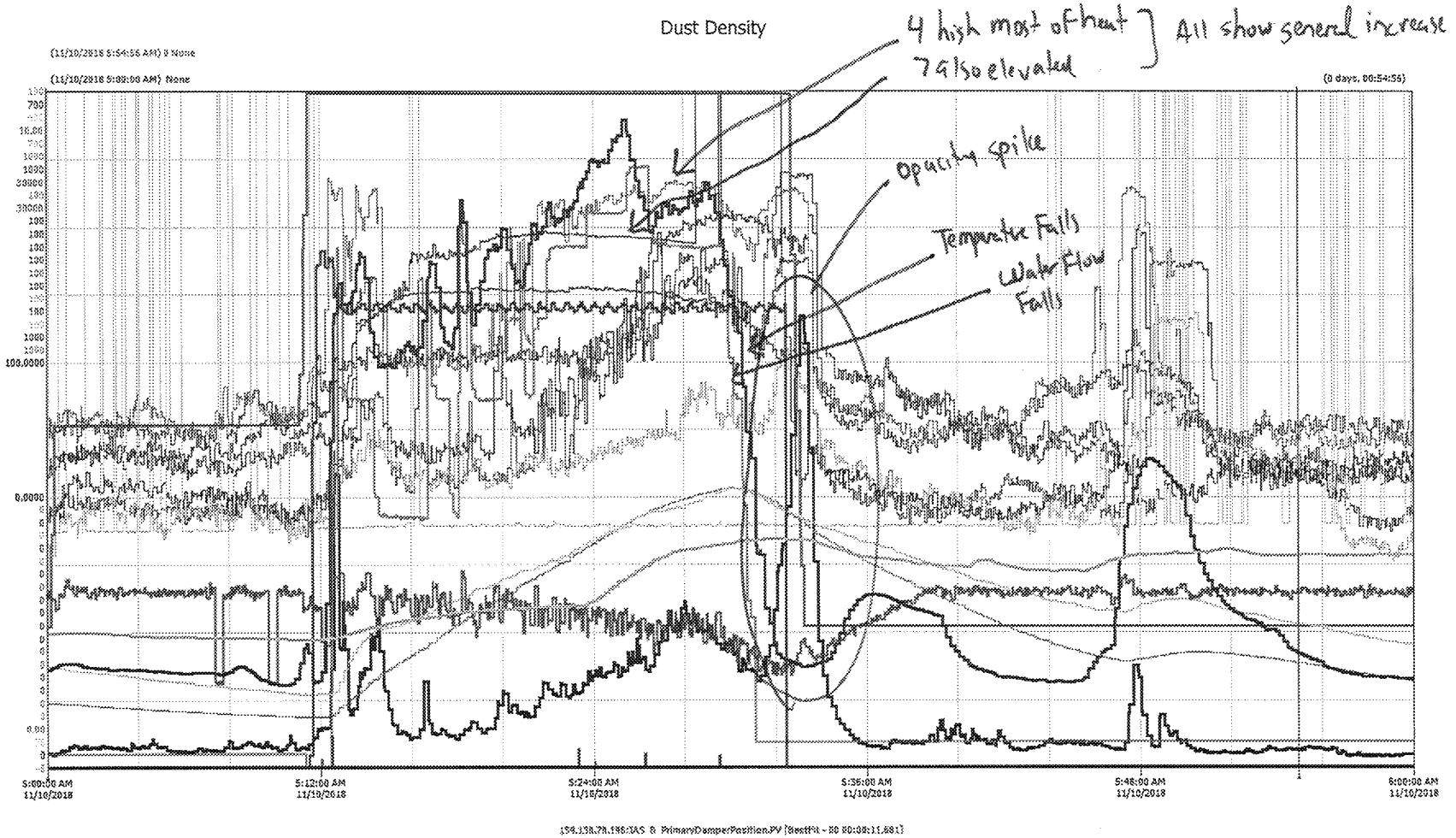
2.) 1A Low but does not bottom out, 5-6C lower at end of heat

1/15/2019 2:43:29 PM

C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\AVC Voltage.aaTrend

ED_003040_00000097-00014

11/10/18 536AM (21.6%)
Dust Density and Water Flow



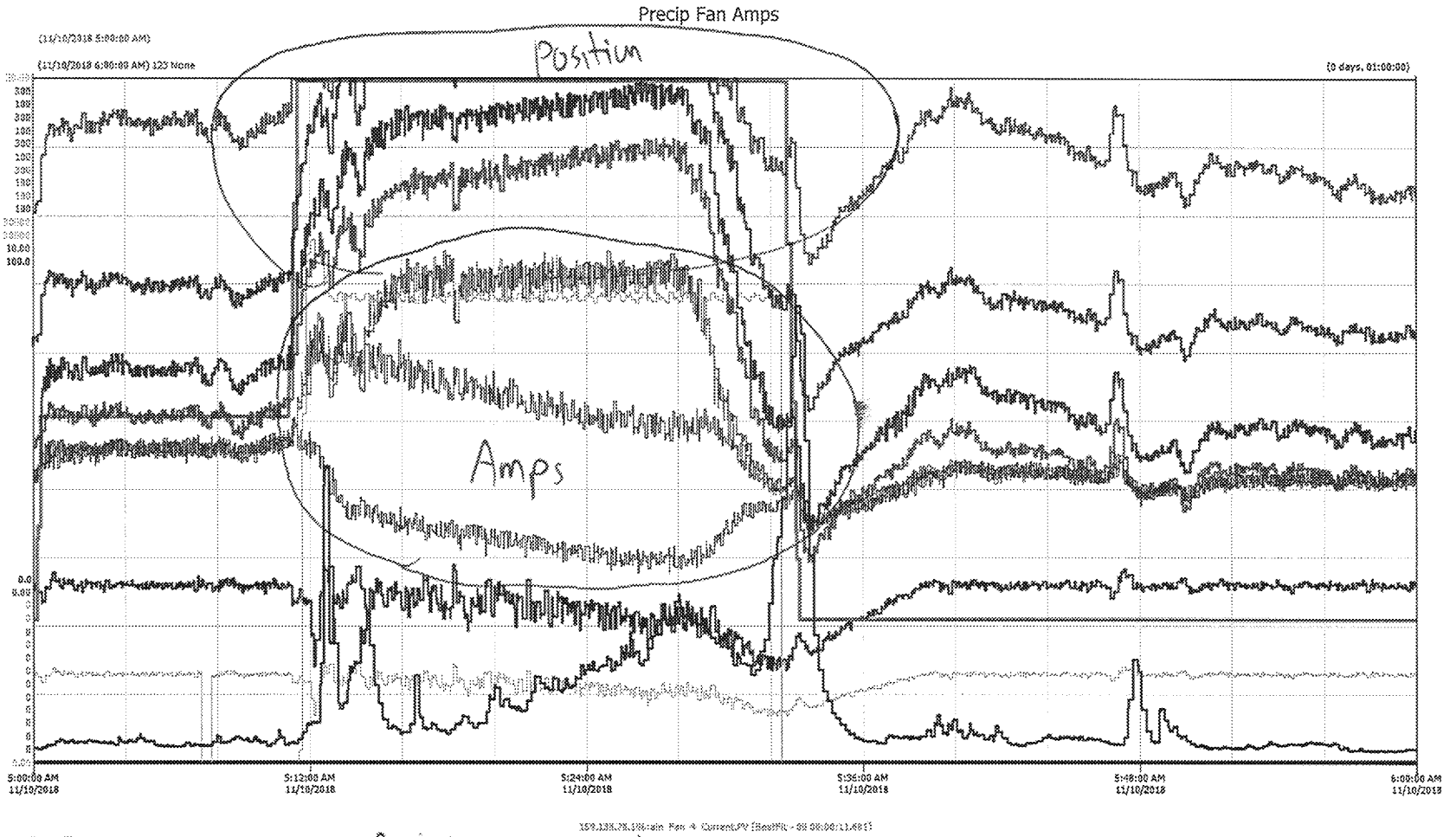
1.) Water sprays turning on and off as required
2.) Temp declines, water off (greatly reduced), all dust density spike with opacity
→ indicative on conditioning problem

1/15/2019 2:44:41 PM
C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\Dust Density.aaTrend

ED_003040_00000097-00015

11/10/18 536AM (21.6/1)

ESP Fan Parameters



1.) Fan Amps ok → No fans tripoff during heat

2.) Fan dampers moving to maintain draft → so wide open due to compartment being down
Start to close when draft ramps down.
Nothing abnormal to cause opacity spike

1/15/2019 2:45:27 PM
C:\Users\dpate\Desktop\Morning Data Analysis\WW\COMS trends\Investigation Trends\Precip Fan Amps.aaTrend

ED_003040_00000097-00016

BOF ESP Operations Shift Checksheet

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11/9	2000	AM/PM
Shift End:	11/10	800	AM/PM

OPERATOR: Powell

PAGE # 1

FILL OUT INFORMATION INSIDE THE BOX ONCE PER SHIFT

(Note if there are any "NO" answers, note in the corresponding "Comments" section when Maintenance was contacted and known follow up)

The items within this bold box are required by an air permit, MACT Plan or O&M Plan.

EQUIPMENT TO BE INSPECTED	Yes	No	COMMENTS
Verification Manometer Reads within +/- 0.2" Water Column to Digital Pressure Transmitter:	✓		
Verify All Rappers Functioning: If "NO" note numbers Note: If "NO" call BOF Maintenance		✓	C-8 down
Verify that the PCAMS is operating properly by checking the following items: 1) Is the computer on and functioning?	✓		
2) Is the Rapper program running?	✓		
3) Are the power levels fluctuating?	✓		
Are there any opacity/COMS alarms or faults on the LED display? If yes, note the code number and notify Supervisor.		✓	

ESP Outlet Louvers - NOTIFY SUPERVISOR If outlet louver is <40% open	1	2	3	4	5	6	7	8
Time: SOS % Open	30	35	40	40	40	40	45	Ø

North Side	South Side
Empty 3/4 Full	Empty 3/4 Full
Over Flows	
#5 1/4 Empty Full	1/4 Heavy
#7 Empty Full	Empty Full

Use the space below for additional comments or alarms observed during the shift

opacity Problems → CF onsite assisting with flow adjustments

Problems throughout shift with opacity / Flow adjustments in Progress

PO-FM-B2-81-04E-02
Rev. 08; 08/25/2016

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the iron & Steel MACT rules and has been approved by EPA. <u>All sections of this form MUST be completed. Blank areas are not accetable.</u> Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11/9	2000	AM/PM
Shift End:	11/10	800	AM/PM

OPERATOR: Powell

SUPERVISOR: GF

Page # 2

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
								Aim	Actual					
100	53499	17.03	GF	N	C-8	N/A	Y	2.6	1.4	N/A	N	Y	Y	Y
106	53499	22.19	GF	N	C-8	N/A	Y	2.6	2.2	N/A	N	Y	Y	Y
118	53499	19.42	GF	N	C-8	N/A	Y	2.2	2.2	N/A	N	Y	Y	Y
330	53501	16.73	GF	N	C-8	1A, 3A	Y	2.6	2.3	N/A	N	Y	Y	Y
336	53501	17.71	GF	N	C-8	1A, 3A	Y	1.5	1.5	N/A	N	Y	Y	Y
530	53503	17.93	GF	N	C-8	1A, 6A	Y	1.7	1.7	N/A	N	Y	Y	Y
536	53503	21.55	GF	N	C-8	1A, 6A	Y	2.1	2.1	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

Alarm Low power on Fields, Pull after heat

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

ED_003040_00000097-00018

Attachment 4 – 11/8 – 11/10 Opacity Event

Timeline of ESP Opacity Corrective Actions

Record of B-Vessel Spray Water Adjustments

ESP COMS 1-Hour 10% Average Exceedance Corrective Action Forms

Check sheet for 6-minute > 15% Opacity Alarms

6-Minute Opacity Investigation Spreadsheet

Timeline of ESP Opacity Corrective Actions

Date	Time	Action
8-Nov	11:52	1st Heat on A/V after 72-hour outage
8-Nov	13:49	1st Heat on B/V after 72 Hour Outage
8-Nov	23:00	1st 10% 1-hr ESP Alarm - Initiate substantial POR between heats
9-Nov	8:00	Meeting with BOF - Discuss Options
9-Nov	10:00	Noticed steam was staying on for excessive time between heats; Notified Boiler operators to not reset steam on if a heat was not upcoming
9-Nov	13:30	Implemented logic to shut steam off 45 minutes after start of blow
9-Nov	15:35	Implemented draft ramp to 1.5" to reduce ESP flow at end of heat
Subsequent A/V Heats showed no alarms - Alarms continued on B-Vessel		
10-Nov	0:48	Began spray nozzle adjustments on B to increase and steady out the flow
10-Nov	1:06	Final 20% opacity alarm associated with this event
10-Nov	6:15	Made deadband adjustments to No. 4 Bank, Adjusted setpoints for No. 5 and No. 7 Banks
10-Nov	10:43	Completed adjustments
10-Nov	12:59	2 consecutive heats with no alarms

Record of B-Vessel Spray Water Adjustments

12/9 | 12/10

Bank	Nozzles Available	B-Vessel - Flow on Random Heat at period of max flow									
		Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time
		1654	1905	2109	2316	BOP ~~100~~ 048	224	316	615	733	903
		Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number
		53490	53491	53492	53493	53494	53495	53496	53497	53498	53499
8	10	BOP ~~52~~ 42	44	41	41	50	BOP ~~50~~ 41	41	41	42	41
9	5	32	32	32	33	33	33	31	32	31	30
7	19	108	112	108	108	107	107	108	107	107	107
5	20	62	63	61	61	72	61	61	84	72	73
6	19	67	69	67	67	78	78	78	78	78	78
2	19	0	35	34	34	34	34	34	34	34	34
1	19	49	50	48	48	48	48	49	48	48	48
3	19	98	100	98	97	97	119	119	108	108	107
4	18	137	0	133	135	133	135	137	132	133	133
Total Flow		685	581	722	717	BOP ~~695~~ 743	759	761	772	754	753
8 Bank Air	BOP	~~647~~ 723	715	724	725	695	BOP ~~642~~ 716	721	712	717	716
9 Bank Air	BOP	~~1176~~ 1441	1540	1441	1441	1540	BOP ~~1565~~ 1441	1540	1441	1540	1565

Minimal Period of High Flow

Minimal Period of High Flow

Opened 1 nozzle 8, 5, 6

Closed 1 on 8, 5, opened 2 on 3

Longer Period of Higher Flow

Greatly Improved Opacity

Opened 1 on 5

No.4 Deadband → 50 to 70

#5 Bank - 400 ↓ 375

#7 Bank - 350 ↓ 325

12/10

Bank	Nozzles Available	B-Vessel - Flow on Random Heat at period of max flow									
		Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time	Heat Start Time
		1043	1207	1259							
		Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number	Heat Number
		53500	53501	53502							
8	10	41	40	40							
9	5	31	32	31							
7	19	107	107	107							
5	20	72	72	73							
6	19	90	90	90							
2	19	34	34	34							
1	19	48	48	48							
3	19	107	108	108							
4	18	133	134	136							
Total Flow		764	772	771							
8 Bank Air		717	717	724							
9 Bank Air		1516	1466	1565							

+1 Nozzle on 6

Opacity OK

ED_003040_00000097-00022

AK Steel

ESP COMS 1-HOUR 10% AVERAGE EXCEEDANCE CORRECTIVE ACTION FORM

4real

The following the procedures are established in case of a **continuous opacity monitor system** (COMS) alarm for exceeding an **hourly average opacity of 10 percent.**

As required by the Integrated Iron and Steel MACT rules, the following information must be completed for each COMS alarm.

Date: 11/8 - 11/9 Name: David Pate

Date and time that the COMS alarmed:

11/8 2300 (17.36), 11/9 100 (11.12), 11/9 200 (12.16), 11/9 300 (11.01)

Date and time that ESP Operator and/or Maintenance were contacted to determine the cause of the alarm: **[EPA MACT requirement is to initiate corrective action to determine the cause <u>within 1 hour</u> of the alarm]**

11/8 2300, 11/9 100, 200, 300 (via text)

Date and time that corrective action to correct the cause of the alarm began: **[EPA MACT requirement is to <u>complete corrective action within 24 hours of the alarm</u> or complete additional corrective action <u>within 48 hours</u> of the alarm.]**

11/8 2230

Date and time that corrective action was completed:

Uncompleted at end of shift

Brief summary of the cause of the alarm and resulting corrective actions:

Compt. 8 came out of outage down. Operations slow (~ 1hr between heats), Iron chemically cold, More flux being added with primary skimmer out of service. Issues unresolved going into first shift / high ambient moisture level as well

This information must be maintained by Steelmaking Department for 5 years and provided to Environmental Affairs via email. Contact information for the Environmental Affairs Department is located on PO-W1-10-06E.

AK Steel

3 real
15

ESP COMS 1-HOUR 10% AVERAGE EXCEEDANCE CORRECTIVE ACTION FORM

The following the procedures are established in case of a **continuous opacity monitor system** (COMS) alarm for exceeding an **hourly average opacity of 10 percent.**

As required by the Integrated Iron and Steel MACT rules, the following information must be completed for each COMS alarm.

Date: 11/9 Name: David Pate

Date and time that the COMS alarmed: steam

11/9 800(11.99), 1000(15.65), 1400(12.96), 1800(12.66)

Date and time that ESP Operator and/or Maintenance were contacted to determine the cause of the alarm: **[EPA MACT requirement is to initiate corrective action to determine the cause within 1 hour of the alarm]**

11/9 800, 1000, 1400, 1800 (via text)

Date and time that corrective action to correct the cause of the alarm began: **[EPA MACT requirement is to complete corrective action within 24 hours of the alarm or complete additional corrective action within 48 hours of the alarm.]**

11/9 754

Date and time that corrective action was completed:

11/9 1600

Brief summary of the cause of the alarm and resulting corrective actions:

Continued slow operations and conditioning problems.
Adjusted Steam Programming throughout day - Completed ~ 3:00PM
3-4E returned to service ~ 1200 PM
Increased Draft ramp implemented ~ 3:00PM
Adjustments effective on A-Vessel; still having problems on B-Vessel

This information must be maintained by Steelmaking Department for 5 years and provided to Environmental Affairs via email. Contact information for the Environmental Affairs Department is located on PO-W1-10-06E.

AK Steel

ESP COMS 1-HOUR 10% AVERAGE EXCEEDANCE CORRECTIVE ACTION FORM

2 real
15

The following the procedures are established in case of a **continuous opacity monitor system** (COMS) alarm for exceeding an **hourly average opacity of 10 percent.**

As required by the Integrated Iron and Steel MACT rules, the following information must be completed for each COMS alarm.

Date: 11/9-11/10 Name: David Pate

Date and time that the COMS alarmed:

11/9 2000(13.86), 2200(12.85), 11/10 ~~82~~ 5 700(11.57)

Date and time that ESP Operator and/or Maintenance were contacted to determine the cause of the alarm: **[EPA MACT requirement is to initiate corrective action to determine the cause within 1 hour of the alarm]**

11/9 2000 (via text)

Date and time that corrective action to correct the cause of the alarm began:
[EPA MACT requirement is to complete corrective action within 24 hours of the alarm or complete additional corrective action within 48 hours of the alarm.]

11/9 1924

Date and time that corrective action was completed:

11/10 8:00 AM

Brief summary of the cause of the alarm and resulting corrective actions:

Inspected B/U sprays
Made changes to B/U spray setpoints (#4 DB 50970, #5 SP 400 to 375, #7 SP 350 to 325)
POR All A-fields between heats
No additional alarms after 700 AM alarm

This information must be maintained by Steelmaking Department for 5 years and provided to Environmental Affairs via email. Contact information for the Environmental Affairs Department is located on PO-W1-10-06E.

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11/8	800	AM/PM
Shift End:	11/8	2000	AM/PM

OPERATOR: Zast

SUPERVISOR: Filek / Kibat

Page # 1

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O) Aim	ESP Draft Value (inches H2O) Actual	ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
0206	—	17.1	RG	N	C-8	N/A	N/A	—	—	SU	N	N	Y	N
1230	53471	16.9	GF	N	C-8	N/A	Y	2.2	2.2	N/A	N	N	Y	N
1412	53472	29.1	GF	N	C-8	1A, 6A	Y	2.2	2.2	N/A	N	N	Y	N
1554	53473	22.6	GF	N	C-8	1A, 6A	Y	2.2	2.2	N/A	N	N	Y	N
1730	53474	16.2	GF	N	C-8	6A	Y	2.2	2.2	N/A	N	N	Y	N
1854	53475	17.5	GF	N	C-8	1A, 3A, 6A	Y	2.6	2.6	N/A	N	N	Y	N
1900	53475	41.2	GF	N	C-8	1A, 3A, 6A	Y	2.2	2.2	N/A	N	N	Y	N

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

1906	53475	22.5	GF	N	C-8	1A, 3A, 6A	Y	2.2	2.2	N/A	N	N	Y	N

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Rev. 06; 08/25/2016

ED_003040_00000097-00026

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11-8	2000	AM/PM
Shift End:	11-9	800	AM/PM

OPERATOR: Stokosa

SUPERVISOR: Parker

Page # 1

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
								Aim	Actual					
2230	53476	56.9	RP	N	C-8	All A-Fields	Y	2.2	2.0	N/A	N	Y	Y	Y
2236	53476	73.5	RP	N	C-8	All A-Fields	Y	2.6	2.6	N/A	N	Y	Y	Y
2342	53477	24.1	RP	N	C-8	All A-Fields	Y	2.2	2.2	N/A	N	Y	Y	Y
2348	53477	39.2	RP	N	C-8	All A-Fields	Y	2.6	2.6	N/A	N	Y	Y	Y
048	53478	68.4	RP	N	C-8	All A-Fields	Y	2.6	2.6	N/A	N	Y	Y	Y
154	53479	22.9	RP	N	C-8/3-4E	1A, 6A	Y	2.2	2.0	N/A	N	Y	Y	Y
200	53479	68.1	RP	N	C-8/3-4E	1A, 6A	Y	2.6	2.6	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

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Rev. 06; 08/25/2016

ED_003040_00000097-00027

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

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	Date	Time	
Shift Start:	11/8	2000	AM/PM
Shift End:	11/9	800	AM/PM

OPERATOR: Stokosa

SUPERVISOR: Parker

Page # 2

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
								Aim	Actual					
242	53480	19.7	RP	N	C-8/3-4E	All A-fields	Y	2.4	2.1	N/A	N	Y	Y	Y
248	53480	30.6	RP	N	C-8/3-4E	All A-fields	Y	2.6	2.5	N/A	N	Y	Y	Y
412	53481	20.6	RP	N	C-8/3-4E	1A,3A,6A	Y	2.0	2.0	N/A	N	Y	Y	Y
418	53481	33.5	RP	N	C-8/3-4E	1A,3A,6A	Y	2.6	2.6	N/A	N	Y	Y	Y
524	53482	21.5	RP	N	C-8/3-4E	1A,3A,6A	Y	2.2	2.1	N/A	N	Y	Y	Y
530	53482	38.8	RP	N	C-8/3-4E	1A,3A,6A	Y	2.4	2.8	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

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Rev. 06; 08/25/2016

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AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

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	Date	Time	
Shift Start:	11/8	2000	AM/PM
Shift End:	11/9	800	AM/PM

OPERATOR: Stokosa

SUPERVISOR: Parker

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Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
								Aim	Actual					
654	53483	20.3	RP	N	C-8/3-4E	1A,3A,6A	Y	2.6	2.4	N/A	N	Y	Y	Y
700	53483	18.7	RP	N	C-8/3-4E	1A,3A,6A	Y	2.2	2.1	N/A	N	Y	Y	Y
754	53484	20.7	RP	N	C-8/3-4E	1A,3A,6A	Y	2.6	2.1	N/A	N	Y	Y	Y
800	53484	55.3	RP	N	C-8/3-4E	1A,3A,6A	Y	2.2	2.1	N/A	N	Y	Y	Y
806	53484	60.9	RP	N	C-8/3-4E	1A,3A,6A	Y	2.2	2.1	N/A	N	Y	Y	Y
812	53484	16.2	RP	N	C-8/3-4E	1A,3A,6A	Y	2.6	2.6	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

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AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11/9	800	AM/PM
Shift End:	11/9	2000	AM/PM

OPERATOR: Boyd

SUPERVISOR: RK/JR

Page # 1

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" If alarms occurred, Power Off Rap after the heat (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) (Describe event in "Comments" section)	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) *If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician*	Humidification Steam turned on at event? (Y/N) *If NO, contact Boiler Pulpit*	Spray Water System Operating? (Y / N) *If NO, contact Maintenance*
								Aim	Actual					
918	53485	32.7	RK	N	C8/3-4E	1A, 3A, 6A	Y	2.2	2.3	N/A	~~Y~~ N	Y	Y	Y
924	53485	39.8	RK	N	C8/3-4E	1A, 3A, 6A	Y	2.6	2.5	N/A	N	Y	Y	Y
936	N/A	27.7	RK	N	C8/3-4E	N/A	POR in Progress	2.6	2.6	N/A	N	Y	Y	Y
1012	53486	22.2	RK	N	C8/3-4E	A-Fields	Y	2.2	2.1	N/A	N	Y	Y	Y
1018	53486	24.4	RK	N	C8/3-4E	A-Fields	Y	2.2	1.9	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

ED_003040_00000097-00030

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11/9	800	(AM)/PM
Shift End:	11/9	2000	AM/(PM)

OPERATOR: Boyd

SUPERVISOR: Redline

Page # 1

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" **If alarms occurred, Power Off Rap after the heat** (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) **(Describe event in "Comments" section)**	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) ***If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician***	Humidification Steam turned on at event? (Y/N) ***If NO, contact Boiler Pulpit***	Spray Water System Operating? (Y / N) ***If NO, contact Maintenance***
								Aim	Actual					
1254	53487	~~37.6~~ 18.9	JR	N	C-8	3A	Y	2.6	2.6	N/A	N	Y	Y	Y
1300	53487	37.6	JR	N	C-8	3A	Y	2.2	2.2	N/A	N	Y	Y	Y
1306	53487	36.4	JR	N	C-8	3A	Y	2.2	2.2	N/A	N	Y	Y	Y
1354	53488	21.9	JR	N	C-8	3A	Y	2.6	2.6	N/A	N	Y	Y	Y
1400	53488	42.3	JR	N	C-8	3A	Y	2.2	2.2	N/A	N	Y	Y	Y
1542	53489	19.2	JR	N	C-8	1A, 3A, 6A	Y	2.6	2.6	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

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Rev. 06; 08/25/2016

ED_003040_00000097-00031

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. All sections of this form MUST be completed. Blank areas are not accetable. Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	11/9	800	(AM)/PM
Shift End:	11/9	2000	AM/(PM)

OPERATOR: Boyd

SUPERVISOR: Redline

Page # 2

Clock Time of **6-MIN > 15%** Opacity (BLOCK) **(Military time)**	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" **If alarms occurred, Power Off Rap after the heat** (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) **(Describe event in "Comments" section)**	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) ***If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician***	Humidification Steam turned on at event? (Y/N) ***If NO, contact Boiler Pulpit***	Spray Water System Operating? (Y / N) ***If NO, contact Maintenance***
								Aim	Actual					
1706	53490	15.71	JR	N	C-8	1A, 4A, 6A	Y	2.6	2.3	N/A	N	Y	Y	Y
1712	53490	36.19	JR	N	C-8	1A, 4A, 6A	Y	1.8	1.7	N/A	N	Y	Y	Y
1718	53490	49.15	JR	N	C-8	1A, 4A, 6A	Y	1.5	1.5	N/A	N	Y	Y	Y
1924	53492	40.71	JR	N	C-8	N/A	N	1.5	1.5	N/A	N	Y	Y	Y
1930	53492	40.79	JR	N	C-8	N/A	N	1.5	1.5	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

ED_003040_00000097-00032

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

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	Date	Time	
Shift Start:	11/9	2000	AM/PM
Shift End:	11/10	800	AM/PM

OPERATOR: Powell

SUPERVISOR: GF

Page # 2

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" **If alarms occurred, Power Off Rap after the heat** (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) **(Describe event in "Comments" section)**	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) ***If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician***	Humidification Steam turned on at event? (Y/N) ***If NO, contact Boiler Pulpit***	Spray Water System Operating? (Y / N) ***If NO, contact Maintenance***
								Aim	Actual					
100	53498	17.03	GF	N	C-8	N/A	Y	2.6	1.4	N/A	N	Y	Y	Y
106	53498	22.19	GF	N	C-8	N/A	Y	2.6	2.2	N/A	N	Y	Y	Y
118	53498	19.42	GF	N	C-8	N/A	Y	2.2	2.2	N/A	N	Y	Y	Y
330	53501	16.73	GF	N	C-8	1A,3A	Y	2.6	2.3	N/A	N	Y	Y	Y
336	53501	17.71	GF	N	C-8	1A,3A	Y	1.5	1.5	N/A	N	Y	Y	Y
530	53503	17.93	GF	N	C-8	1A,6A	Y	1.7	1.7	N/A	N	Y	Y	Y
536	53503	21.55	GF	N	C-8	1A,6A	Y	2.1	2.1	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

ED_003040_00000097-00033

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

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	Date	Time	
Shift Start:	11/9	2000	AM/PM
Shift End:	11/10	800	AM/PM

OPERATOR: Powell/Boyd

SUPERVISOR: GF

Page # 1

Clock Time of 6-MIN > 15% Opacity (BLOCK) (Military time)	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" **If alarms occurred, Power Off Rap after the heat** (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) **(Describe event in "Comments" section)**	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) ***If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician***	Humidification Steam turned on at event? (Y/N) ***If NO, contact Boiler Pulpit***	Spray Water System Operating? (Y / N) ***If NO, contact Maintenance***
								Aim	Actual					
2012	53493	26.97	GF	N	C-8	N/A	N	1.5	1.5	N/A	N	Y	Y	Y
2018	53493	17.10	GF	N.	C-8	N/A	N	2.6	2.6	N/A	N	Y	Y	Y
2130	53494	24.07	GF	N	C-8	1A, 3A	Y	1.5	1.5	N/A	N	Y	Y	Y
2136	53494	44.10	GF	N	C-8	1A, 3A	Y	1.8	1.7	N/A	N	Y	Y	Y
2142	53494	17.90	GF	N	C-8	1A, 3A	Y	2.6	2.6	N/A	N	Y	Y	Y
2336	53496	25.92	GF	N	C-8	N/A	N	1.8	1.8	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

ED_003040_00000097-00034

AK STEEL DEARBORN WORKS - BOF PRECIPITATOR

Check Sheet for 6-Minute (>15% 6-Min Average)

This form is required to be completed per the Operation and Maintenance Plan for the BOF Electrostatic Precipitator (ESP) which satisfies the requiremnts of the Iron & Steel MACT rules and has been approved by EPA. <u>All sections of this form MUST be completed. Blank areas are not accetable.</u> Failure to do so could result in an air permit deviation or Notice of Violation from MDEQ.

	Date	Time	
Shift Start:	~~11/10~~ 11/9	800	AM/PM
Shift End:	11/10	800	AM/PM → 918 recorded on this sheet

OPERATOR: Powell

SUPERVISOR: GF

Page # 3

Clock Time of **6-MIN > 15%** Opacity (BLOCK) **(Military time)**	BATCH Numbers	Value of 6-Min OPACITY %	Enter Initials of Supervisor Notified	AVC Controllers Reset? (Y / N) (if "Yes" which controllers?)	List Fields with AVC Outages (If none, enter N/A)	List Fields with "LOW POWER ALARMS" **If alarms occurred, Power Off Rap after the heat** (If none, enter N/A)	Did you POWER OFF RAP after the heat? (Y / N)	ESP Draft Value (inches H2O)		ESP Fan Start Up or Shutdown? (SU / SD) (Enter N/A, if no fan issue occurred)	Fan Failure (Y / N) **(Describe event in "Comments" section)**	Is AUTOMATIC POWER OFF RAPPING turned ON and ACTIVE? (Y /N) ***If not ACTIVE, turn off/on to re-initiate. If still not ACTIVE, call Electrician***	Humidification Steam turned on at event? (Y/N) ***If NO, contact Boiler Pulpit***	Spray Water System Operating? (Y / N) ***If NO, contact Maintenance***
								Aim	Actual					
630	53504	20.6	GF	N	C-8	N/A	Y	2.6	2.2	N/A	N	Y	Y	Y
636	53504	28.8	GF	N.	C-8	N/A	Y	1.5	1.4	N/A	N	Y	Y	Y
642	53504	16.7	GF	N	C-8	N/A	Y	2.6	2.6	N/A	N	Y	Y	Y
736	53506	19.8	GF	N	C-8	7A	Y	2.6	2.6	N/A	N	Y	Y	Y
918	53508	17.3	GF	N	C-8	N/A	N	2.6	2.2	N/A	N	Y	Y	Y

Additional Comments or Descriptions of other issues contributing to an event must be described below: (Continue on back of sheet, if necessary)

PO-FM-B2-80-78E-01
Rev. 06; 08/25/2016

ED_003040_00000097-00035

6-MINUTE AVERAGE OPACITY INVESTIGATION SPREADSHEET

Date / Time	6-Min Avg Opacity	COMS Monitor Calibration or Maint?	Duration Between O2 Blows	Min Into O_2 Blow for 6-min Ave >15%	AV Activity	BV Activity	AV Damper Positions	BV Damper Positions	O2 ok?	Steam Interfere	Dust Density Monitors (DDMs)	Automatic Voltage Controllers (AVCs)	Spray Water	Root Cause	Notes / Corrective Action Taken
11/8/18 2:12 PM	28.3	no	1 hr 24 min	23 min 26 sec	Offline	Online	Offline	Online	Ok	no	All spike with opacity at end of heat	C8 Down, 1A, 6A both struggle last half of heat	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR low power fields
11/8/18 3:54 PM	22.8	no	1 hr 22 min	19 min 19 sec	Online	Offline	Online	Offline	Ok	no	All spike with opacity at end of heat	C8 Down, 1A, 6A both struggle last 2/3 of heat	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR low power fields
11/8/18 5:30 PM	18.3	no	1 hr 11 min	19 min 19 sec	Offline	Online	Offline	Online	Ok	no	All spike when water drops below 500 gpm. 1,2,4 spike highest	C8 Down, 6A low last 1/3 of heat. 1A, 3A both dip but do not bottom out	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR low power fields
11/8/18 6:54 PM	37.5	no	1 hr 7 min	18 min 18 sec	Online	Offline	Online	Offline	Ok	yes	4 elevated all heat; 1,4 spike highest	C8 Down. 1A, 3A, 6A all struggle last half of heat	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR low power fields
11/8/18 7:00 PM	41.3			24 min 18 sec						yes					
11/8/18 7:06 PM	22.5			30 min 18 sec						no					
11/8/18 10:30 PM	58.9	no	3 hr 8 min	21 min 53 sec	Online	Online	Offline	Online	Ok	no	1,2,4 high most of heat	C8 down, All fields dip last third of heat	Ok - Flow never above 500 gpm; due to offgas temp	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR All Fields
11/8/18 10:55 PM	22.5			27 min 53 sec						no					
11/8/18 11:42 PM	24.3	no	49 min 43 sec	19 min 9 sec	Online	Offline	Online	Offline	Ok	yes	All spike at end of heat with opacity	All fields dip towards end of heat; 1A, 3A, 6A dip lowest	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR All Fields
11/8/18 11:48 PM	38.2			75 min 9 sec						no					
11/9/18 12:48 AM	68.4	no	40 min 59 sec	22 min 30 sec	Online	Offline	Online	Offline	Ok	no	All spike at end of heat with opacity	Most fields decline; none bottom out	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR All Fields
11/9/18 1:54 AM	32.8	no	51 min 31 sec	15 min 34 sec	Online	Offline	Online	Offline	Ok	yes	1,2,4 active all heat, all spike with opacity at end of heat	All fields decline at end of heat; 1A, 6A particulary low, 3-4E tripped out at 1:17. C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR All Fields
11/9/18 2:00 AM	58.3			21 min 34 sec						no					
11/9/18 3:42 AM	39.7	no	28 min 45 sec	14 min 10 sec	Offline	Online	Offline	Online	Ok	no	All spike with opacity; 1,2,4 highest	1A, 6A Both low last 1/3 of heat, 3-4E tripped out at 1:17, C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR 1A, 6A
11/9/18 3:58 AM	39.6			20 min 10 sec						no					
11/9/18 4:12 AM	38.6	no	1 hr 5 min	18 min 25 sec	Online	Offline	Online	Offline	Ok	yes	All spike with opacity at end of heat	1A, 3A, 6A all low last third of heat, 3-4E tripped out at 1:17, C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR 1A, 3A, 6A
11/9/18 4:18 AM	38.5			24 min 25 sec						no					
11/9/18 5:24 AM	21.5	no	51 min 3 sec	17 min 54 sec	Online	Offline	Online	Offline	Ok	no	All spike with opacity at end of heat; 1,2,4 all high 2nd half of	1A, 3A, 6A all low last third of heat, 3-4E tripped out at 1:17, C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR 1A, 3A, 6A
11/9/18 5:30 AM	38.8			23 min 54 sec						no					
11/9/18 6:54 AM	20.3	no	1 hr 10 min	16 min 26 sec	Offline	Online	Offline	Online	Ok	no	All spike with opacity at end of heat; 1,2,4 all high 2nd half of	1A, 3A, 6A all low last third of heat, 3-4E tripped out at 1:17, C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR 1A, 3A, 6A
11/9/18 7:00 AM	18.7			22 min 26 sec						no					
11/9/18 7:54 AM	20.7	no	40 min 3 sec	13 min 47 sec	Offline	Online	Offline	Online	Ok	yes	4 high all heat; 1 and 2 spike 2nd half of heat	1A, 3A, 6A all low last third of heat, 3-4E tripped out at 1:17, C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR All Fields
11/9/18 8:00 AM	20.1			19 min 47 sec						no					
11/9/18 8:06 AM	20.8			25 min 47 sec						no					
11/9/18 8:12 AM	16.2			31 min 47 sec						no					
11/9/18 9:18 AM	32.7	no	51 min 35 sec	19 min 33 sec	Online	Offline	Online	Offline	Ok	no	4 high all heat, 1-2 spike 2nd half of heat, all spike with opacity at end of heat	1A, 3A, 6A all low last third of heat, 3-4E tripped out at 1:17, C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR All Fields
11/9/18 9:24 AM	39.8			25 min 33 sec						no					
11/9/18 9:36 AM	27.7	no	N/A	N/A	Offline	Offline	Offline	Offline	N/A	no	3,4 spike	Ok, 3-4E tripped out at 1:17, C8 Down	Ok	POR on 3-4 A-D with E-field down	Notified operator to run fields 3 and 4 1 at a time
11/9/18 10:12 AM	27.2	yes	33 min 54 sec	18 min 13 sec	Offline	Online	Offline	Online	N/A	N/A	4 high all heat; 1 and 2 spike 2nd half of heat	All fields decline but none bottom out, 3-4E tripped out at 1:17, C8 Down	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out	POR All Fields
11/9/18 10:18 AM	26.4	no		24 min 13 sec						no					
11/9/18 12:54 PM	18.9	no	2 hr 21 min	13 min 13 sec	Online	Offline	Online	Offline	Ok - 20K	yes	All rise through heat; 1,3,4 most elevated	All A-fields and 5-6C decline through heat (None Bottom out); 1A, 3A, 6A lowest, C-8 Down, 3-4E Back in service	Ok	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out, steam programming did not function as intended during heat - shut off during the heat	POR 1A, 3A; 3-4E returned to service prior to heat, continue blow at reduced rate
11/9/18 1:00 PM	37.6			19 min 13 sec						yes					
11/9/18 1:06 PM	36.4			25 min 13 sec						no					
11/9/18 1:54 PM	25.9	no	35 min 3 sec	16 min 41 sec	Offline	Online	Offline	Online	Ok - 20K	yes	All spike through heat; 1,3,4 especially elevated	All A-fields dip (none bottom out), 1A, 3A, 6A worst, C-8 out of service	Overall less flow on B than A, Banks 2 and 6 both declined ~25 gpm mid heat	Long Delay, Slow Pace, "Dead" Iron, Extra flux added with primary skimming station out. B-Vessel spay issues?	POR 3A, continue blow at reduced rate, steam program in affect to ramp up at end of heat
11/9/18 2:00 PM	42.3			22 min 41 sec						no					
11/9/18 3:42 PM	18.2	no	1 hr 35 min	6 min 50 sec	Online	Offline	Online	Offline	Ok - 20K	yes	All spike start of heat and decline	6A low last half of heat, 1A, 3A low but do not bottom out	Ok	Video and Trending Review Indicated Steam	POR 3A
11/9/18 5:06 PM	15.7	no	56 min 17 sec	12 min 3 sec	Offline	Online	Offline	Online	Ok - 20K	yes	All elevated end of heat; 1 and 4 most elevated	All A fields dip throughout heat; none bottom out	No. 2 Bank Offline; Overall less flow than on A	B-Vessel Heats Conditioning	POR 1A, 6A, 6A; Adjustments on B/V dead bangs from 35 to 50. Notified maintenance and boilermakers to inspect B/V spray banks. Note that draft ramp to 1.5 implemented, continue blowing at 20K
11/9/18 5:12 PM	36.2			18 min 3 sec						no					
11/9/18 5:18 PM	48.2			24 min 3 sec						no					
11/9/18 7:24 PM	38.7	no	49 min 37 sec	16 min 5 sec	Offline	Online	Offline	Online	Ok - 20K	no	Most spike when offgas temp dips and decline at end of heat	All dip when opacity spikes, C-8 offline for maintenance	Bank 7 returned to service (flow at 35 gpm), Overall flow less than on A	B-Vessel Heats Conditioning	Bank 2 returned to service; Maintenance and boilermakers to inspect B/V sprays
11/9/18 7:30 PM	46.8			22 min 5 sec						no					
11/9/18 8:12 PM	27.9	no	19 min 58 sec	23 min 8 sec	Online	Offline	Online	Offline	Ok - 20K	no	All spike end of heat	C-8 down, others ok	Ok	End of heat conditioning	None Taken
11/9/18 8:18 PM	27.1			29 min 8 sec						no					

Form No.: PO-82-81-98E-2; Rev. 2; 01/15

ED_003040_00000097-00036

6-MINUTE AVERAGE OPACITY INVESTIGATION SPREADSHEET

Date / Time	6-Min Avg Opacity	COMS Monitor Calibration or Maint?	Duration Between O2 Blows	Min into O_2 Blow for 6-min Ave >15%	AV Activity	BV Activity	AV Damper Positions	BV Damper Positions	O2 ok?	Steam Interfere	Dust Density Monitors (DDMs)	Automatic Voltage Controllers (AVCs)	Spray Water	Root Cause	Notes / Corrective Action Taken
11/9/18 9:30 PM	24.1	no	54 min 31 sec	21 min 4 sec	Offline	Online	Offline	Online	Ok - 20K	yes	DD All very active	1A, 3A struggle but do not bottom out	Ok - Overall less flow than on A	B-Vessel Heats Conditioning	FOR all A-fields; adjustments to 4 bank deadband, lowered spray setpoints on No. 5 and 7 banks, continue reduced blow rate
11/9/18 9:36 PM	24.1			27 min 4 sec						no					
11/9/18 9:42 PM	17.9			33 min 4 sec						no					
11/9/18 11:36 PM	25.9	no	48 min 32 sec	19 min 3 sec	Offline	Online	Offline	Online	Ok - 20K	no	All spike throughout heat	1A and 6A dip but recover prior to end of heat; C-8 down for maintenance	Ok - Starting to catch up to A/V water flow	B-Vessel Heats Conditioning	Continue with B-Vessel Conditioning Adjustments
11/10/18 1:00 AM	17.0	no	33 min 34 sec	12 min 30 sec	Offline	Online	Offline	Online	Ok - 20K; Lance pull at 9 min into heat	no	All spike with opacity; 1 and 4 spike highest when blow reinitialized	C-8 Down, other fields ok	Ok - Lance pull due to high offgas temp	Reinitializing blow after lance pull; B-Vessel heats conditioning improving	FOR all A-fields
11/10/18 1:06 AM	22.2			18 min 30 sec						no					
11/10/18 1:18 AM	18.4			30 min 30 sec						no					

ED_003040_00000097-00037