Jonathan D. Crabtree
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211 USA
* CrabtreeJD@bv.com
((913) 458-2403
Building a World of Difference®

From: Betz, Alex [mailto:Alex.Betz@eon-us.com]
Sent: Tuesday, October 12, 2010 3:12 PM
To: Crabtree, Jonathan D.
Cc: Saunders, Eileen; Hillman, Timothy M.; Wehrly, M. R.; 168908 E.ON-AQC
Subject: RE: 168908. 41.0100 101011 Mill Creek Information Request

Jonathan,

Sorry about forgetting the attachment yesterday. It should be attached this time.

We had already found one drawing on Unit 2 that was requested, so I am uploading it today. We will mark that one as being complete and if you find otherwise, please let me know.

We do have percent volume CO2 at the stack and I am in the process of getting that data (should be tomorrow). I am planning to get the year-to-date data, if you need more, let me know.

I'm not positive I can find testing results in those areas, but I would say they probably have been done before. I will try to find any test results I can.

I will get an uncorrupted version of "MC 3 SCR General Arrangt Plan Section E-20.pdf" uploaded tomorrow.

What address, and to whose attention, should the B&V Short Circuit Study be sent?

Thanks,

Alex Betz
(502) 933-6602 Office
(502) 217-2286 Fax
(502) 817-3733 Cell

From: Crabtree, Jonathan D. [mailto:CrabtreeJD@bv.com]
Sent: Monday, October 11, 2010 5:11 PM
To: Betz, Alex
Cc: Saunders, Eileen; Hillman, Timothy M.; Wehrly, M. R.; 168908 E.ON-AQC
Subject: 168908. 41.0100 101011 Mill Creek Information Request

Alex,

Thanks for the update. I believe your attachment did not make it on there with your email. Feel free to resend it or wait until your next update.

Regarding the plant arrangements, if the ones we requested are Unit 2 drawings, we already have clear copies of those and you do not need to rescan them. Unless you have additional Unit 1 plant arrangement drawings, we will assume we have everything we need and we can close that item.

Additionally, in response to the "Not measured" items on the data request (air heater leakage, precipitator leakage, and stack gas outlet oxygen percent) please provide information regarding the following (if available):

1) Do you have measurements of percent volume CO2 at the stack on any or all units?

2) Has the plant conducted any flue gas testing on any of the units at the air heater gas outlets and/or the cold-side ESPs? The type of information we would be looking for would again be percent volume O2 and/or CO2.

Lastly, in the priority 2 folder, the "MC 3 SCR General Arrangt Plan Section E-20.pdf" appears to be corrupted and we are unable to open it. If possible, please send another copy.

Thanks for your help,

Jonathan D. Crabtree
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211 USA
* CrabtreeJD@bv.com
((913) 458-2403

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From: Betz, Alex [mailto:Alex.Betz@eon-us.com]
Sent: Monday, October 11, 2010 2:59 PM
To: Wehrly, M. R.
Cc: Saunders, Eileen; Hillman, Timothy M.; Bayless, James W. III (Jim); 168908 E.ON-AQC; Crabtree, Jonathan D.
Subject: RE: 168908. 41.0143 101011 Mill Creek Information Request

M.R.,

Thanks for the feedback on these issues. I will get the AH info uploaded as soon as possible. We're looking for the prints you've listed below. We've found some, but they are not the latest revisions you've listed. Just for clarification, these prints you've listed are for Unit 2, not Unit 1.

Once again, the sheet is attached. There wasn't much that was added today, only 4 foundation prints under the Priority 2 folder.

Thanks,

Alex Betz
(502) 933-6602 Office
(502) 217-2286 Fax
(502) 817-3733 Cell

From: Wehrly, M. R. [mailto:WehrlyMR@bv.com]
Sent: Monday, October 11, 2010 10:03 AM
To: Betz, Alex
Cc: Saunders, Eileen; Hillman, Timothy M.; Bayless, James W. III (Jim); 168908 E.ON-AQC; Crabtree, Jonathan D.
Subject: 168908. 41.0143 101011 Mill Creek Information Request

Alex,
Sorry for any confusion on the Unit 1 Plant arrangements.

There are six Unit 1 PA drawings that just fuzz out to the point you can't read the characters when you blow them up to readable size. It may just be bad files or poor copies of good files. The six drawings are:

F-663-253-16, -16A, & 16B (drawings are actually numbered as F-663-253, shts 1 of 3, 2 of 3 & 3 of 3)
F-663-254-12, -12A, & 12B (drawings are actually numbered as F-663-254, shts 1 of 3, 2 of 3 & 3 of 3)

Please do the best you can. If the originals are real light, they may never scan well.

I'll let you know if we need anything further on Limestone.

Thanks,

M.R.

From: Betz, Alex [mailto:Alex.Betz@eon-us.com]
Sent: Friday, October 08, 2010 2:19 PM
To: Wehrly, M. R.
Cc: Saunders, Eileen; Hillman, Timothy M.; Bayless, James W. III (Jim); 168908 E.ON-AQC; Crabtree, Jonathan D.
Subject: RE: 168908. 41.0143 101005 Mill Creek RE: B&V Short Circuit Study

M.R.,

Attached is the updated spreadsheet for today. There is some confusion on the Unit 1 Plant Arrangement Drawings. If possible, please list the drawing numbers of the prints that are unreadable or the file names and I will look for better copies of those prints.

Also, please check the limestone analysis file I uploaded to see if that is the information you're looking for.

Thanks,

Alex Betz
(502) 933-6602 Office
(502) 217-2286 Fax
(502) 817-3733 Cell

From: Betz, Alex
Sent: Thursday, October 07, 2010 3:18 PM
To: 'Wehrly, M. R.'
Cc: Saunders, Eileen; Hillman, Timothy M.; Bayless, James W. III (Jim); 168908 E.ON-AQC; Crabtree, Jonathan D.
Subject: RE: 168908. 41.0143 101005 Mill Creek RE: B&V Short Circuit Study

M.R.,

Attached is the updated spreadsheet for today. A lot of information has been added. We are having trouble finding "Original/Operating performance data" for the Air Heaters. We do have actual operating data, but are not sure if that's what you're looking for. Please advise on that item.

The Excess O2 spreadsheet shows the actual data in 4 hour averages for the year to date. If you need more data, please let me know.

Thanks,

Alex Betz
(502) 933-6602 Office
(502) 217-2286 Fax
(502) 817-3733 Cell

From: Wehrly, M. R. [mailto:WehrlyMR@bv.com]
Sent: Wednesday, October 06, 2010 8:59 PM
To: Betz, Alex
Cc: Saunders, Eileen; Hillman, Timothy M.; Bayless, James W. III (Jim); 168908 E.ON-AQC; Crabtree, Jonathan D.
Subject: RE: 168908. 41.0143 101005 Mill Creek RE: B&V Short Circuit Study

Alex,
Thanks for the update.
Send the study when you can. With the transformer nameplate pictures/drawings, we should be able to get started on the electrical review.

I've forwarded the structural steel study information on to Monty and if we think it will be useful, we'll try to get it from our storage.
M.R.

From: Betz, Alex [mailto:Alex.Betz@eon-us.com]
Sent: Wednesday, October 06, 2010 2:23 PM
To: Wehrly, M. R.
Cc: Saunders, Eileen; Hillman, Timothy M.; Bayless, James W. III (Jim); 168908 E.ON-AQC; Crabtree, Jonathan D.
Subject: RE: 168908. 41.0143 101005 Mill Creek RE: B&V Short Circuit Study

M.R.,

I am in the process of getting you a copy of the study, but I doubt it will be to you by Friday.

The attached sheet shows everything that I've uploaded to the website. Notice that some of the items could not be found either because we don't measure them, can't find them, or they don't exist. For the MC3 FD Fan Curve and MC1 & MC2 ID Booster Fan Curves, please see the comments in the "Completed" column.

I did find a structural report on Unit 3 FGD from 1993 by B&V, but it does not look that helpful, especially since it's from 1993. The cover letter is attached which shows the B&V Project and File number for you to reference in the B&V files if you think it would be valuable.

Thanks,

Alex Betz
(502) 933-6602 Office
(502) 217-2286 Fax
(502) 817-3733 Cell

From: Wehrly, M. R. [mailto:WehrlyMR@bv.com]
Sent: Tuesday, October 05, 2010 10:22 PM
To: Betz, Alex
Cc: Saunders, Eileen; Hillman, Timothy M.; Bayless, James W. III (Jim); 168908 E.ON-AQC; Crabtree, Jonathan D.
Subject: 168908. 41.0143 101005 Mill Creek RE: B&V Short Circuit Study

Alex,
Thanks for finding this information.
Yes we can still use SKM although we have a newer version and we'd have to update the data anyway.
Our Ann Arbor office told us they have the SKM model disks also, so we can get them from them if we need to.
Just a copy of the report would do it for now.
Thanks,
M.R.

From: Betz, Alex [mailto:Alex.Betz@eon-us.com]
Sent: Tuesday, October 05, 2010 12:16 PM
To: Wehrly, M. R.
Cc: Saunders, Eileen; Hillman, Timothy M.
Subject: B&V Short Circuit Study

M.R.,

I have located the short circuit study, but I also found out from the guy who has the study that he has a model in an SKM (PTW) format. I think I remember you mentioning that format during the conference call yesterday, but don't remember if you said you could use that or couldn't use that, so please let me know.

Thanks,

Alex Betz
Mechanical Engineer II
LG&E - Mill Creek Station
14660 Dixie Hwy
Louisville, KY 40272
(502) 933-6602 Office
(502) 217-2286 Fax
(502) 817-3733 Cell

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Table 1-4
Limestone Properties
[E.ON TO CONFIRM]

Dry Basis, Percent (%) by Weight	Nominal	% Guaranteed
Calcium Carbonate, $CaCO_3$	94%	90% minimum
Magnesium Carbonate, $MgCO_3$	3%	6% maximum ~~(1.5% max insoluble)~~
Silica Dioxide, SiO_2	-	3.5% maximum
Ferric Oxide, Fe_2O_3	-	1.5% maximum
Aluminum Oxide, Al_2O_3	-	4.3% maximum
Total Inerts (non $CaCO_3$)	6%	7% maximum
~~Moisture~~	~~5%~~	~~12% maximum~~
Bond Work Index (kWh/t)	12	12 maximum ~~4 minimum~~
Surface Moisture	12%	7% maximum
Fluorides	500	ppm
Chlorides	550	ppm
Bulk Density Design Basis		
Volumentric Sizing	55	pcf
Structural Loading	115	pcf
Angle of Repose	30	degree
Surcharge Angle	25	degree
Maximum lump size	¾	inch

Data from Environmental Compliance Project Quality Data spreadsheet.

From: Hillman, Timothy M.
To: Saunders, Eileen
CC: Jackson, Audrey; 168908 E.ON-AQC; Crabtree, Jonathan D.; Wehrly, M. R.; Lucas, Kyle J.; Mehta, Pratik D.; Mahabaleshwarkar, Anand
Sent: 9/29/2010 5:24:40 PM
Subject: 168908.41.0100 100929 Mill Creek, Ghent and Brown Coal Fuel Question
Attachments: Environmental Compliance Proj quality data.xlsx; Mill Creek.xls

Eileen,

During the Phase I work, E.ON initially provided coal analysis data (included in the spreadsheet below) as the typical or "Current Coal" for Mill Creek. Coal data for Ghent and Brown were not initially provided.

Later during the course of the Phase I work, we were asked to use a different fuel (a "Future Coal", included in the spreadsheet below) for the Phase I work for Mill Creek, as well as for Ghent and Brown.

Accordingly, the Phase I study was conducted using the "Future Coal" as a design basis for Mill Creek, Ghent and Brown.

The analyses for the Mill Creek "Current Coal" and "Future Coal" are as follows:

Ultimate Coal Analysis (% by mass as received):	**Current Coal**	**Future Coal**
Carbon	64	61.21
Hydrogen	4.5	4.28
Sulfur	3.5	3.36
Nitrogen	1.3	1.27
Oxygen	4.62	6.89
Chlorine	0.08	0
Ash	12	12
Moisture	10	11
Total	100.00	100.00
Higher Heating Value, Btu/lb (as received)	11,471.82	11,200
SO2 Inlet Loading, lb/Mbtu	6.10	6.00

Additionally, during the Aug 5-6 Mill Creek AQC Workshop, a 6.2 lb/Mbtu SO2 coal was referenced, which is higher than the 6.10 and 6.00 lb/Mbtu SO2 for the "Current Coal" and "Future Coal", respectively.

Our question is, which fuel analysis should we use as the coal fuel design basis for Mill Creek, Ghent, and Brown in the Phase II work?

Regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**E.ON U.S. Corporate Fuels**														
2	**Environmental Compliance Project - Coal Quality Data**														
3	**5/3/10**														
4															
5												Ultimate			
6	**Coal Quality Average for 2009**			Moisture	Ash AR	Volatile AR	ixed Carbon A	BTU AR	Sulfur AR	lkalinity AF	Carbon AR	Hydrogen AR	Nitrogen AF	Oxygen AR	uminum Oxi
7				%	%	%	%	BTU/lb	%	mg/L	%	%	%	%	%
8	Brown Average			6.01	10.62	36.72	46.65	12,403	1.51	0.19	69.39	4.67	1.37	6.42	27.93
9									2.44		100.00				
10	Green River Average			10.55	8.60	36.71	44.15	11,827	2.36	0.21	66.00	4.46	1.34	6.69	19.54
11									3.99		100.00				
12	Cane Run Average			13.59	10.36	34.92	41.13	10,933	2.72	0.21	60.83	4.18	1.34	6.99	23.42
13									4.97		100.00				
14	Ghent Average			10.77	11.27	35.66	42.30	11,286	2.81	0.22	62.70	4.31	1.27	6.88	21.41
15									4.98		100.00				
16	Mill Creek Average			11.43	11.36	35.68	41.54	11,115	3.02	0.23	61.67	4.22	1.28	7.01	20.89
17									5.44		100.00				
18	Trimble County Average			10.30	11.96	35.67	42.07	11,261	3.09	0.24	62.36	4.31	1.26	6.72	22.62
19									5.48		100.00				
20															
21															
22	**TYPICAL/Average Quality for Future Coals**														
23	**Ghent, Mill Creek, Cane Run, Trimble C**			**11.00**	**12.00**	**36.00**	**42.00**	**11,200**	**3.36**	**0.22**	**61.21**	**4.28**	**1.27**	**6.89**	**21.69**
24									6.00		100.01				
25	**Brown Low Sulfur Coal**			**6.50**	**11.50**	**37.00**	**47.00**	**12,000**	**1.50**	**0.19**	**68.04**	**4.67**	**1.37**	**6.42**	**27.93**
26									2.50		100.00				
27	**Green River Average**			**10.50**	**9.00**	**37.00**	**44.00**	**11,600**	**2.60**	**0.21**	**65.41**	**4.46**	**1.34**	**6.69**	**19.45**
28									4.48		100.00				
29	**PRB for TC2 Blend**			**28.00**	**7.00**	**36.00**	**30.00**	**8,500**	**0.60**	**0.40**	**48.00**	**3.53**	**0.86**	**12.01**	**18.00**
30											100.00				

	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
1																
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4																
5	Ash Analysis															
6	arium Oxic	alcium Oxic	Iron Oxide	agnesium Oxi	anganese Oxi	sphorus Pento	otassium Oxid	licon Dioxi	odium Oxic	rontium Oxi	ulfur Trioxi	anium Diox	Silica	Undetermined	Antimony, SE	Arsenic, As
7	%	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm
8	0.13	1.40	12.63	0.84	0.03	0.35	2.21	51.11	0.33	0.15	1.09	1.55	77.53	0.25	0.76	21
9																
10	0.06	2.89	19.97	0.91	0.04	0.21	2.41	49.61	0.77	0.04	2.47	1.08	67.72		1.07	10
11																
12	0.05	1.21	22.91	0.99	0.03	0.24	2.63	45.95	0.31	0.05	0.95	1.10	64.72	0.17	1.37	15
13																
14	0.07	2.70	21.39	0.89	0.04	0.24	2.24	46.56	0.52	0.05	2.58	1.07	65.14	0.25	1.00	13
15																
16	0.08	3.41	21.84	0.92	0.04	0.27	2.37	45.26	0.48	0.04	3.36	1.00	63.44	0.04	1.12	12
17																
18	0.08	2.57	22.23	0.92	0.04	0.29	2.39	45.09	0.45	0.06	2.24	1.01	63.70		0.94	13
19																
20																
21																
22																
23	0.07	2.74	21.80	0.91	0.04	0.26	2.33	45.88	0.48	0.05	2.58	1.04	64.37	0.12	1.05	13
24																
25	0.13	1.40	12.63	0.84	0.03	0.35	2.21	51.11	0.33	0.15	1.09	1.55	77.53	0.25	0.76	21
26																
27	0.06	2.89	19.90	0.91	0.04	0.21	2.41	49.65	0.77	0.04	2.47	1.08	67.72	0.13	1.07	10
28																
29	0.40	17.00	5.10	3.60	0.03	0.50	0.90	40.27	1.60	0.40	11.00	1.20	58.00		2.00	4
30																

	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS
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3														
4														
5	Trace Elements													
6	Barium, Ba	Cadmium, Cc	Chlorine, Cl	Chromium, Cr	Flourine, Fl	Lead, Pb	Magnesium, Mg	Mercury, Hg	Nickel, Ni	Selenium, Se	Strontium, Si	Vanadium, V	Zinc, Zn	
7	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
8	115	0.08	863	20	85	8	547	0.12	15	4.73	135	31	14	
9														
10	49	0.30	1,845	17	71	11	509	0.10	14	1.93	30	40	50	
11														
12	63	0.20	155	23	86	12	721	0.09	29	2.32	58	48	32	
13														
14	72	0.60	964	21	93	12	663	0.13	19	3.16	56	40	44	
15														
16	77	0.68	622	23	102	10	703	0.13	20	2.65	47	37	51	
17														
18	79	0.89	624	25	108	11	693	0.12	21	3.02	67	39	59	
19														
20														
21														
22														
23	74	0.65	1,600	23	98	11	684	0.12	20	2.94	56	40	48	
24														
25	115	0.08	863	20	85	8	547	0.12	15	4.73	135	31	14	
26														
27	49	0.30	1,845	17	71	11	509	0.10	14	1.93	30	40	50	
28														
29	270	1.40	125	10	63	4	1,525	0.08	7	2.00	250	28	11	
30														

Limestone Quality

Mill Creek, Trimble County and Ghent

§6.1 Specifications. The limestone delivered hereunder shall conform to the foll

specifications on a "dry" basis:

Active Ingredient Proportions	(%) Guaranteed
Surface Moisture	7.0% Maximum
$CaCO_3$	90.0% Minimum *
$MgCO_3$	6.0% Maximum
SiO_2	3.5% Maximum
Fe_2O_3	1.5% Maximum
Al_2O_3	4.30% Maximum
Inerts	7.0% Maximum
Flouride	500 PPM
Chloides	550PPM
Bond Work Index	12 Maximum

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
51																	
52				* The Seller shall use its best efforts to supply limestone containing a minimum of 9													
53				$CaCO_3$.													
54																	
55																	
56																	
57																	
58																	

	R	S
51		
52	?2.0%	
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Limestone Quality

Brown

§6.1 Specifications. The limestone delivered hereunder shall conform to the follc

specifications on an "as received" basis:

Active Ingredient Proportions	(%) Guaranteed
Surface Moisture	4.0% Maximum
$CaCO_3$	92.0% Minimum
$MgCO_3$	6.0% Maximum
SiO_2	3.5% Maximum
Fe_2O_3	1.0% Maximum
$R_2O_3(Al_2O_3+Fe_2O_3)$	.90% Typical
S	.05% Maximum
P_2O_5	.40% Maximum
Alkali (Na_2O+K_2O)	1.0% Maximum
Al_2O_3	1.5% Maximum

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Inerts	3.0% Maximum
Flouride	1,250 PPM
Chlorides	250 PPM
Bond Work Index	10.5 Maximum

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	A	B	C	D	E	F	G	H	I
1			**Black & Veatch AQCS Information Needs**						
2									
3	Power Plant:				Owner:				
4	Unit				Project:				
5									
6		**References:**							
7	1)								
8	2)								
9	3)								
10	4)								
11		Yellow highlight denotes Critical Focus Needs.							
12		**Fuel Data**							
13		Ultimate Coal Analysis (% by mass as received):				**Typical**	**Minimum**	**Maximum**	
14		Carbon				64			%
15		Hydrogen				4.5			%
16		Sulfur				3.5			%
17		Nitrogen				1.3			%
18		Oxygen				4.62			%
19		Chlorine				0.08			%
20		Ash				12			%
21		Moisture				10			%
22		Total				100.00			
23		Higher Heating Value, Btu/lb (as received)				11471.82			Btu/lb
24		Ash Mineral Analysis (% by mass):							
25		Silica(SiO_2)							%
26		Alumina (Al_2O_3)							%
27		Titania (TiO_2)							%
28		Phosphorous Pentoxide (P_2O_5)							%
29		Calcium Oxide (CaO)							%
30		Magnesium Oxide (MgO)							%
31		Sodium Oxide (Na_2O)							%
32		Iron Oxide (Fe_2O_3)							%
33		Sulfur Trioxide (SO_3)							%
34		Potassium Oxide (K_2O)							%
35		Coal Trace Element Analysis (mercury and especially arsenic if fly ash is returned to boiler)							

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13	**Notes**	
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	A	B	C	D	E	F	G	H	I
36		Vanadium					%		
37		Arsenic					%		
38		Mercury					% or ppm		
39		Other	LOI				%		
40		Natural gas firing capability (if any at all)							
41		Natural gas line (into the station) capacity (if applicable)							
42		Current Lost on Ignition (LOI)							
43		Start-up Fuel							
44		Ash Fusion Temperature							
45		Initial Deformation					°F		
46		Softening					°F		
47		Hemispherical					°F		
48		Hardgrove Grindability Index							

	J	K
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	A	B	C	D	E	F	G	H	I
49		**Plant Size and Operation Data: (provide for each unit)**				**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**
50		Maximum (Design) Fuel Burn Rate				B&V can determine some values from previous VISTA			
51		Boiler Type (e.g. wall-fired, tangential fired, cyclone)				Tangential fired	Tangential fired	opposed wall	opposed wall
52		Boiler Manufacturer				CE	CE	B&W	B&W
53		Net MW Rating (specify plant or turbine MW)		Winter ratings		303MW	303MW	397MW	492MW
54		Gross MW Rating		Winter ratings		330MW	330MW	423MW	525MW
55		Net Unit Heat Rate				10639	10929	10602	10410
56		Net Turbine Heat Rate							
57		Boiler SO2 to SO3 Conversion Rate (if known)							
58		Fly Ash/Bottom Ash Split				80/20	80/20	80/20	80/20
59		Flue Gas Recirculation (FGR)							
60			Installed? (Y/N)			N	N	N	N
61			In operation? (Y/N)						
62		Flue Gas Recirculation (if installed)							
63		Type of Air Heater				Air Preheater Co.	Air Preheater Co.	Ljungstrom	Ljungstrom
64		Air Heater Configuration (horizontal or vertical flow or shaft)				Vertical Flow	Vertical Flow	Vertical Flow	Vertical Flow
65		Design Pressure/Vacuum Rating for Steam Generator			+/-				
66		Design Pressure/Vacuum Rating for Particulate Control			+/-				
67									
68		**Electrical / Control**							
69		DCS Manufacturer (e.g. Westinghouse, Foxboro, Honeywell, etc.)				Honeywell	Honeywell	Honeywel	Honeywell
70		Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 30				TC3000			Experion
71		Neural Network Installed? (Y/N)				Y	Y	N	N
72		Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)				Neuco	Neuco		
73		Extra Capacity available in DCS?				minimal	minimal	minimal	minimal
74		Historian Manufacturer				Honeywell	Honeywell	Honeywell	Honeywell
75		Additional Controls from DCS or local PLC w/tie-in							
76		Transformer Rating for Intermediate Voltage Switchgear							
77		Capacity of Spare Electrical Cubicles in Existing MCC's and LCUS's (S							
78		Auxiliary Electric Limited (Y/N)				N	N	N	N
79									
80		**Operating Conditions**							
81		Economizer Outlet Temperature				760	760	690	640

	J	K
49		**Notes**
50	MBtu/hr	
51		
52		
53	MW	
54	MW	
55	Btu/kWh	
56	Btu/kWh	
57	%	
58	%	
59		
60		
61		
62	%	
63		
64		
65	in wg.	
66	in wg.	
67		
68		
69		
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73		
74		
75		
76		
77		
78		
79		
80		
81	°F	

	A	B	C	D	E	F	G	H	I
82		Economizer Outlet Pressure				-5	-5	-5	-5
83		Excess Air or Oxygen at Economizer Outlet (full load/min load)				5	5	5	5
84		Economizer Outlet Gas Flow				1524804	1524804	1958726	2239453
85						2976508	2976508	4056287	4848440
86		Air Heater Outlet Temperature				375	375	325	315
87		Air Heater Outlet Pressure				-10	-10	-18	-18
88		Particulate Control Equipment Outlet Temperature				375	375	325	315
89		Particulate Control Equipment Outlet Pressure				-14	-14	-23	-21
90		FGD Outlet Temperature (if applicable)				133	133	130	130
91		FGD Outlet Pressure (if applicable)				1	1	1	1

	J	K
82	in wg.	
83	%	
84	acfm	
85	lb/hr	
86	°F	
87	in wg.	
88	°F	
89	in wg.	
90	°F	
91	in wg.	

	A	B	C	D	E	F	G	H	I
92		**NOx Emissions**				**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**
93		Emissions Limit						0.7	0.7
94		Type of NOx Control (if any) - LNB, OFA, etc.				LNB/OFA	LNB/OFA	LNB/SCR	LNB/SCR
95		Current NOx Reduction with existing controls						90%	90%
96		Type of Ammonia Reagent Used (Anhydrous or % H_2O or Urea)						Anhydrous	Anhydrous
97		Reagent Cost						500	500
98		Current Emissions				0.32	0.32	0.05	0.05
99									
100									
101									
102		**Particulate Emissions**							
103		Emissions Limit				0.115	0.115	0.105	0.105
104		Type of Emission Control - Hot Side ESP, Cold Side ESP or FF				Cold Side ESP	Cold Side ESP	Cold Side ESP	Cold Side ESP
105		Oxygen Content of Flue Gas @ Air Heater Outlet				4	4	4	4
106		Oxygen Content of Flue Gas @ ESP/FF Outlet				4	4	4	4
107		Current Emissions				0.36	0.48	0.05	0.04
108		Fly Ash Sold (Y/N) - See Economic Section				Y	Y	Y	Y
109									
110			**ESP**						
111			Specific Collection Area (SCA)						
112			Discharge Electrode Type						
113			Supplier						
114			Efficiency						
115			No. of Electrical Sections						
116			% of Fly Ash Sold						
117									
118			**Fabric Filter**						
119			Air to Cloth Ratio (net)						
120			Number of Compartments						
121			Number of Bags per Compartments						
122			Efficiency						
123			% of Fly Ash Sold						
124									
125		**SO_2 Emissions**							
126		Emissions Limit				1.2	1.2	1.2	1.2

	J	K
92		**Notes**
93	lb/MBtu	
94		
95	%	
96		
97	$/ton	
98	lb/hr	
99	ton/yr	
100	lb/MBtu	
101		
102		
103	lb/MBtu	
104		
105	%	
106	%	
107	lb/MBtu	
108		Very minimal at this point in time
109		
110		
111	ft^2/1000 acfm	
112		
113		
114	%	
115		
116	%	
117		
118		
119	ft/min	
120		
121		
122	%	
123	%	
124		
125		
126	lb/MBtu	

	A	B	C	D	E	F	G	H	I
127		Type of Emission Control - wet or semi-dry FGD (if any)				Wet FGD	Wet FGD	Wet FDG	Wet FGD
128		Current Emissions				0.47	0.47	0.58	0.47
129									
130									
131		Byproduct Sold (Y/N) - See Economic Section							
132									

	J	K
127		
128	lb/hr	
129	ton/yr	
130	lb/MBtu	
131		
132		

	A	B	C	D	E	F	G	H	I
133		**ID Fan Information (at Full Load):**				**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**
134		ID Fan Inlet Pressure				-16	-16.5	-22	-23
135		ID Fan Discharge Pressure				-2	-1		
136		ID Fan Inlet Temperature				340	340	330	330
137		Oxygen Content of Flue Gas @ ID Fan Inlet				4	4	4	4
138		ID Fan Motor Voltage (Rated)				4160	4160	4160	4160
139		ID Fan Motor Amps (Operating)				275	275	920	1115
140		ID Fan Motor Amps (Rated)				320	320	1176	
141		ID Fan Motor Power (Rated)				2500	2500	9000	9500
142		ID Fan Motor Service Factor (1.0 or 1.15)				1.15	1.15	1	1.15
143									
144		**Chimney Information:**							
145		Flue Liner Material				C276	C276	C276	C276
146		Flue Diameter				15' 6"	15' 6"	19' 6"	19' 6"
147		Chimney Height				623	623	630	630
148		Number of Flues				1	1	1	1
149									
150		**Drawing and Other Information Needs:**							
151		Baseline pollutant emissions data for AQC analysis							
152		Technical evaluations performed to support recent consent decree activity							
153		Existing Plant/AQC system general design and performance issues							
154		Full detailed boiler front, side, and rear elevation drawings							
155		Boiler Design Data (Boiler Data Sheet)							
156		Ductwork Arrangement Drawing (emphasis from economizer outlet to air heater inlet)							
157		Ductwork Arrangement Drawing (emphasis from air heater outlet to stack)							
158		Plant Arrangement Drawings (showing column row spacing)							
159		CEM Quarterly and Annual Data (required if base emissions are to be verified)							
160		Recent Particulate Emission Test Report (If available)							
161		Current Mercury Testing Results (If available)							
162		Current Site Arrangement Drawing							
163		Foundation Drawings and/or Soils Report							
164		Underground Utilities Drawings							
165		Plant One Line Electrical Drawing							
166		Fan Curves for Existing ID Fans (including current system resistance curve)							
167		Acceptable Fan Operating Margins							

	J	K
133		**Notes**
134	in wg.	
135	in wg.	
136	F	
137	%	
138	volts	
139	A	
140	A	
141	hp	
142		
143		
144		
145		
146	ft	top of liner
147	ft	
148		1&2 share a common stack
149		
150		
151		
152		
153		
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	A	B	C	D	E	F	G	H	I
168		Plant Outage Schedule							
169		Specific burner and overfire air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of over							
170									

	J	K
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	A	B	C	D	E	F	G	H	I
171		**Economic Evaluation Factors:**				**Unit X**	**Unit X**	**Unit X**	**Unit X**
172		Remaining Plant Life/Economic Life							
173		Annual Capacity Factor (over life of study/plant)							
174		Contingency Margin (can be determined by B&V)							
175		Owner Indirects Cost Margin							
176		Interest During Construction							
177		Levelized Fixed Charge Rate or Capital Recovery Factor							
178		Present Worth Discount Rate							
179		Capital Escalation Rate							
180		O&M Escalation Rate							
181		Energy Cost (energy to run in-house equipment)							
182		Replacement Energy Cost (required to be							
183		purchased during unit outage)							
184		Year-by-Year Fuel Prices (over life of study/plant)							
185									
186		Base Fuel Price							
187									
188		Fuel Price Escalation Rate							
189		Water Cost							
190		Limestone Cost							
191		Lime Cost							
192		Ammonia Cost							
193		Fully Loaded Labor Rate (per person)							
194		Fly Ash Sales							
195		Bottom Ash Sales							
196		FGD Byproduct Sales							
197		Waste Disposal Cost							
198		Fly Ash							
199		Bottom Ash							
200		Scrubber Waste							

	J	K
171		**Notes**
172	years	
173	%	
174	%	
175	%	
176	%	
177	%	
178	%	
179	%	
180	%	
181	$/MWh	
182		
183	$/MWh	
184	$/MBtu	
185	$/ton	
186	$/MBtu	
187	$/ton	
188	%	
189	$/1,000 gal	
190	$/ton	
191	$/ton	
192	$/ton	
193	$/year	
194	$/ton	
195	$/ton	
196	$/ton	
197		
198	$/ton	
199	$/ton	
200	$/ton	

	A	B	C	D	E	F
1						
2	Project - Document & Drawing List					
3						
4		**Item**	**Document Type**	**Document/Drawing No.**	**Description**	**Date**
5		1	Drawing			
6		2	Drawing			
7		3	Drawing			
8		4	Drawing			
9		5	Document			
10		6	Drawing			
11		7	Document			
12		8	Document			
13		9	Document			
14		10	Document			
15		11	Document			
16		12	Document			
17		13	Document			
18		14	Document			
19		15	Document			
20		16	Document			
21		17	Drawing			
22		18	Drawing			
23		19	Drawing			
24		20	Drawing			
25		21	Drawing			
26		22	Drawing			
27		23	Drawing			
28		24	Drawing			
29		25	Drawing			
30		26	Document			
31		27	Document			
32		28	Drawing			
33		29	Drawing			
34		30	Drawing			
35		31	Drawing			
36		32	Document			
37		33	Document			
38		34	Drawing			
39		35	Drawing			
40		36	Drawing			
41		37	Drawing			
42		38	Drawing			
43		39	Drawing			
44		40	Document			

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4	**Notes**
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	A	B	C	D	E	F
45		41	Drawing			
46		42	Drawing			
47		43	Drawing			
48		44	Drawing			
49		45	Document			
50		46	Drawing			
51		47	Document			
52		48	Document			

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From: Saunders, Eileen
To: Schroeder, Andrea
Sent: 10/14/2010 9:58:52 AM
Subject: FW: Environmental Compliance-DRAFT
Attachments: Environmental Summay alternate scenario Rev4 - Pras (4) 10-13-10.xlsx

Andrea,

I noticed that Robert is out of the office so I thought I would send you a copy of the email I sent to him yesterday.

Thanks,

Eileen

From: Saunders, Eileen
Sent: Wednesday, October 13, 2010 11:44 AM
To: Conroy, Robert
Cc: Straight, Scott; Ritchey, Stacy
Subject: Environmental Compliance-DRAFT

Robert,

Scott and I conference this morning regarding the enclosed spreadsheet. Here are some general comments for you to consider while conducting your review:

- For the most part, we approached each station as a program. Mill Creek is slightly different due to the variety of work that is planned for the station.
- The start dates for construction are based on the earliest unit to be installed.
- For Mill Creek, the FGD upgrades on Units 1, 2, 3 and SCR upgrades on Unit 4 are tied to the same construction dates. All MC Baghouses, PAC Injection Systems and Unit 3 Removal dates are linked together. Lastly, all new MC SCR's are tied to the same date.
- I did not make any changes to the ECR Filing column, the SAM Mitigation row or the financials.
- As discussed, we do not have a corporate contracting strategy at this time so I used the worst case scenario of an EPC contract as my starting point. Additionally, these construction dates are based on schedules provided by B&V during their Phase I Study. That study is not representative of Level I Engineering.

Please let me know if you would like to arrange a conference call to discuss the information provided.

Thanks,

Eileen

	A	C	D	E	F	G	H	I	J
1	**Environmental Air - CATR by January 2015, NAAQS by January 2016, HAPs by January 2017**			DRAFT					
2	$ in thousands								
3		**Capital Cost**	**ECR Filing**	**pportable Docume**	**st Major Commitme**	2011	2012	2013	2014
4	**Alternate Plan**								
5	**Brown**								
6	Brown 1 - SCR	$59,000	Dec-10		See BR- Unit 2	$2,950	$17,700	$23,600	$14,750
7	Brown 1 - Baghouse	$34,000	Dec-10		See BR- Unit 2	$1,700	$11,900	$13,600	$6,800
8	Brown 1 - PAC Injection	$1,599	Apr-12		See BR- Unit 2			$800	$800
10	Brown 1 - SAM Mitigation	$4,000	Dec-10			$200	$1,200	$1,600	$1,000
12	Brown 1 - Escalation	$15,476				$371	$3,679	$6,504	$4,922
13	Total Brown 1	**$114,075**				**$5,221**	**$34,479**	**$46,103**	**$28,272**
14									
15	Brown 2 - SCR	$92,000	Dec-10		May, 2011	$9,200.0	$34,500	$43,700	$4,600
16	Brown 2 - Baghouse	$34,000	Jul-11		May, 2011		$1,360	$10,200	$10,880
17	Brown 2 - PAC Injection	$2,476	Apr-13		May, 2011				$1,238
20	Brown 2 - SAM Mitigation	$4,000	Dec-10			$200	$1,600	$2,200	
22	Brown 2 - Escalation	$21,300				$718	$4,475	$9,214	$3,524
23	Total Brown 2	**$153,776**				**$10,118**	**$41,935**	**$65,314**	**$20,242**
24									
27	Brown 3 - Baghouse	$61,000	Apr-12		See BR- Unit 2			$1,830	$21,350
28	Brown 3 - PAC Injection	$5,426	Apr-13		See BR- Unit 2				$1,000
31	Brown 3 - Escalation	$16,475			See BR- Unit 2	$0	$0	$301	$4,711
32	Total Brown 3	**$82,901**				**$0**	**$0**	**$2,131**	**$27,061**
33									
34	**Total Brown**	**$350,751**				**$15,339**	**$76,414**	**$113,547**	**$75,575**
35									
36	**Ghent**								
37	Ghent 1 - Baghouse	$131,000	Apr-12		See GH-Unit 2			$3,930	$45,850
38	Ghent 1 - PAC Injection	$6,380	Apr-13		See GH-Unit 2				$1,000
42	Ghent 1 - Escalation	$34,012				$0	$0	$645	$9,876
43	Total Ghent 1	**$171,392**				**$0**	**$0**	**$4,575**	**$56,726**
44									
45	Ghent 2 - SCR	$227,000	Dec-10		June, 2011	$11,350	$68,100	$90,800	$56,750
46	Ghent 2 - Baghouse	$120,000	Apr-12		June, 2011			$4,800	$42,000
47	Ghent 2 - PAC Injection	$6,109	Apr-13		June, 2011				$1,000
52	Ghent 2 - Escalation	$66,928				$867	$8,135	$15,701	$21,028
53	Total Ghent 2	**$420,037**				**$12,217**	**$76,235**	**$111,301**	**$120,778**
54									
55	Ghent 3 - Baghouse	$138,000	Apr-12		See GH-Unit 2			$16,560	$48,300
56	Ghent 3 - PAC Injection	$6,173	Apr-13		See GH-Unit 2				$3,087
60	Ghent 3 - Escalation	$33,660			See GH-Unit 2	$0	$0	$2,720	$10,832
61	Total Ghent 3	**$177,833**				**$0**	**$0**	**$19,280**	**$62,219**
62									
63	Ghent 4 - Baghouse	$117,000	Apr-12		See GH-Unit 2			$11,700	$40,950
64	Ghent 4 - PAC Injection	$6,210	Apr-13		See GH-Unit 2				$3,105
68	Ghent 4 - Escalation	$28,990				$0	$0	$1,922	$9,287
69	Total Ghent 4	**$152,200**				**$0**	**$0**	**$13,622**	**$53,342**
70									
71	**Total Ghent**	**$921,461**				**$12,217**	**$76,235**	**$148,777**	**$293,065**
72									

	K	L	M	N	O	P
1						
2						
3	2015	2016	2017	2018	Total	
4						
5						
6					$59,000	$0
7					$34,000	$0
8					$1,599	$0
10					$4,000	$0
12					$15,476	$0
13	**$0**	**$0**	**$0**	**$0**	**$114,075**	**$0**
14						
15					$92,000	$0
16	$10,540	$1,020			$34,000	$0
17	$1,238				$2,476	$0
20					$4,000	$0
22	$3,053	$316			$21,300	$0
23	**$14,831**	**$1,336**	**$0**	**$0**	**$153,776**	**$0**
24						
27	$28,670	$9,150			$61,000	$0
28	$3,426	$1,000			$5,426	$0
31	$8,320	$3,142			$16,475	$0
32	**$40,416**	**$13,292**	**$0**	**$0**	**$82,901**	**$0**
33						
34	**$55,248**	**$14,628**	**$0**	**$0**	**$350,751**	**$0**
35						
36						
37	$61,570	$19,650			$131,000	$0
38	$4,380	$1,000			$6,380	$0
42	$17,097	$6,393			$34,012	$0
43	**$83,047**	**$27,043**	**$0**	**$0**	**$171,392**	**$0**
44						
45					$227,000	$0
46	$56,400	$16,800			$120,000	$0
47	$4,109	$1,000			$6,109	$0
52	$15,686	$5,511			$66,928	$0
53	**$76,195**	**$23,311**	**$0**	**$0**	**$420,037**	**$0**
54						
55	$66,240	$6,900			$138,000	$0
56	$3,087				$6,173	$0
60	$17,972	$2,136			$33,660	$0
61	**$87,298**	**$9,036**	**$0**	**$0**	**$177,833**	**$0**
62						
63	$58,500	$5,850			$117,000	$0
64	$3,105				$6,210	$0
68	$15,970	$1,811	$0	$0	$28,990	$0
69	**$77,575**	**$7,661**	**$0**	**$0**	**$152,200**	**$0**
70						
71	**$324,115**	**$67,052**	**$0**	**$0**	**$921,461**	**$0**
72						

	A	C	D	E	F	G	H	I	J
73	**Mill Creek**								
74	Mill Creek 1 - FGD Upgrade	$41,250	Apr-12		June, 2011			$10,313	$28,875
75	Mill Creek 1 - SCR	$97,020	Apr-12		December, 2011			$2,911	$27,166
76	Mill Creek 1 - Baghouse	$80,850	Jul-11		See MC-Unit 4		$8,085	$28,298	$40,425
77	Mill Creek 1 - Electrostatic Precipitator	$0			See MC-Unit 4		$0	$0	$0
78	Mill Creek 1 - PAC Injection	$4,290	Jul-11		See MC-Unit 4		$429	$1,502	$2,360
81	Mill Creek 1 - SAM Mitigation	$7,920	Apr-12					$396	$792
83	Mill Creek 1 - Escalation	$52,077				$0	$1,017	$7,131	$21,000
84	Total Mill Creek 1	**$283,407**				**$0**	**$9,531**	**$50,549**	**$120,617**
85									
86	Mill Creek 2 - FGD Upgrade	$41,250	Jul-11		June, 2011		$10,313	$28,875	$2,063
87	Mill Creek 2 - SCR	$97,020	Jul-11		December, 2011		$2,911	$27,166	$29,106
88	Mill Creek 2 - Baghouse	$80,850	Dec-10		See MC-Unit 4	$8,085	$28,298	$40,425	$4,043
89	Mill Creek 2 - Electrostatic Precipitator	$33,000	Dec-10		See MC-Unit 4	$3,300	$11,550	$16,500	$1,650
90	Mill Creek 2 - PAC Injection	$4,290	Dec-10		See MC-Unit 4	$429	$1,502	$2,360	
91	Mill Creek 2 - SAM Mitigation	$7,920	Jul-11				$396	$792	$2,376
92	Mill Creek 2 - Escalation	$45,866				$903	$6,566	$19,070	$8,271
93	Total Mill Creek 2	**$310,196**				**$12,717**	**$61,534**	**$135,188**	**$47,508**
94									
97	Mill Creek 3 - FGD (U4 update and tie in)	$63,750	Apr-13		June, 2011				$47,813
98	Mill Creek 3 - FGD (Unit 3 Removal)	$25,500	Apr-13		See MC-Unit 4				$6,375
99	Mill Creek 3 - Baghouse	$104,125	Jul-11		See MC-Unit 4		$2,083	$31,238	$39,568
100	Mill Creek 3 - PAC Injection	$5,525	Jul-11		See MC-Unit 4		$111	$1,658	$2,100
101	Mill Creek 3 - Escalation	$43,488				$0	$262	$5,402	$20,206
102	Total Mill Creek 3	**$242,388**				**$0**	**$2,455**	**$38,297**	**$116,061**
103									
104	Mill Creek 4 - FGD	$236,250	Dec-10		March, 2011	$18,900	$80,325	$89,775	$47,250
105	Mill Creek 4 - SCR Upgrade	$5,250	Dec-10		June, 2011	$4,200	$1,050		
106	Mill Creek 4 - Baghouse	$131,250	Dec-10		March, 2011	$5,250	$45,938	$52,500	$27,563
107	Mill Creek 4 - PAC Injection	$6,825	Dec-10		March, 2011	$273	$2,389	$2,730	$1,433
108	Mill Creek 4 - Ammonia	$10,500	Dec-10		June, 2011	$5,250	$5,250		
109	Mill Creek 4 - Escalation	$58,596				$2,588	$16,121	$23,815	$16,073
110	Total Mill Creek 4	**$448,671**				**$36,461**	**$151,072**	**$168,820**	**$92,319**
111									
112	**Total Mill Creek**	**$1,284,663**				**$49,177**	**$224,592**	**$392,854**	**$376,505**
113									
114	**Trimble**								
115	Trimble 1 - Baghouse	$128,000	Apr-12		December, 2012			$12,800	$44,800
116	Trimble 1 - PAC Injection	$6,451	Apr-13		December, 2012				$3,226
117	Trimble 1 - Escalation	$31,635				$0	$0	$2,102	$10,124
118	Total Trimble 1	**$166,086**				**$0**	**$0**	**$14,902**	**$58,149**
119									
120	**Total Trimble**	**$166,086**				**$0**	**$0**	**$14,902**	**$58,149**
121									
122	**Total Environmental Compliance Air - Alternate Plan**	**$2,722,961**				**$76,733**	**$377,241**	**$670,080**	**$803,294**
123									
124									
125	Scope	$2,274,459							
126	Escalation	$448,502							
127		**$2,722,961**							

	K	L	M	N	O	P
73						
74	$2,063				$41,250	$0
75	$29,106	$35,897	$1,940		$97,020	$0
76	$4,043				$80,850	$0
77	$0				$0	$0
78					$4,290	$0
81	$2,376	$3,960	$396		$7,920	$0
83	$9,744	$12,340	$846		$52,077	$0
84	**$47,331**	**$52,197**	**$3,182**	**$0**	**$283,407**	**$0**
85						
86					$41,250	$0
87	$35,897	$1,940			$97,020	$0
88					$80,850	$0
89					$33,000	$0
90					$4,290	$0
91	$3,960	$396			$7,920	$0
92	$10,332	$723	$0		$45,866	$0
93	**$50,190**	**$3,060**	**$0**	**$0**	**$310,196**	**$0**
94						
97	$15,938				$63,750	$0
98	$19,125				$25,500	$0
99	$31,238				$104,125	$0
100	$1,658				$5,525	$0
101	$17,617	$0			$43,488	$0
102	**$85,575**	**$0**	**$0**	**$0**	**$242,388**	**$0**
103						
104					$236,250	$0
105					$5,250	$0
106					$131,250	$0
107					$6,825	$0
108					$10,500	$0
109	$0				$58,596	$0
110	**$0**	**$0**	**$0**	**$0**	**$448,671**	**$0**
111						
112	**$183,095**	**$55,257**	**$3,182**	**$0**	**$1,284,663**	**$0**
113						
114						
115	$64,000	$6,400			$128,000	$0
116	$3,226				$6,451	$0
117	$17,427	$1,981			$31,635	$0
118	**$84,653**	**$8,381**	**$0**	**$0**	**$166,086**	**$0**
119						
120	**$84,653**	**$8,381**	**$0**	**$0**	**$166,086**	**$0**
121						
122	**$647,111**	**$145,319**	**$3,182**	**$0**	**$2,722,961**	**$0**
123						
124						
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128									
129									
130									
131									
132									
133									
134							3.5%	3.5%	3.5%
135							1	2	3

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128						
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133						
134	3.5%	3.5%	3.5%	3.5%	3.5%	
135	4	5	6	7	8	

	A	B	D	E	F	G	H	I	J	K	L	M	N
1		**Environmental Air - CATR by January 2015, NAAQS by January 2016, HAPs by January 2017**											
2		$ in thousands											
3			**Capital Cost**		2011	2012	2013	2014	2015	2016	2017	2018	Total
4		**Alternate Plan**											
5	1	Brown 1 - SCR	$59,000		$2,950	$17,700	$23,600	$14,750					$59,000
6	1	Brown 1 - Baghouse	$34,000		$1,700	$11,900	$13,600	$6,800					$34,000
7	1	Brown 1 - SAM Mitigation	$4,000		$200	$1,200	$1,600	$1,000					$4,000
10	1	Brown 2 - SCR	$92,000		$9,200	$34,500	$43,700	$4,600					$92,000
11	1	Brown 2 - SAM Mitigation	$4,000		$200	$1,600	$2,200						$4,000
12	1	Ghent 2 - SCR	$227,000		$11,350	$68,100	$90,800	$56,750					$227,000
16	1	Mill Creek 2 - Baghouse	$80,850		$8,085	$28,298	$40,425	$4,043					$80,850
19	1	Mill Creek 2 - Electrostatic Precipitator	$33,000		$3,300	$11,550	$16,500	$1,650					$33,000
20	1	Mill Creek 2 - PAC Injection	$4,290		$429	$1,502	$2,360						$4,290
23	1	Mill Creek 4 - FGD	$236,250		$18,900	$80,325	$89,775	$47,250					$236,250
24	1	Mill Creek 4 - SCR Upgrade	$5,250		$4,200	$1,050							$5,250
28	1	Mill Creek 4 - Baghouse	$131,250		$5,250	$45,938	$52,500	$27,563					$131,250
29	1	Mill Creek 4 - PAC Injection	$6,825		$273	$2,389	$2,730	$1,433					$6,825
30	1	Mill Creek 4 - Ammonia	$10,500		$5,250	$5,250							$10,500
35	2	Brown 2 - Baghouse	$34,000			$1,360	$10,200	$10,880	$10,540	$1,020			$34,000
36	2	Mill Creek 1 - Baghouse	$80,850			$8,085	$28,298	$40,425	$4,043				$80,850
37	2	Mill Creek 1 - PAC Injection	$4,290			$429	$1,502	$2,360					$4,290
41	2	Mill Creek 2 - FGD Upgrade	$41,250			$10,313	$28,875	$2,063					$41,250
42	2	Mill Creek 2 - SCR	$97,020			$2,911	$27,166	$29,106	$35,897	$1,940			$97,020
46	2	Mill Creek 2 - SAM Mitigation	$7,920			$396	$792	$2,376	$3,960	$396			$7,920
47	2	Mill Creek 3 - Baghouse	$104,125			$2,083	$31,238	$39,568	$31,238				$104,125
48	2	Mill Creek 3 - PAC Injection	$5,525			$111	$1,658	$2,100	$1,658				$5,525
49	3	Brown 1 - PAC Injection	$1,599				$800	$800					$1,599
50	3	Brown 3 - Baghouse	$61,000				$1,830	$21,350	$28,670	$9,150			$61,000
53	3	Ghent 1 - Baghouse	$131,000				$3,930	$45,850	$61,570	$19,650			$131,000
55	3	Ghent 2 - Baghouse	$120,000				$4,800	$42,000	$56,400	$16,800			$120,000
56	3	Ghent 3 - Baghouse	$138,000				$16,560	$48,300	$66,240	$6,900			$138,000
57	3	Ghent 4 - Baghouse	$117,000				$11,700	$40,950	$58,500	$5,850			$117,000
58	3	Mill Creek 1 - FGD Upgrade	$41,250				$10,313	$28,875	$2,063				$41,250
59	3	Mill Creek 1 - SCR	$97,020				$2,911	$27,166	$29,106	$35,897	$1,940		$97,020
60	3	Mill Creek 1 - SAM Mitigation	$7,920				$396	$792	$2,376	$3,960	$396		$7,920
63	3	Trimble 1 - Baghouse	$128,000				$12,800	$44,800	$64,000	$6,400			$128,000
64	4	Brown 2 - PAC Injection	$2,476					$1,238	$1,238				$2,476
65	4	Brown 3 - PAC Injection	$5,426					$1,000	$3,426	$1,000			$5,426
66	4	Ghent 1 - PAC Injection	$6,380					$1,000	$4,380	$1,000			$6,380
67	4	Ghent 2 - PAC Injection	$6,109					$1,000	$4,109	$1,000			$6,109
68	4	Ghent 3 - PAC Injection	$6,173					$3,087	$3,087				$6,173
69	4	Ghent 4 - PAC Injection	$6,210					$3,105	$3,105				$6,210
70	4	Mill Creek 3 - FGD (U4 update and tie in)	$63,750					$47,813	$15,938				$63,750
71	4	Mill Creek 3 - FGD (Unit 3 Removal)	$25,500					$6,375	$19,125				$25,500
72	4	Trimble 1 - PAC Injection	$6,451					$3,226	$3,226				$6,451
73													
74													
75													

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30	$0
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37	$0
41	$0
42	$0
46	$0
47	$0
48	$0
49	$0
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56	$0
57	$0
58	$0
59	$0
60	$0
63	$0
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65	$0
66	$0
67	$0
68	$0
69	$0
70	$0
71	$0
72	$0
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75	

	A	B	D	E	F	G	H	I	J	K	L	M	N
76													
77													
78													
79					3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	
80					1	2	3	4	5	6	7	8	

From: Wilson, Stuart
To: Hurst, Brian
Sent: 9/9/2010 4:49:45 PM
Subject: RE: Brown Ash Pond/Landfill Analysis

Cool. Thanks.

From: Hurst, Brian
Sent: Thursday, September 09, 2010 4:40 PM
To: Wilson, Stuart
Subject: RE: Brown Ash Pond/Landfill Analysis

Stuart,
Attached is the bullet point summary you requested for the Brown Landfill/Ash Pond analysis and (hopefully) all the relevant information needed between the 2005 study and the recent document from Project Engineering. I can construct this into a formal document if need be…just let me know.

Basically the story is the Landfill options in the 2005 study were the highest cost with long projected permitting lead times (3+ years). The high by-product production rates (40% higher than the recent Project Engineering document) forecasted the ponds to be full by January 2010 which was too late to wait for landfill permitting. That's why the landfills weren't considered. The Project Engineering report still expects the landfills to be more expensive, but in order to be compliant, the ash ponds need to discontinue by-product disposal.

Let me know if you have any questions or issues.

Brian Hurst
Planning Engineer, Generation Planning
(502) 627-3416 phone
(502) 217-4898 fax

From: Wilson, Stuart
Sent: Wednesday, September 08, 2010 3:26 PM
To: Hurst, Brian
Subject: Re: Brown Ash Pond/Landfill Analysis

Sounds good. We can reference this report to bridge the gap between the options considered in 2009 and the options we're considering now. As we discussed, we need a series of bullet points summarizing our story. I'd envision this to be part of a bullet point. Make sense?

Stuart

From: Hurst, Brian
To: Wilson, Stuart
Sent: Wed Sep 08 14:57:21 2010
Subject: RE: Brown Ash Pond/Landfill Analysis

Stuart,

Just talked to Jeff Heun in Project Engineering who was the lead on the Brown Ash Pond project up until early this year. He said that the document they based their onsite ash-pond/onsite landfill decision on was an FMSM (engineering consulting firm) report from September 2006, that we referenced several times in our testimony and appendices for the 2009 ECR Filing. In this document FMSM evaluated 3 different ash pond options and 2 different on-site landfill options. The limiting factor was that Brown needed byproduct capacity very soon and landfill permitting was estimated to take at least 3 years because of the coarse features underneath the property at Brown (cave-like features). For the landfill options, once the ponds filled up, off-site trucking would be needed until permitting and initial construction could be completed which significantly increased the revenue requirements.

He said that the PSC has several of these documents in their possession and can reference them.

However, I will still look at this report (he said Generation Engineering has a copy) and diagnose the major points we can use if the PSC comes back with questions on this issue.

Let me know if you have any questions or issues.

Brian Hurst

Planning Engineer, Generation Planning

(502) 627-3416 phone

(502) 217-4898 fax

From: Wilson, Stuart
Sent: Tuesday, September 07, 2010 5:56 PM
To: Hurst, Brian
Subject: Brown Ash Pond/Landfill Analysis

Brian,

Based on your experience from the 2009 ECR filing (as it relates to Brown), I'd like your thoughts on how best to communicate the 'stop the pond and go with a landfill' decision to the commission. What did we say before? What should we say now? So far, PE's paper contains total revenue requirements. Is this all the commission needs to see? I understand that our 2009 filing contained two options (ash pond and off-site landfill). How do we bridge the gap from that 'story' to our story now?

Thanks.

Stuart

From:	Saunders, Eileen
To:	Joyce, Jeff; Wright, Paul; Drake, Michael; Ayler, Danny; Bickers, Troy; Smith, Dave; Jones, Greg; Scott, Randy; Revlett, Gary
CC:	Hillman, Timothy M.
Sent:	10/14/2010 11:18:02 AM
Subject:	FW: 168908.14.1000 101012 Ghent - Draft Kickoff and Site Visit Meeting Minutes
Attachments:	Draft Ghent Kickoff and Site Walkdown Meeting Minutes - 101210 with attachments.pdf

All,

Here are the notes from our meeting. Please let me know if you have any comments so I can respond to B&V.

Thanks,

Eileen

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
Sent: Tuesday, October 12, 2010 1:53 PM
To: Saunders, Eileen
Cc: 168908 E.ON-AQC; Jackson, Audrey; Wehrly, M. R.; Lucas, Kyle J.; Mahabaleshwarkar, Anand; Lausman, Rick L.; Hintz, Monty E.; Goodlet, Roger F.; Crabtree, Jonathan D.
Subject: 168908.14.1000 101012 Ghent - Draft Kickoff and Site Visit Meeting Minutes

Eileen,

Please find attached draft meeting minutes from the Ghent kickoff. Please provide E.ON's comments by next Tuesday, 10/19.
Thanks,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

DRAFT

BLACK & VEATCH CORPORATION
CONFERENCE MEMORANDUM

E.ON US	B&V Project 168908
Phase II: Air Quality Control Study	B&V File 14.1000
Ghent Kick-off and Site Visit	October 12, 2010

A kick-off and site walk down meeting was held October 6-7th at the Ghent Generating Station for the Phase II: Air Quality Control Study Project.

Recorded by: Tim Hillman

Attending:

Ghent Kick-off Meeting, October 6th

Eileen Saunders	E.ON
Mike Mooney	E.ON
Gary Revlett	E.ON
James Yocun	KU
Randy Scott	LG&E - KU
Greg Jones	LG&E - KU
Jeff Joyce	KU
Danny Ayler	KU
Troy Bickers	KU
Paul Wright	KU
Mike Drake	KU
Dave Smith	KU
Tim Hillman	B&V
M.R. Wehrly	B&V
Anand Mahabaleshwarkar	B&V
Kyle Lucas	B&V
Rick Lausman	B&V
Monty Hintz	B&V
Roger Goodlet	B&V

The purpose of this meeting was to 1) present the project scope and Phase I study results to the Ghent facility personnel, and 2) provide for a site visit and walk down of the Ghent facility. The above attendance list reflects those attending the initial kick-off meeting at Ghent. (Agenda and Attendance Roster attached herein for reference).

MEETING DISCUSSION

Day 1, October 6, 2010

The kick-off meeting began at 9 am at Ghent.

1. Eileen began the meeting with introductions and a brief summary of the project scope. E.ON requested B&V to prepare a data request with priority dates similar to that developed for Mill Creek. (Action Item #1)
2. E.ON (Gary Revlett) provided a review of all the regulations and environmental controls that are driving the capital projects. (Presentation attached herein for reference).
    - NAAQS

- Clean Air Transport Rule - CATR
- Electric Generating Unit Maximum Achievable Control Technology - EGU MACT

3. The change from annual average to a one (1) hour limit for NAAQS causes the biggest issues; even the diesel fired units may have issues on the site. The impact of one hour limits will be based on monitoring of stack emissions coupled with modeling done for the plume dispersion.
4. SO_2 should not be a problem for the Ghent units since the existing FGDs basically achieve +98% removal on the units and the modeling shows that they require 96% removal on a plant average.
5. Compliance dates are very short and the industry has commented that insufficient implementation time is included for CATR Phase 1 in 2012 and Phase 2 in 2014.
6. CATR is the driving force for Ghent for both SO_2 and NO_x.
7. Hg is an issue at Ghent. However, E.ON hopes that with the addition of an SCR on Unit 2, acceptable Hg control may be achieved without additional modifications.
8. E.ON provided an updated table that can be used as the initial Ghent design basis titled: Estimated Limits & Compliance Dates for Future New Air Requirements Ghent Station". (Attached herein for reference).
9. E.ON believes Ghent will likely meet the new NAAQS standards because of the existing scrubbers and SCRs.
10. CATR NOx and SO2 limits are aggressive because allowance modeling for the plant assumed a new SCR on Unit 2. Ghent SO2 allowances for SO2 in 2014 are higher for some reason than the 2012 allowances. This maybe an error in the CATR model.
11. B&V provided a presentation of the Ghent Phase I results and an overview of a PJFF. (Power Point Presentation attached herein for reference). The following general characteristics of a pulse jet fabric filter (PJFF) were discussed.
    - Pressure drop can be 6-8 inches through the PJFF. The increased system pressure drop will require increased ID fan capacity. Upgrade of the existing ID fans, the addition of booster fans, or new replacement ID fans will be required. E.ON emphasized that, if possible, the fans should be located downstream of the PJFF to minimize erosion and damage by dust loading.
    - PJFF bags are normally made of polyphenylene sulfide (PPS) materials, but materials such as fiberglass with a Teflon membrane have been used in specific applications. Temperature constraints on PPS bags are in the range of 380-400 ^{o}F continuous operation. Bags woven of fiberglass material can safely be subjected to 500 ^{o}F over the short term. The temperature limits require PJFFs to be installed downstream of the air heater.
    - PJFFs are compartmentalized with isolation between compartments to allow online maintenance of bags and compartment equipment.
    - The differences between PJFFs and reverse gas fabric filters were described and discussed.
    - Bag life for a PJFF is typically 3 years by guarantee. The PJFF is harder on the bags during cleaning than a reverse gas fabric filter due to the high, short-duration air pulse used.

- Dimensions of PJFF vary by manufacturer and are based on gas flow. A "typical" PJFF for a Ghent-sized unit would have an approximately 90 foot x140 foot footprint.
- An advantage of PJFF installation is that its performance is generally independent of the ash type and is based primarily on flue gas volume. A PJFF could allow burning of PRB coal in the future. This flexibility will be considered in the study.
- One question to be considered is whether Ghent needs to keep the hot-side ESPs, either for ash scavenging or because the existing SCRs are the low-dust type. B&V noted that a change in catalyst could convert the SCRs to operate in high-dust conditions if the possibility of lower catalyst life is acceptable.
- The area and facilities for dry ash conversion and ash handling need to be considered with this study. E.ON commented that B&V had previously completed an ash handling study and that the AQC study must be coordinated with the plans developed in the ash handling study.

12. B&V provided an overview of the Phase I study results. Two additional points were also noted and discussed.
    - B&V may consider designing the Unit 2 SCR as high-dust units from the onset, allowing deletion of the existing ESPs at Unit 2 if warranted by congestion and construction difficulties.
    - B&V asked if E.ON needs to sell fly ash. Saleable fly ash would require "scalping" of the fly ash upstream of PAC injection and require the retention and use of the existing ESPs. E.ON would like to sell fly ash on an opportunistic basis, but is not necessarily tied to the existing ESPs.
13. EON made the following general comments.
    - E.ON wants any new axial fans to be downstream of the PJFFs.
    - E.ON asked B&V to investigate a refined layout for Unit 3 PJFF that would reduce the ductwork runs indicated in the Phase I study.
    - The courtyard area between Units 2 and 3 can be used for siting new equipment. The various maintenance shops on the south side of the courtyard could be relocated. There is no "sacred ground" onsite that must be avoided in locating new facilities. However, retention or re-establishment of the ground level breezeway and the overhead skyway between Units 2 and 3 is desirable.
14. A plant walk down of Units 1-4 was conducted until approximately 3 pm.
15. After the walk down, B&V personnel convened in the Ghent conference room to review preliminary arrangement sketches and begin preparations for the debriefing meeting.
16. Day 1 activities adjourned at approximately 6 pm.

Day 2, October 7, 2010

The second day of meetings began at 8 am at Ghent.

17. B&V began Day 2 by preparing some initial sketch arrangements for Units 1-4 in preparation for a site de-briefing scheduled later in the afternoon.

18. At approximately 10 am, B&V resumed site walk downs, splitting into two groups to ground-verify some assumptions made in the initial arrangement sketches.

19. A site debriefing meeting was convened at 1 pm. The following are the general and unit specific discussions that ensued. (Initial arrangement sketches attached herein).

    - General comments:
        - B&V believes it will likely not be feasible to reuse/upgrade the existing ID fans to avoid the addition of new booster or ID fans. Physical constraints on routing duct to and from the existing ID inlet fans is problematic. Locating the PJFFs to protect all of the existing ID fans is not practical in all cases, even for the axial fans at Units 3 and 4. The Unit 3 fans can be incorporated into the revised AQC system, but only in a location that may not be beneficial. B&V fan experts will review this, but new ID fans or booster fans are expected to be required for all units.
    - Unit 1:
        - Sorbent injection will need to be relocated in the duct work to near the inlet of the PJFF. E.ON questioned whether the PJFF vendors would be willing to offer SO3 guarantees based on sorbent injection. B&V noted that if the vendor is awarded both sorbent injection and the PJFF as a single package he will likely offer some guarantees, but the specific level will have to be negotiated.
        - Concern was expressed with the elevated PJFF for Unit 1 being located close to the Unit 2 cooling tower. B&V will investigate and provide opinions on the overall affect of the new structures on cooling tower performance and level of icing that could result.
        - If the impact to performance warrants it, it was discussed that a couple cells could be added to the east end of the tower to increase the overall tower capacity or allow impacted cells to be taken out of service.
        - Alternate arrangements at Unit 1 appear very limited at this time. E.ON asked about relocating Unit 2's cooling tower to make more room for Unit 1 PJFF. The major issue with that approach is where to relocate the cooling tower. The potential of locating the new cooling tower towards the river or to the east of Unit 1's cooling tower was discussed. Any new construction towards the river, either relocating the Unit 2 cooling tower or the plant reagent piperack, would likely trigger permit concerns with the COE. Building a new tower in the "rock pile" area (formerly the limestone storage area east of the plant) was also discussed. Routing of the underground circulating water lines potentially would be a major issue.
    - Unit 2
        - Because of the high level of congestion in the existing arrangement at Unit 2, plus the need to add a PJFF, B&V considered three alternatives for the SCR location at Unit 2. Two alternatives (Alternates 1 & 3) include split SCR's – two separate reactors, one for each ESP train, with the only difference between the alternatives being the location of the west side SCR.
        - Alternate 1 locates the west SCR in the area just west of the west ID fan and the east SCR above the tower support for the Unit 1 SCRs. The area

west of the ID fans appears sufficiently open to allow construction of a tower support for the SCR. The advantage of this arrangement is the short runs of ductwork required.

- Alternate 3 locates the west SCR along the west side of the Unit 2 boiler structure and the east SCR in the same location as Alternate 1. The approach suggested in the Phase 1 study of locating both split SCRs on the west side of the boiler structure would be problematic because of the difficulty of routing duct work from east side Unit 2 duct to the courtyard and back.
- Alternate 2 is similar to that used for the Unit 1 SCR, with a combined SCR located above the ESPs. However, the area beneath the SCRs in Alternate 2 is very congested, making foundation design and installation extremely difficult. Moreover, the lack of nearby open area will limit crane access and greatly complicate constructability. Assuming sufficient free area is found to accommodate the necessary foundations, Alternate 1 is more favorable to construction and the most likely option.
- Low dust SCRs will be assumed for Unit 2 unless elimination of the existing ESPs is warranted for some other reason.
- E.ON has previous studies about locating the SCR modules in the courtyard. E.ON offered to provide these studies to B&V. B&V will add these studies to the Ghent Information Request.
- The Unit 2 PJFF is assumed to be located north of the existing ESPs and ductwork. It appears that a short temporary bypass connecting the airheater outlet duct and the ductwork to the scrubber inlet would allow installation of a PJFF in this area with the unit on line. The completed PJFF would be tied into the system during an outage. The new booster or ID fans for Unit 2 (not shown on the arrangement sketches) would tentatively be located at the west (downstream) end of the new PJFF.

- Unit 3
  - The preliminary arrangement sketches show the PJFF location in the courtyard, requiring relocation of the maintenance shop. E.ON has some ideas where the shop could be relocated. As currently configured, new booster or ID fans could be added south of the PJFF without impacting the existing tanks south of the shop.
  - The skyway connecting Units 2 and 3 would need to be temporarily removed, and then routed around the south side of the PJFF. The skyway may be used to provide access from the turbine buildings to the PJFF. To avoid re-routing of the significant amount of interconnecting pipe located in the ground level breezeway between units, the PJFF would be designed to span over this piping and allow the breezeway structure to remain in place, if practical.
- Unit 4
  - The most likely location for the new PJFF is between the existing Unit 4 ESP area and the Unit 3 cooling tower as shown on the sketch. This location avoids the circ water pipe and most of the underground utilities in the area.

- The ID fans currently being installed at Unit 4 would be difficult to incorporate into the ductwork system running to the new PJFF and back, as shown on the arrangement sketches. For that reason, new ID fans located near the PJFF and sized to replace the ID fans would be the most likely option due to constructability, access, and outage considerations. New ID fans in this location would allow relatively easy connection directly to the ductwork at the FGD inlet.
- E.ON asked about wet fans to be located downstream of the scrubber, similar to those used in Europe. B&V explained some of the disadvantages, including materials of construction, maintenance and reliability.
- E.ON expressed general agreement with the arrangement as discussed for Unit 4. An alternate version of the Unit 4 arrangement sketch was developed to more closely depict the arrangement discussed.

- The debriefing meeting concluded at approximately 2:30.

20. Eileen identified Dave Smith as the Ghent information request point of contact. Dave's contact information is as follows: 502-627-4633 and dave.smith@eon-us.com.
21. B&V conducted a final walk down to ground-truth some of the comments obtained during the debriefing meeting and review the Unit 1 issues with relocating equipment to allow a more advantageous PJFF location to avoid cooling tower issues.
22. Plant personnel provided an electronic of an aerial view of the site.
23. B&V departed Ghent at approximately 4 pm.

ACTION ITEMS

#	Description	Responsible	Due Date
1	Prepare Ghent Information Request	TMH	10/15/10
2			
3			
4			
5			

ATTACHMENTS

- Agenda
- Attendance roster
- E.ON Environmental Drivers Presentation and Estimated Limits & Compliance Dates for Future New Air Requirements Ghent Station
- Phase I Results and PJFF PowerPoint Presentation
- Initial arrangement sketches presented during the de-brief meeting

cc: All Attendees
File

AGENDA

Phase II Air Quality Control Study – Kickoff Meeting and Site Visit
E.ON - Ghent
October 6 - 7, 2010
Location: Ghent Generating Station

Day 1, October 6th, B&V Arrives 8 am

I. Introductions (Starts at 9 am)
II. Project/Scope Description (E.ON – Eileen S)
III. Environmental Drivers Presentation (E.ON – Gary R)
IV. Phase I Study Results/PJFF Overview Presentation (B&V – Rick L and Anand M)
V. Lunch (on site)
VI. Begin Escorted Site Walk Down and Data Collection

Day 2, October 7th, B&V Arrives 8 am

I. Continue Escorted Site Walk Down and Data Collection
II. Lunch (on site)
III. Site Debriefing Meeting
IV. Additional Walk Down Time if Required
V. Depart (no later than 4 pm)

E.ON AQC GHENT PLANT KICKOFF 10/6/2010

9:00 A.M.

NAME	COMPANY/POSITION	TELE NO.	EMAIL
Tim Hillman	B&V / Proj Mgr	913-458-7928	hillmantm@bv.com
ROGER GOODLET	B&V / CONSTRUCTION	913-458-4134	goodletrf@bv.com
M.R. WEHRLY	B&V / ENG MGR	913-458-7131	wehrlymr@bv.com
RICK LAUSMAN	B&V / AQC Eng	913 458-7528	LAUSMANRL@BV.COM
MONTY HINTZ	B&V / CIVIL-STRUCT ENGR	913-458-2464	hintzme@bv.com
Anand Mahabaleshwarkar	B&V / AQC	913 458 7736	mahabaleshwarkara@bv.com
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JAMES YOCUM	KU	502-347-4157	JAMES.YOCUM LG+KU
Randy Scott	LG&E - KU	347-4020	Randy.Scott@Eon-US.Com
Greg Jones	"	347-4031	Greg.Jones " "
Mike Mooney	LGE/KU	627-3671	Mike.Mooney@eon-us.com
Eileen Saunders	LG&E/KU	347-4023	Eileen.Saunders
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DANNY AYLER	KU	502-347-4052	DANNY.AYLER@eon-us.com
TROY BICKERS	Kentucky Utilities	502-347-4057	Troy.bickers@ " " "
Paul Wright	K.U.	502-347-4003	paul.wright@eon-us.com
Mike Drake	KU	502 347 4002	michael.drake@eon-us.com
Dave Smith	KU	(502)627-4633	dave.smith@eon-us.com

New EPA Air Regulations

Gary Revlett
Air Manager, Environmental Affairs

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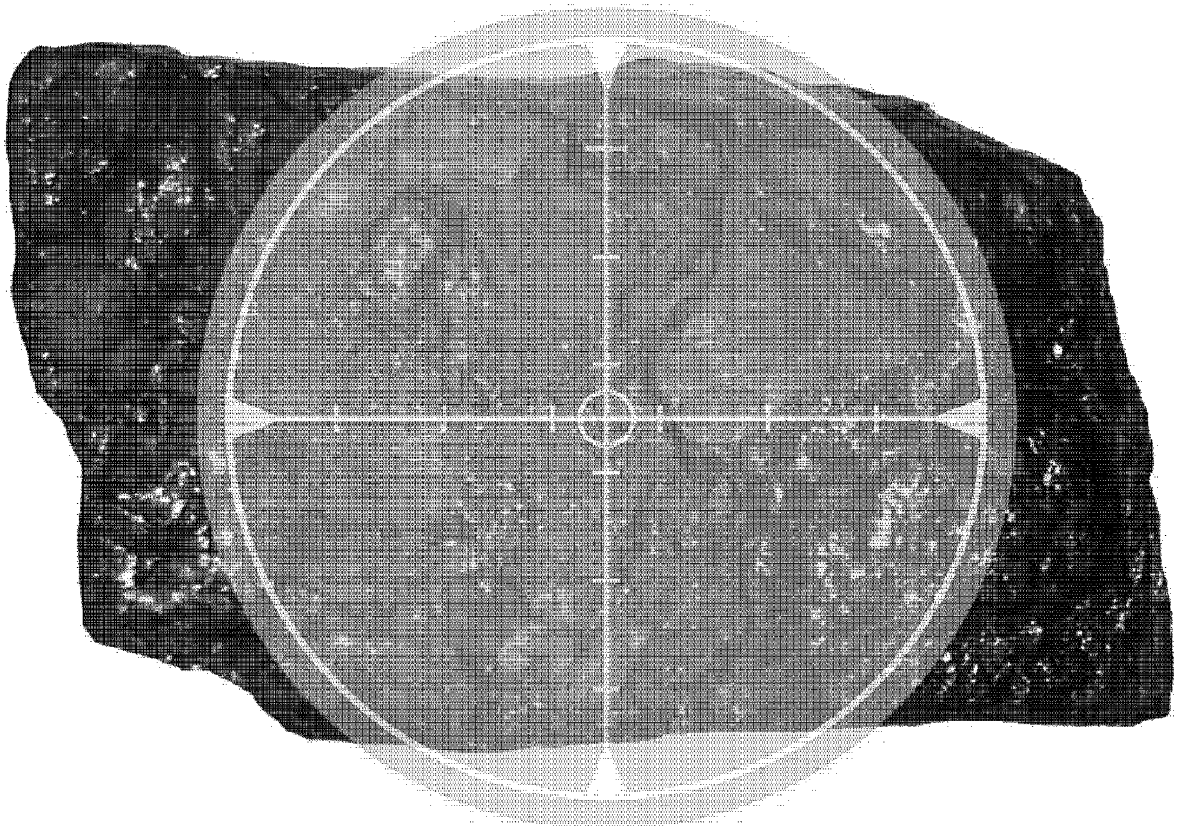
Coal (Still) in the Crosshairs



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Upcoming Air Related EPA Regulations

1. **Nitrogen Dioxide National Ambient Air Quality Standard: NO_x - NAAQS**
2. **Sulfur Dioxide National Ambient Air Quality Standard: SO_2 - NAAQS**
3. **Clean Air Interstate Rule (CAIR) Replacement: Clean Air Transport Rule (CATR)**
4. **Clean Air Mercury Rule (CAMR) Replacement: Electric Generating Unit Maximum Achievable Control Technology (EGU MACT)**

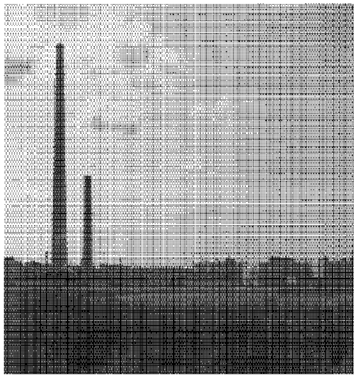
New Nitrogen Dioxide National Ambient Air Quality Standard

- New 1-hour NO_2 ambient air standard added to the current annual standard.
- The new ambient air standard is added to protect public health from short-term exposures.
- Sources with the greatest impact are power plants and major highways.
- Maximum impact due to short-duration adverse meteorological conditions.
- This new regulation is final and compliance is required by 2016.

Potential Company Impact(s):

- All coal-fired boilers will need tall stacks (> 400 ft.).

  OR
- Any coal-fired unit without a tall stack will need a SCR



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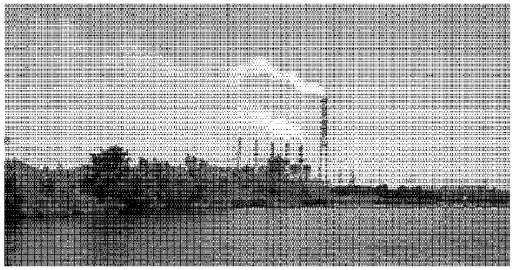
New Sulfur Dioxide National Ambient Air Quality Standard

- New 1-hour SO_2 ambient air standard added to the current 24-hour standard.
- The new ambient air standard is added to protect public health from short-term exposures.
- Sources with the greatest impact are coal-fired power plants.
- Maximum impact due to short-duration adverse meteorological conditions.
- This new regulation is final and compliance is required by end of 2016.

Potential Company Impact(s):

- All coal-fired boilers need tall stacks (> 400 ft.) and a FGD with greater than 96% removal efficiency.

  OR
- Switch to low sulfur fuels



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CAIR Replacement - Proposed Clean Air Transport Rule (CATR) for SO_2 and NO_x

- Replaces the CAIR cap-and-trade regulations which were vacated in 2008.
- The Acid Rain SO_2 cap-and-trade program will remain in place.
- 100% intrastate trading of SO_2 and NO_x allowances but limited interstate trading
- The new regulations were proposed in July, 2010 and will not be final until June, 2011.
- The proposed implementation dates of Phase 1 in 2012 and Phase 2 in 2014 are unrealistic.

Potential Company Impact(s):

- With less than 10% interstate trading allowed, utilities in Kentucky need to self comply.
- Will require a fleet-wide 20% reduction in NO_x emissions and more than 50% reduction in SO_2 emissions by 2014.

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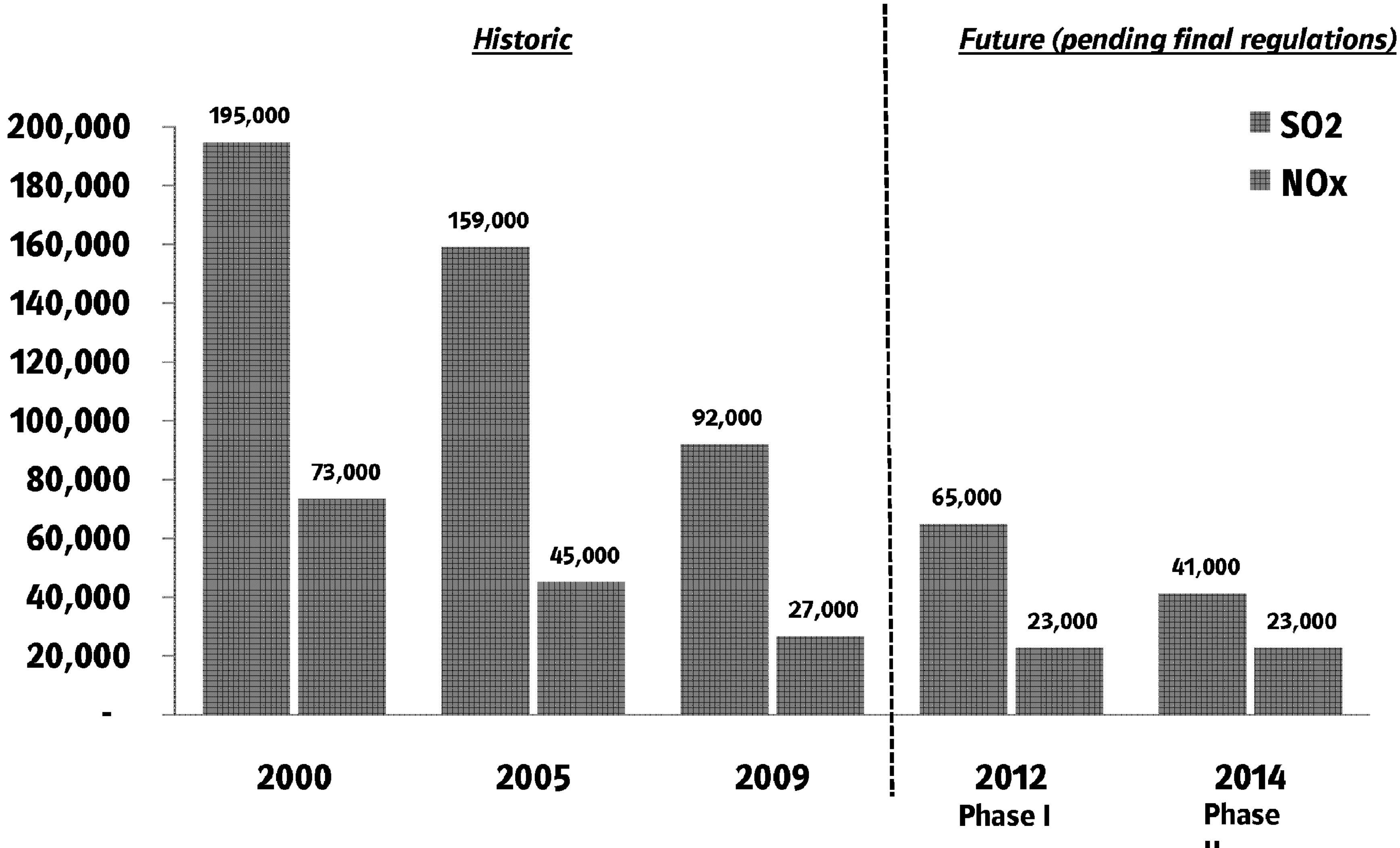
SO_2 and NO_x: Historic Emissions and CATR Allocations



KU and LG&E, 75% Trimble Co. coal

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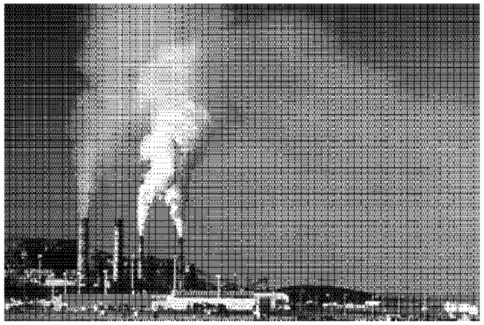
CAMR Replacement - Electric Utility Maximum Achievable Control Technology (MACT)

- Currently the CAMR replacement has not yet been proposed by EPA.
- EPA plans to propose in the new rules in March 2011 and finalize in November 2011.
- New emissions limits for Hazardous Air Pollutants such as mercury, hydrogen chloride and hydrogen fluoride and other toxic metals.
- No trading of emissions or allowances, each plant must meet the pollutant specific emission limit.
- Expected compliance date will be 2015 with a possible 1-year extension.

Potential Company Impact(s):

- Most coal-fired units will need to add a baghouse with carbon and lime injection.



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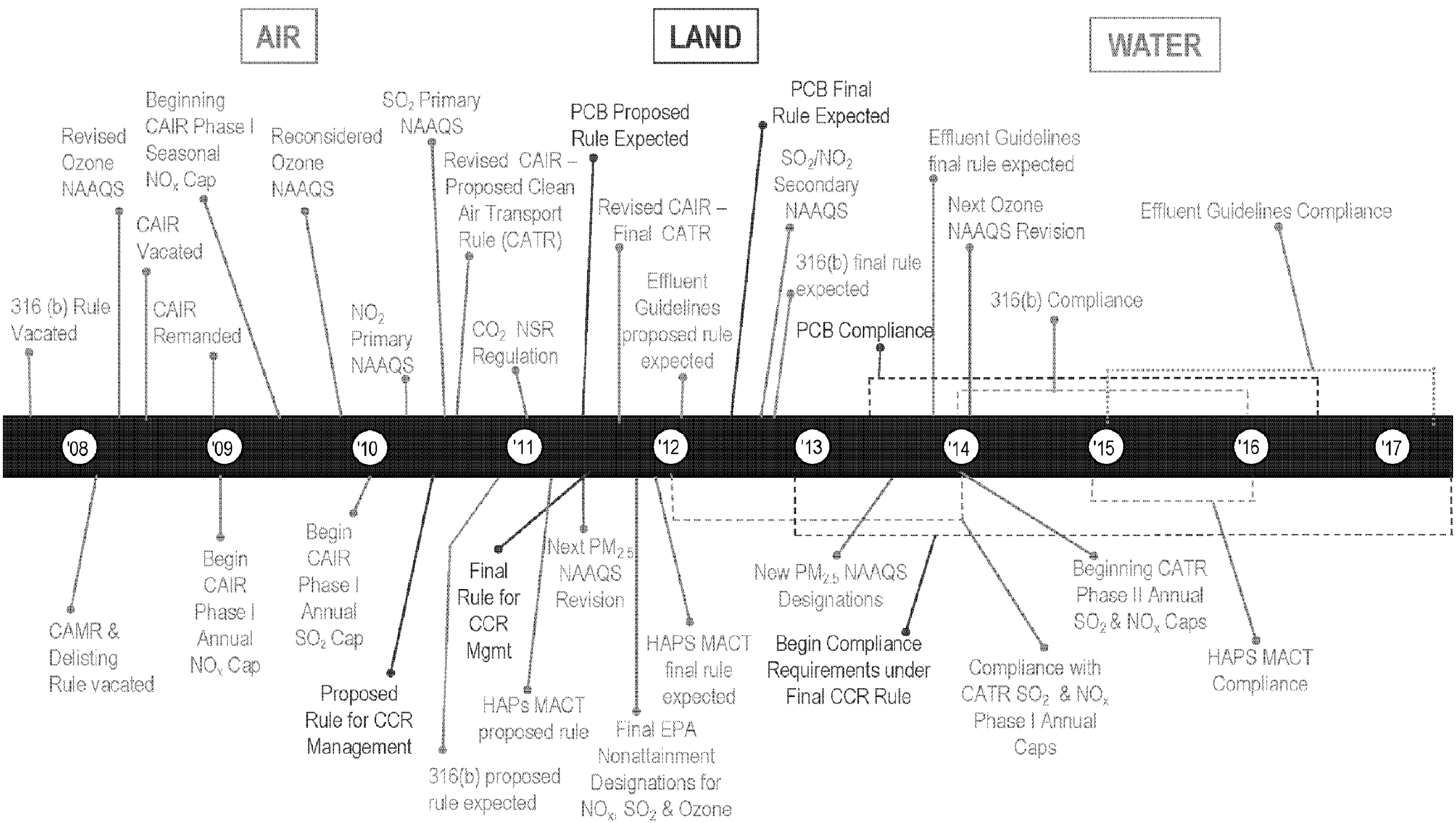

-- adapted from (EPA 2008) Updated August, 2010

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Summary

- Coal is still, and will continue to be, in the cross-hairs of the EPA.
- We will analyze every EPA proposal to determine the full magnitude of its impact, including the financial and operational implications.
- As with any proposed environmental regulation, we will continue to follow the developments and act accordingly to achieve full compliance once it takes effect.
- It will be necessary for continued coordination between departments and across the lines of business. There will be an increased effort to educate the public and key stakeholders.

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Estimated Limits & Compliance Dates For Future New Air Requirements

Ghent Station

Program Name	Regulated Pollutants			Unit/Plant Averaging	Current Reg. Required Date	Forcasted Date for Compliance
	Pollutant	Limit	Units			
SAM NSR NOV	H_2SO_4	2 - 10	ppm	Unit	To Be Determined	2012 - 2014
New 1-hour NAAQS for SO_2	SO_2	0.31 for plant avg.	lbs/mmBtu	Based on air quality modeling	June, 2017	June, 2016 to June, 2017
New 1-hour NAAQS for NO_x	NO_x	0.47 for plant avg.	lbs/mmBtu	Based on air quality modeling	January, 2017	No sooner than January, 2017
CATR	SO_2	0.186	lbs/mmBtu	Plant, but statewide trading	Beginning Phase I in 2012; Limits in Phase II during 2014	Beginning Phase I in 2013; Limits in Phase II during 2015
	NO_x	0.041	lbs/mmBtu			
New EGU MACT	Mercury	90% or 0.012	Removal lbs/GWH	Plant	January, 2015, with 1-yr extension - January, 2016	January, 2016, with 1-yr extension - January, 2017 Potential delay for commitment to shutdown older coal-fired units
	Acids (HCl)	0.002	lbs/mmBtu	Unit or Plant		
	Metals (PM) or Metals (As)	0.03 0.5×10^{-5}	lbs/mmBtu lbs/mmBtu			
	Organics (CO)	0.10	lbs/mmBtu			
	Dioxin/Furan	15×10^{-18}	lbs/mmBtu			
$PM_{2.5}$ NAAQS	$PM_{2.5}$ or Condensable PM	To be determined based on modeling	lbs/hours	Plant	After 2017	After 2017

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Evaluation of CATR for Ghent Station

Plant	Unit	2009 Actual Emissions SO_2 (tons)	NO_x (tons)	mmBtu (year)	SO_2 Rate (lbs/mmBtu)	NO_x Rate (lbs/mmBtu)
Ghent	1	1,418.1	973.2	31,802,243	0.09	0.06
Ghent	2	5,044.3	2,664.9	24,783,886	0.41	0.22
Ghent	3	3,188.6	1,972.3	34,425,557	0.19	0.11
Ghent	4	1,220.5	802.8	28,668,181	0.09	0.06
Ghent	**Total**	**10,872**	**6,413**	**119,679,867**	**0.182**	**0.107**

Plant	Unit	CATR Allocation Tons			CATR Alterative lb/mmBtu			SO_2 2012 Heat Input	NO_x 2012 Heat Input
		SO_2 for 2012	SO_2 for 2014	NO_x in ≥ 2012	SO_2 for 2012	SO_2 for 2014	NO_x in ≥ 2012		
Ghent	1	2,221	3,653	794	0.139	0.214	0.050	31,854,467	31,477,413
Ghent	2	2,101	1,813	976	0.180	0.108	0.058	23,378,147	33,536,165
Ghent	3	3,578	3,363	483	0.199	0.203	0.030	35,919,897	32,698,639
Ghent	4	1,214	3,359	468	0.079	0.203	0.029	30,683,824	32,663,045
Ghent	**Total**	**9,114**	**12,188**	**2,721**	**0.155**	**0.186**	**0.041**	**121,836,336**	**130,375,262**

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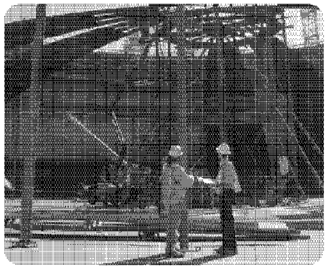

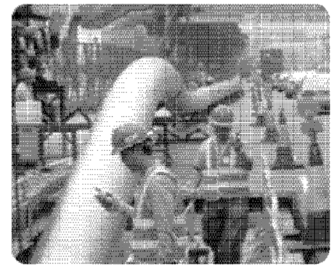
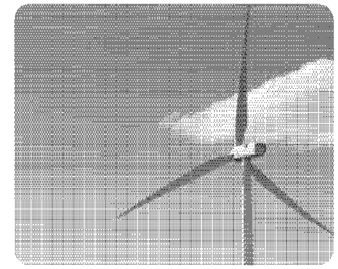

Phase II AQC Study
Ghent Station Kickoff

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October 2010

Agenda

- Regulatory drivers
- PJFF overview
- Overview of phase I results

Regulatory drivers – still uncertainty

Program Name	Regulated Pollutants	Forecasted Date for Compliance
PSD/NSR	SAM Ghent Units 1- 4	E.ON currently negotiating with EPA
1-hour NAAQS for NO_x	NO_x	2015 - 2017
1-hour NAAQS for SO_2	SO_2	2016
Clean Air Transport Rule	NO_x SO_2	Beginning in 2012 Phase in 2014
New EGU MACT	Mercury Acids (HCl) Metals (PM) Metals (AS) Organics (CO) Dioxin/Furan	Estimated January, 2015; with 1-yr extension - January, 2016

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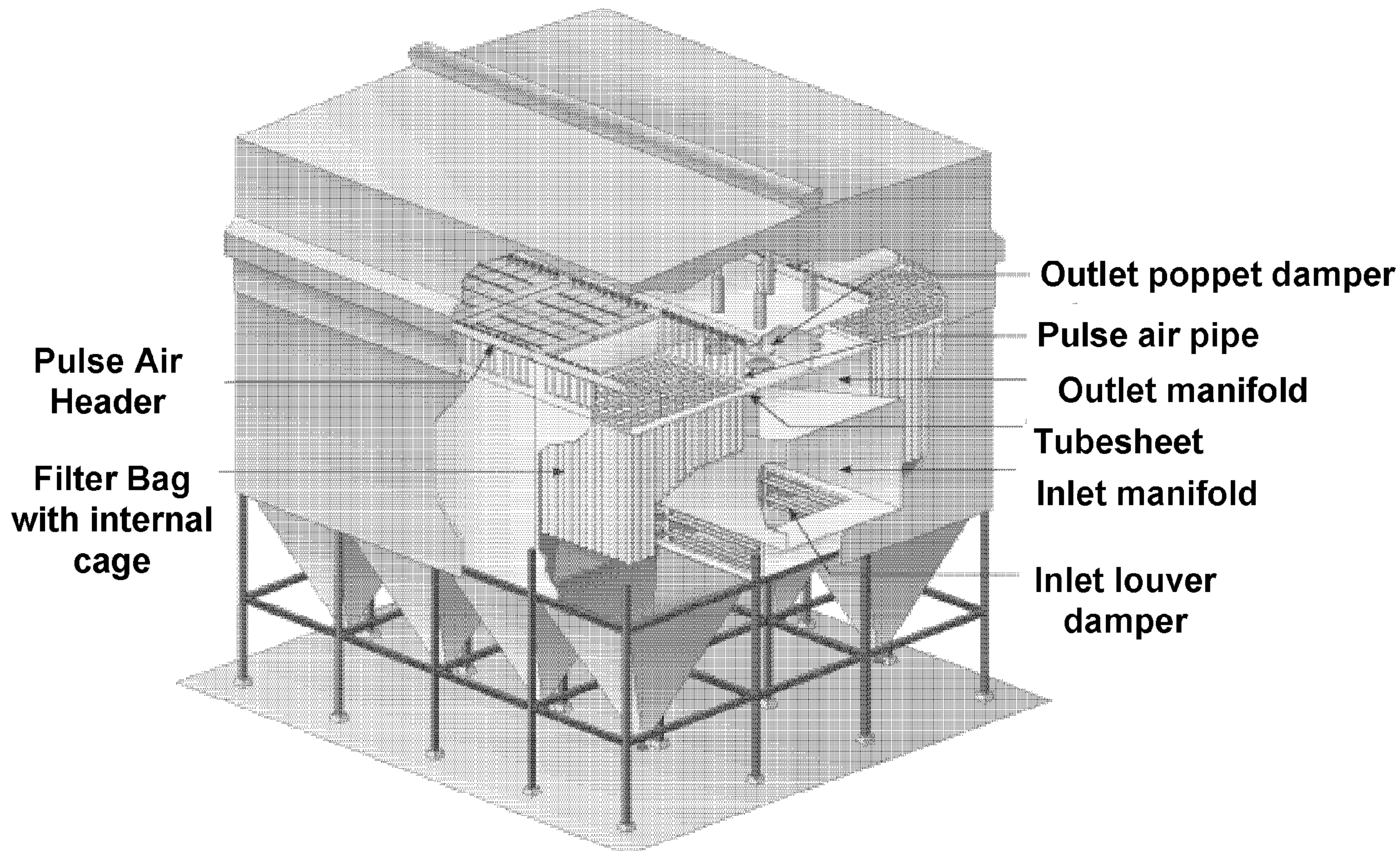
PJFF Overview

PJFF – overall layout



Courtesy: Babcock & Wilcox

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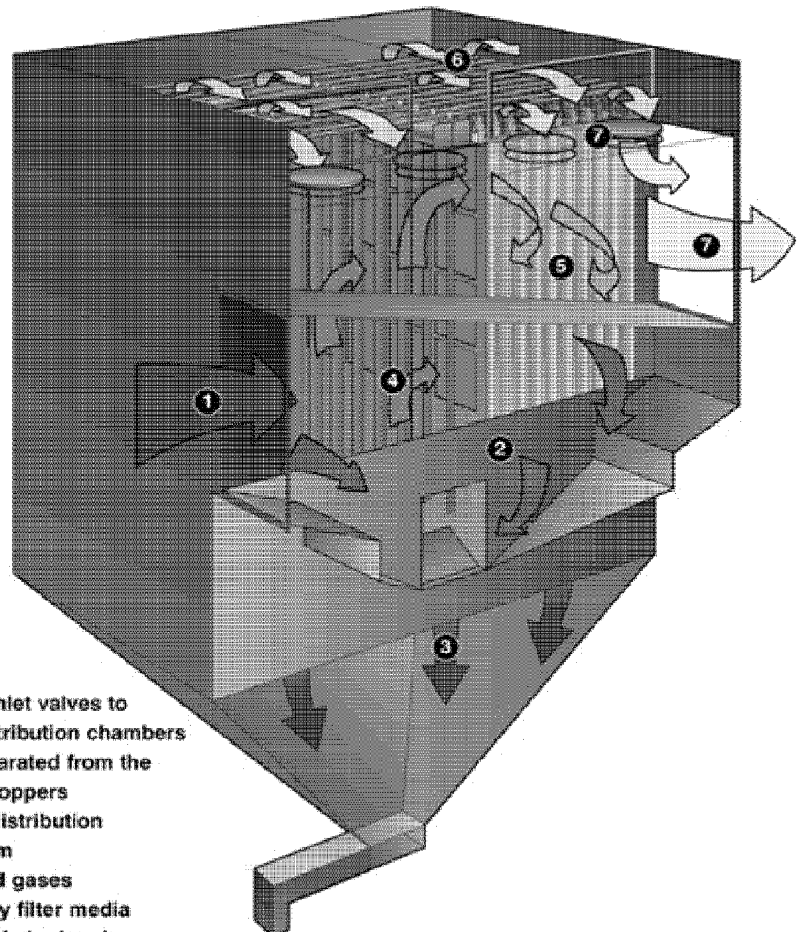
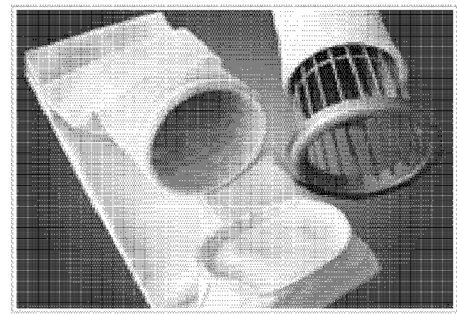
PJFF – flow diagram



1. Process gas inlet
2. Gas passes through inlet valves to pre-separator and distribution chambers
3. Heavy particulate separated from the gas for collection in hoppers
4. Gas passes through distribution system giving optimum dispersion of dust and gases
5. Particulate removed by filter media
6. Gas passes to cleaned air chamber
7. Clean gases exit through outlet valves and cleaned air duct

PJFF advantages vs. DESP

- Fuel flexibility
- High efficiency especially on $PM_{2.5}$
- Performance is less susceptible to plant operating conditions
- Works well during startups
- Better control of hazardous air pollutants such as heavy metals (Ar, Ni, Pb, etc.)
- Allows reagent injection to work better (Hg or SO_3)



PJFF disadvantages vs. DESP

- Bags damaged by high temperatures
- High pressure drop
- Periodic bag replacement

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Overview of Phase I Results

Phase I AQCS results for Ghent Station

- Ghent Unit 1
  - Pulse Jet Fabric Filter (PJFF)
  - Powdered Activated Carbon (PAC) Injection
- Ghent Unit 2
  - Selective Catalytic Reduction (SCR) System
  - Pulse Jet Fabric Filter (PJFF)
  - Lime / Trona Injection
  - Powdered Activated Carbon (PAC) Injection
- Ghent Unit 3
  - Pulse Jet Fabric Filter (PJFF)
  - Powdered Activated Carbon (PAC) Injection
- Ghent Unit 4
  - Pulse Jet Fabric Filter (PJFF)
  - Powdered Activated Carbon (PAC) Injection

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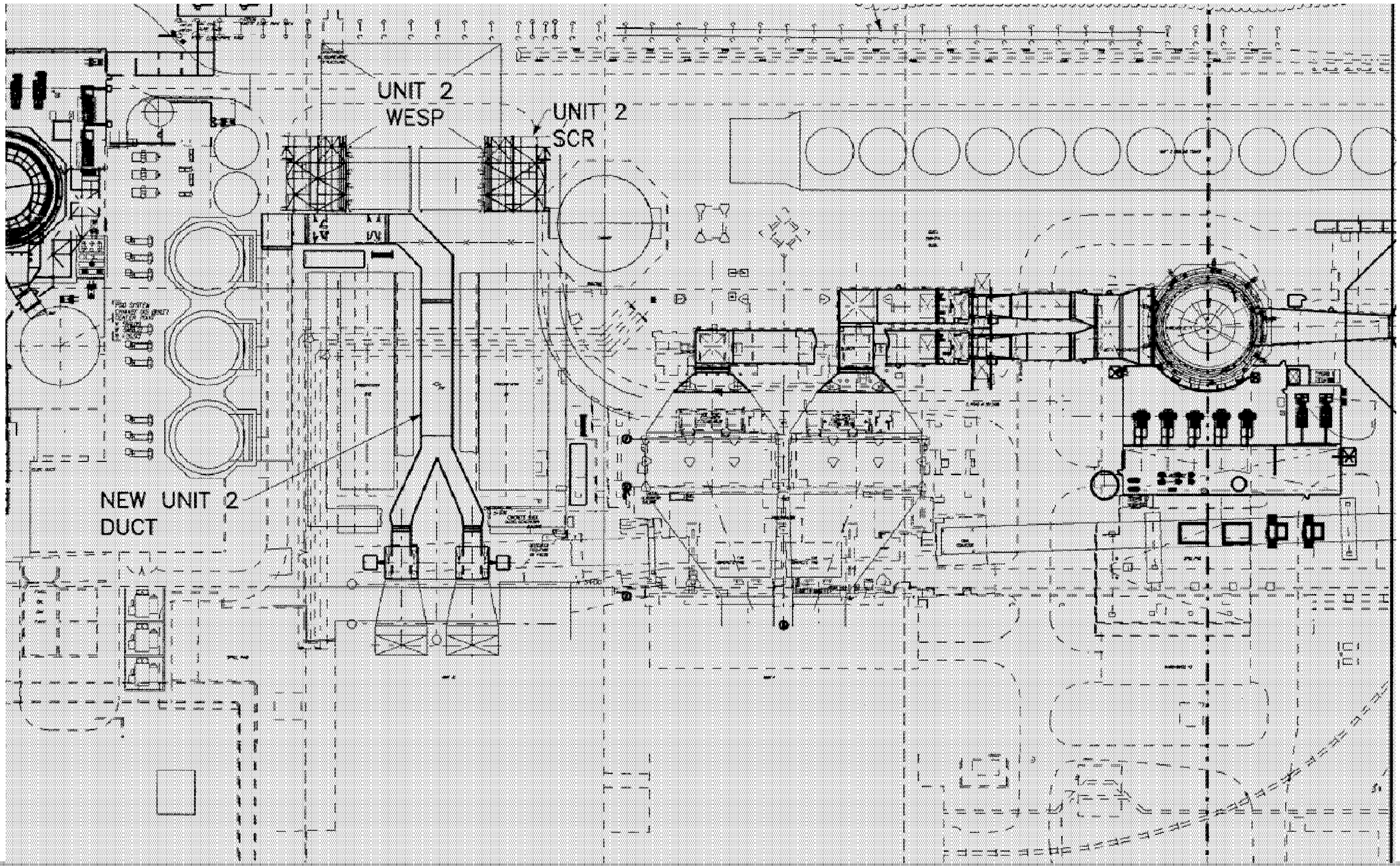
Ghent Unit 1 and Unit 2 space constraints



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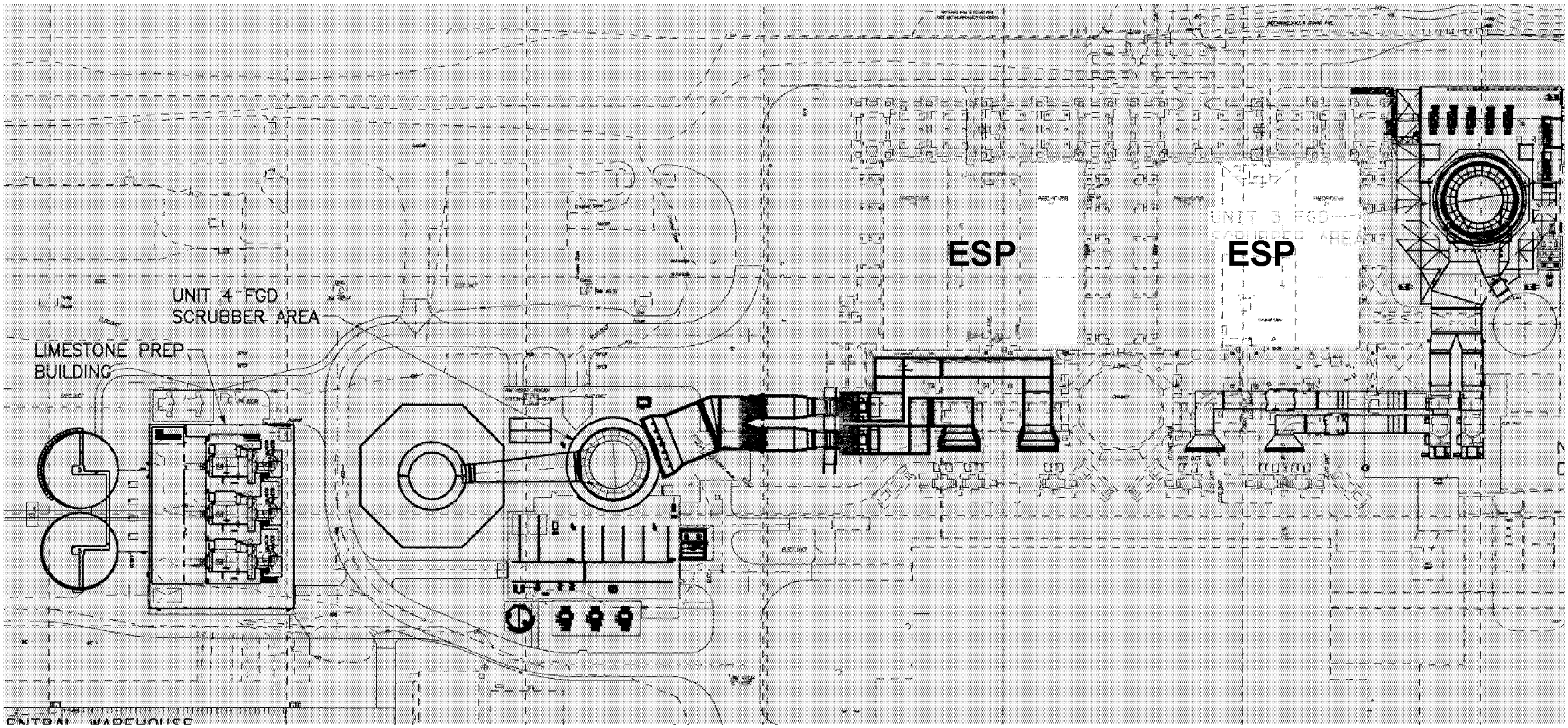
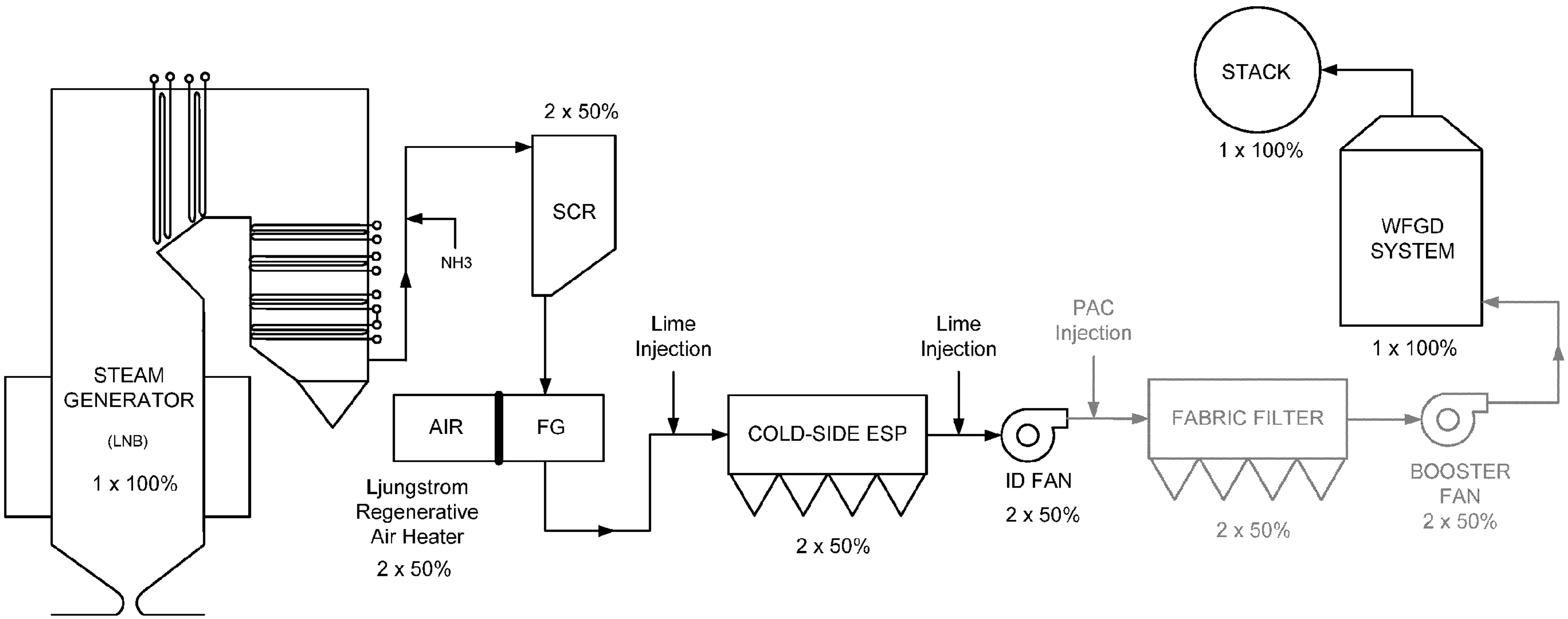
Ghent Unit 3 and Unit 4 space constraints



Ghent Unit 1 layout



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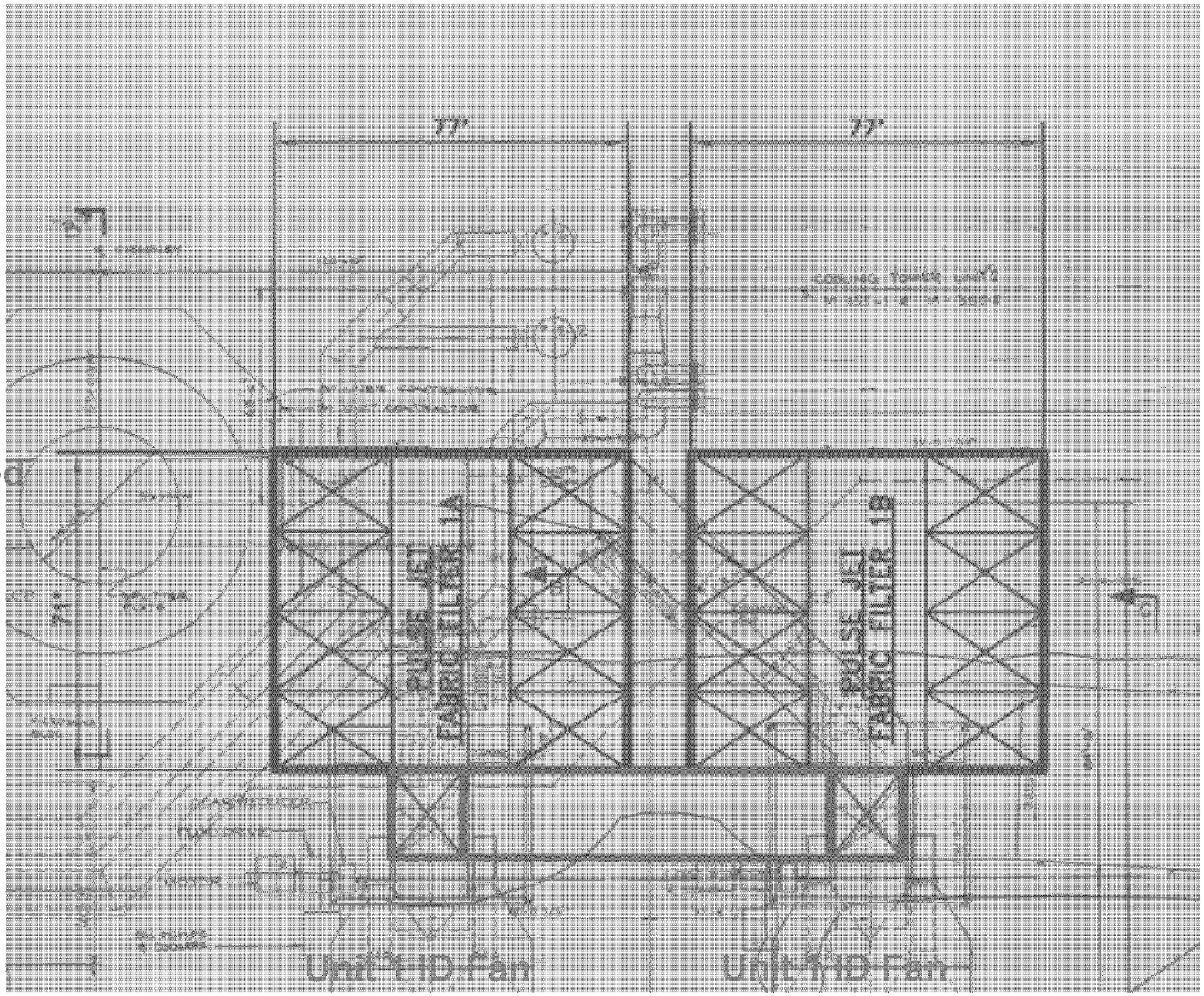
Ghent Unit 1 PJFF layout

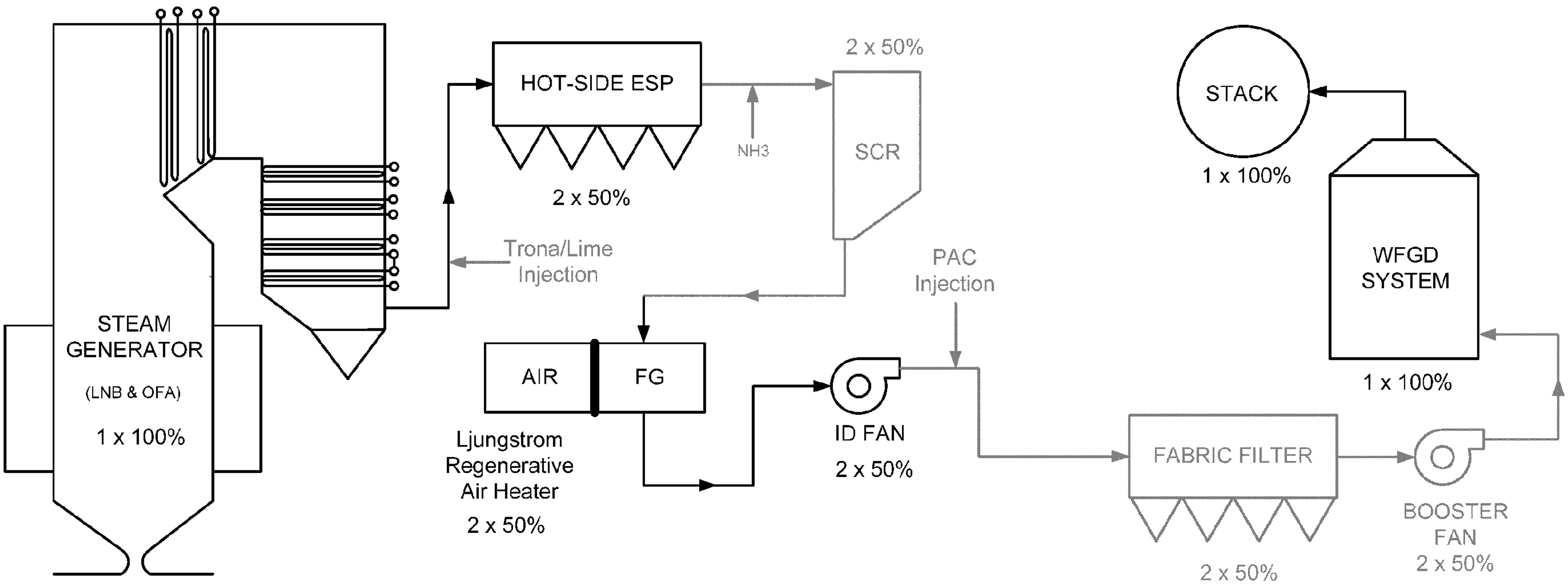
Unit 2 Abandoned Stack



Ghent Unit 1 PJFF challenges

- Elevated PJFF
- Real estate constraints
- Demolition and relocation of pipe racks
- Difficult crane access
- Restricted cooling tower access during project execution
- Lattice boom / crawler crane booms for final assembly

Ghent Unit 2 layout



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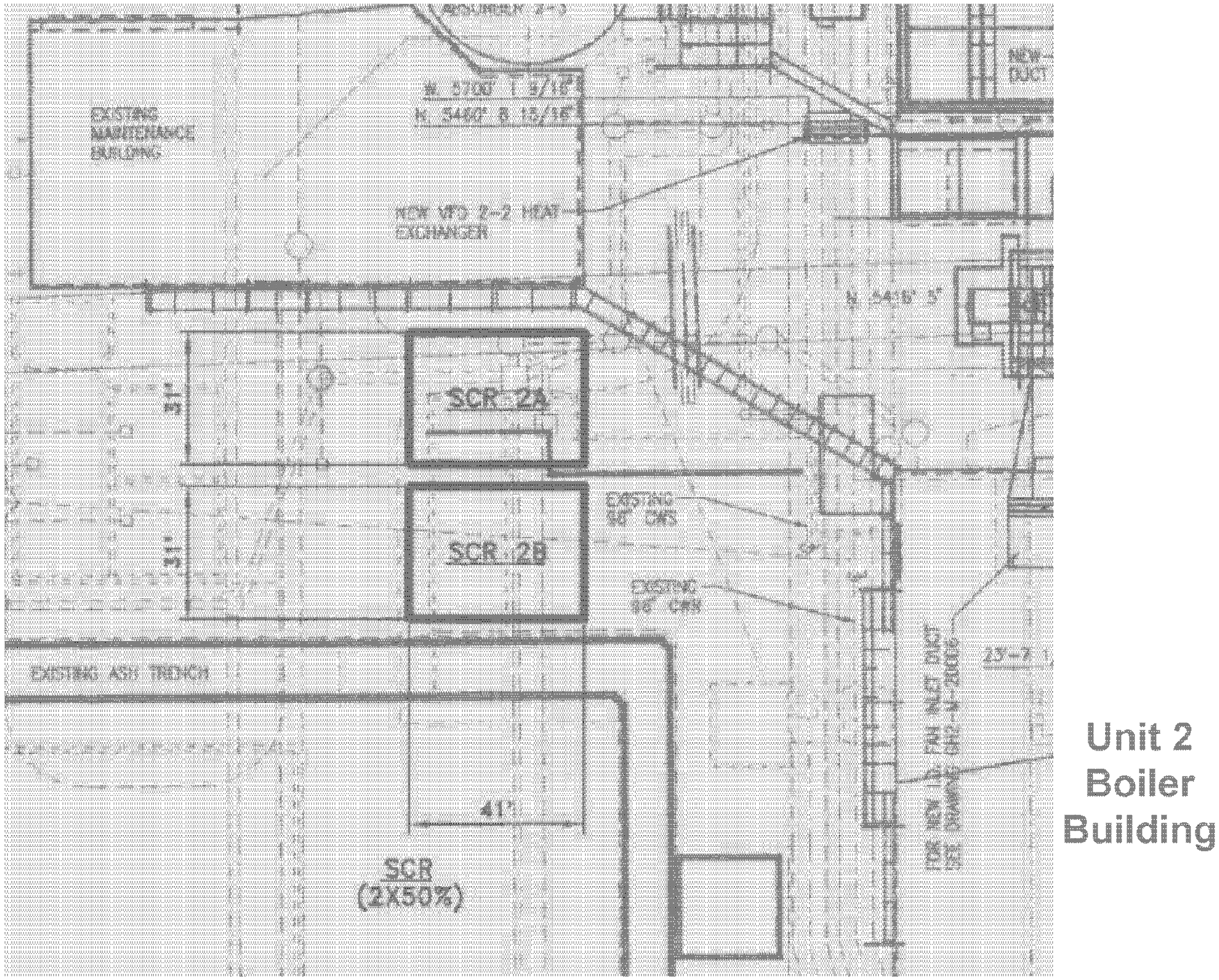
Ghent Unit 2 SCR layout



Ghent Unit 2 SCR challenges

- Equipment lifting required over areas of high personnel traffic
- Demolition of overhead walkway between Unit 2 & Unit 3 boiler building
- Demolition and relocation of overhead power lines
- Tower crane for heavy equipment and final assembly of SCR
- Demolition and relocation of pipe-racks

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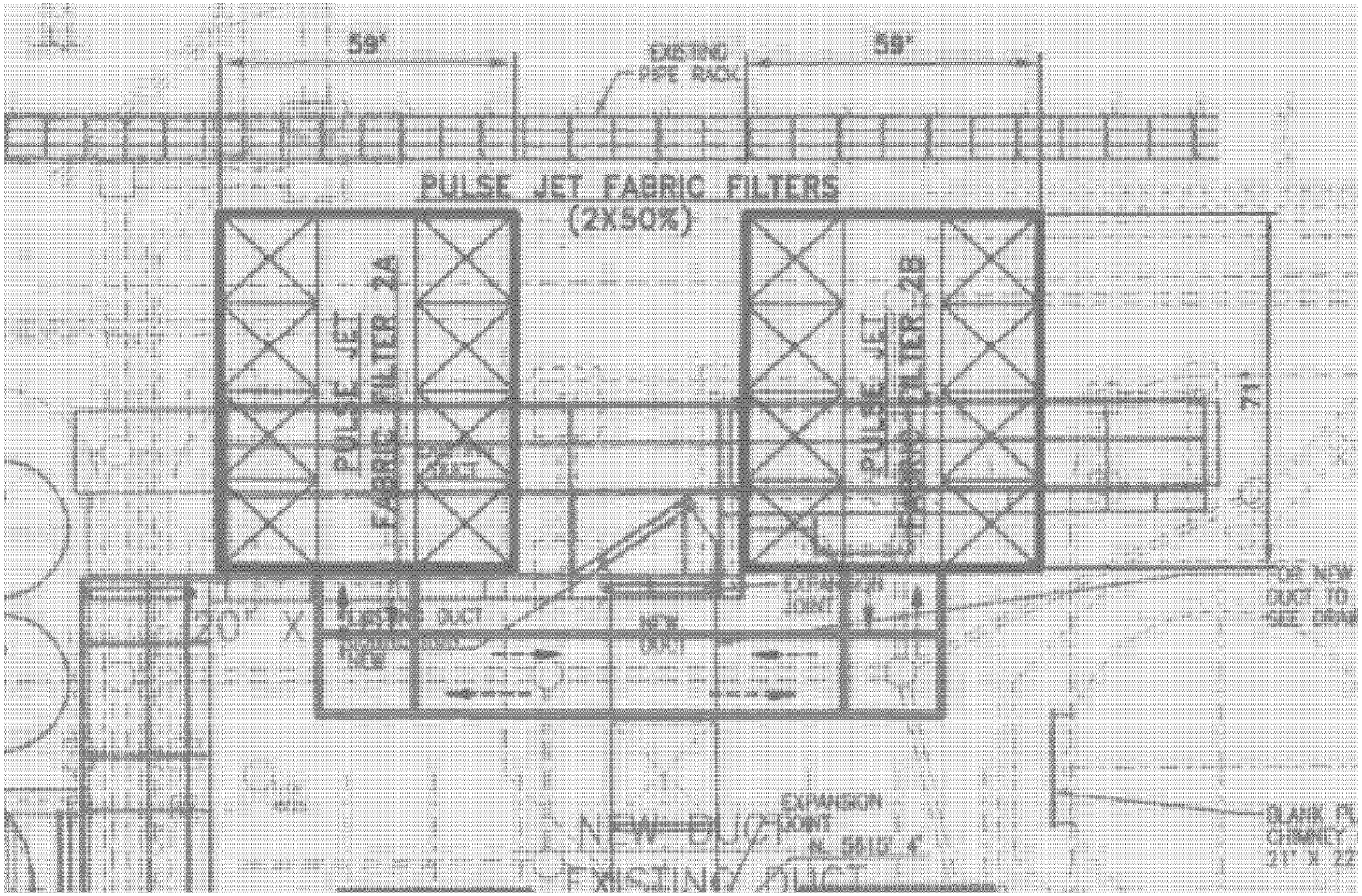
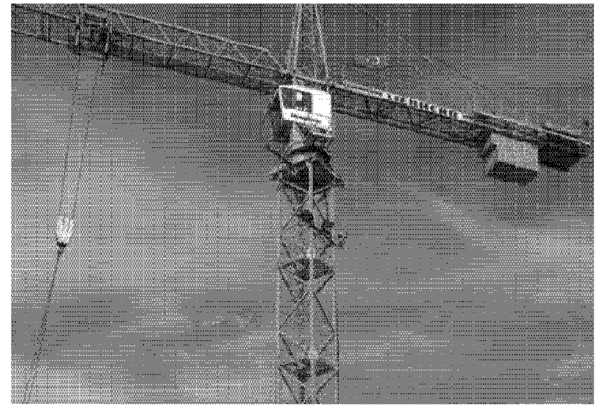
Ghent Unit 2 PJFF layout



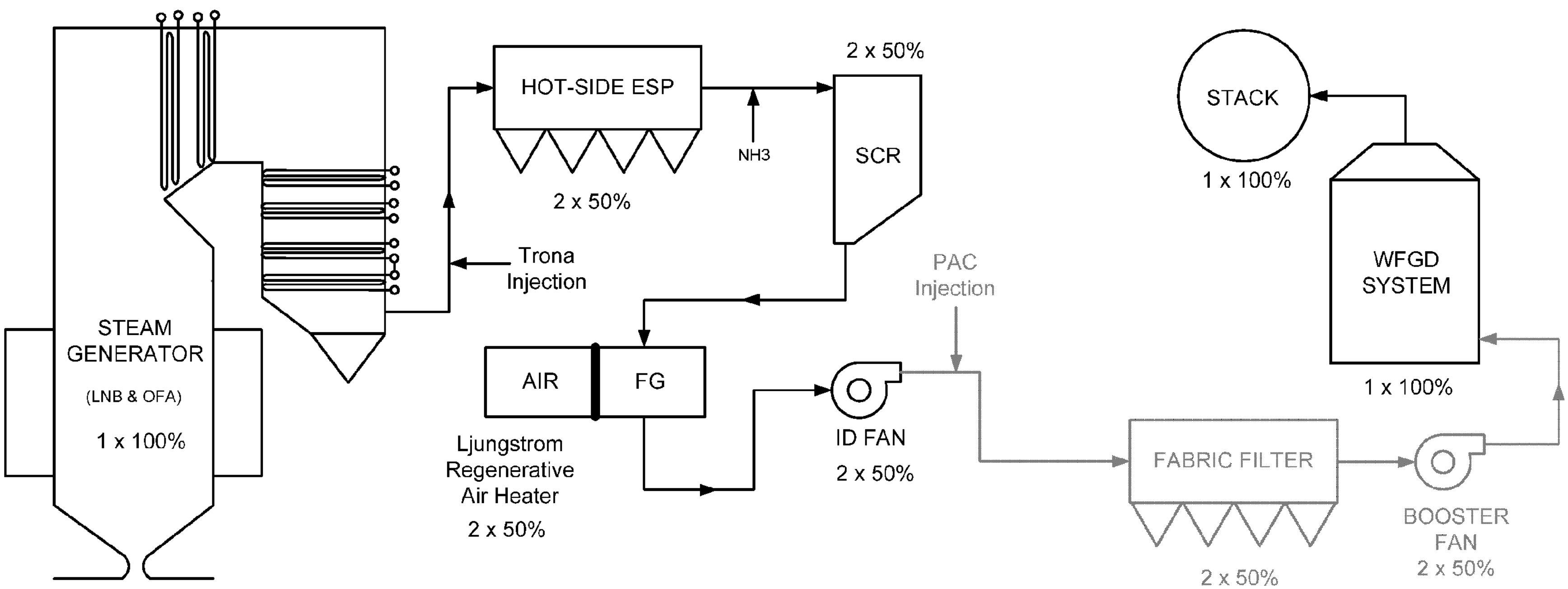
Unit 2 ID Fan
Outlet Ductwork

Ghent Unit 2 PJFF challenges



- Elevated PJFF
- Real estate constraints
- Difficult crane access
- Demolition and relocation of pipe racks
- Restricted cooling tower access during project execution
- Lattice boom / crawler crane booms for final assembly
- Bypass duct required

Ghent Unit 3 / Unit 4 layout



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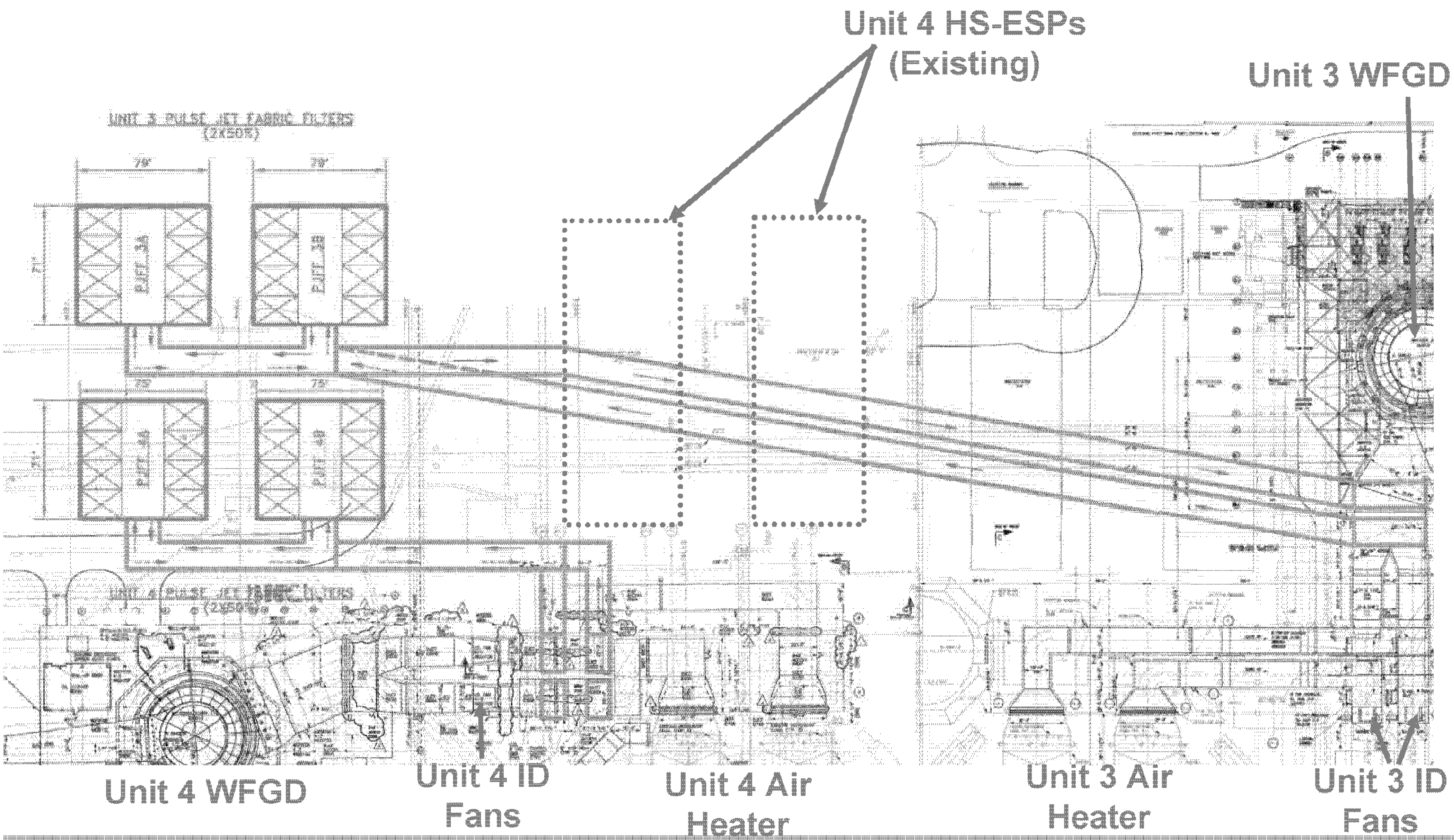
Ghent Unit 3 and Unit 4 PJFF layout

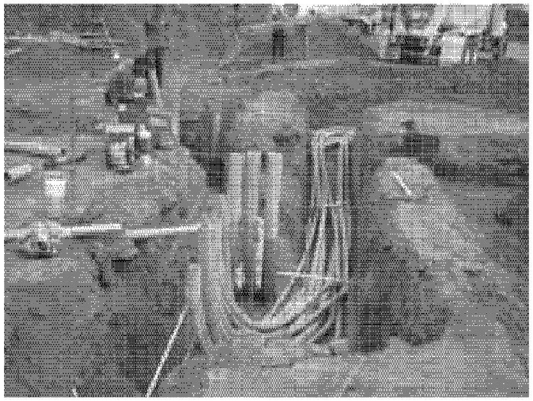


Ghent Unit 3 PJFF challenges

- Site constraints
- Long ductwork for Unit 3
- Restricted access around the footprint of Unit 3 ESP – tight space
- Difficult crane access for tie in of Unit 3 fabric filter inlet/outlet ductwork

Ghent Unit 4 PJFF challenges

- Demolish and relocate underground utilities
  - Electrical manholes
  - Water wells
  - Storm sewer boxes and piping
  - Circulating cooling water piping

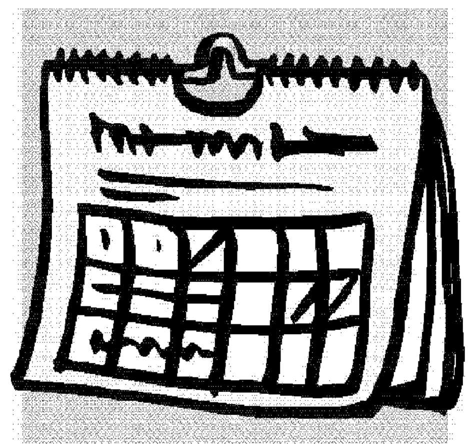


Typical PJFF schedule

- 32 to 36 months
  - Engineering & procurement – 16 months
  - Erect PJFF foundations – 6 months
  - Erect PJFF – 12 months
  - Tie-in outage – 1 month
  - Start-up – 1 month

Typical SCR schedule

- 32 to 36 months
  - Engineering & procurement – 16 months
  - Erect SCR foundations – 4 months
  - Erect SCR support steel – 4 months
  - Erect SCR & ductwork – 8 months
  - Tie-in outage – 1 month
  - Start-up – 1 month

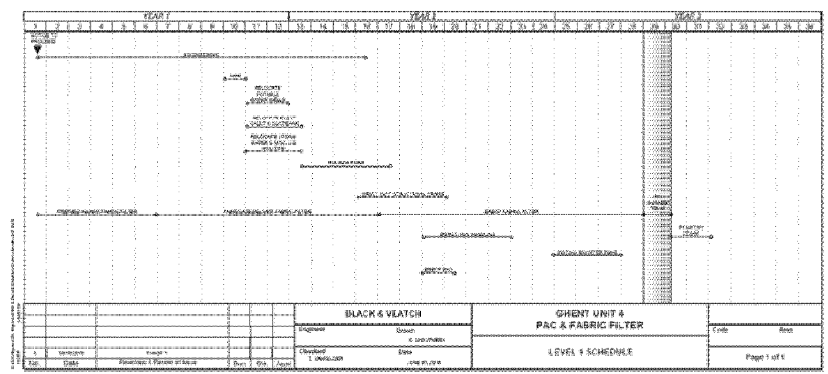


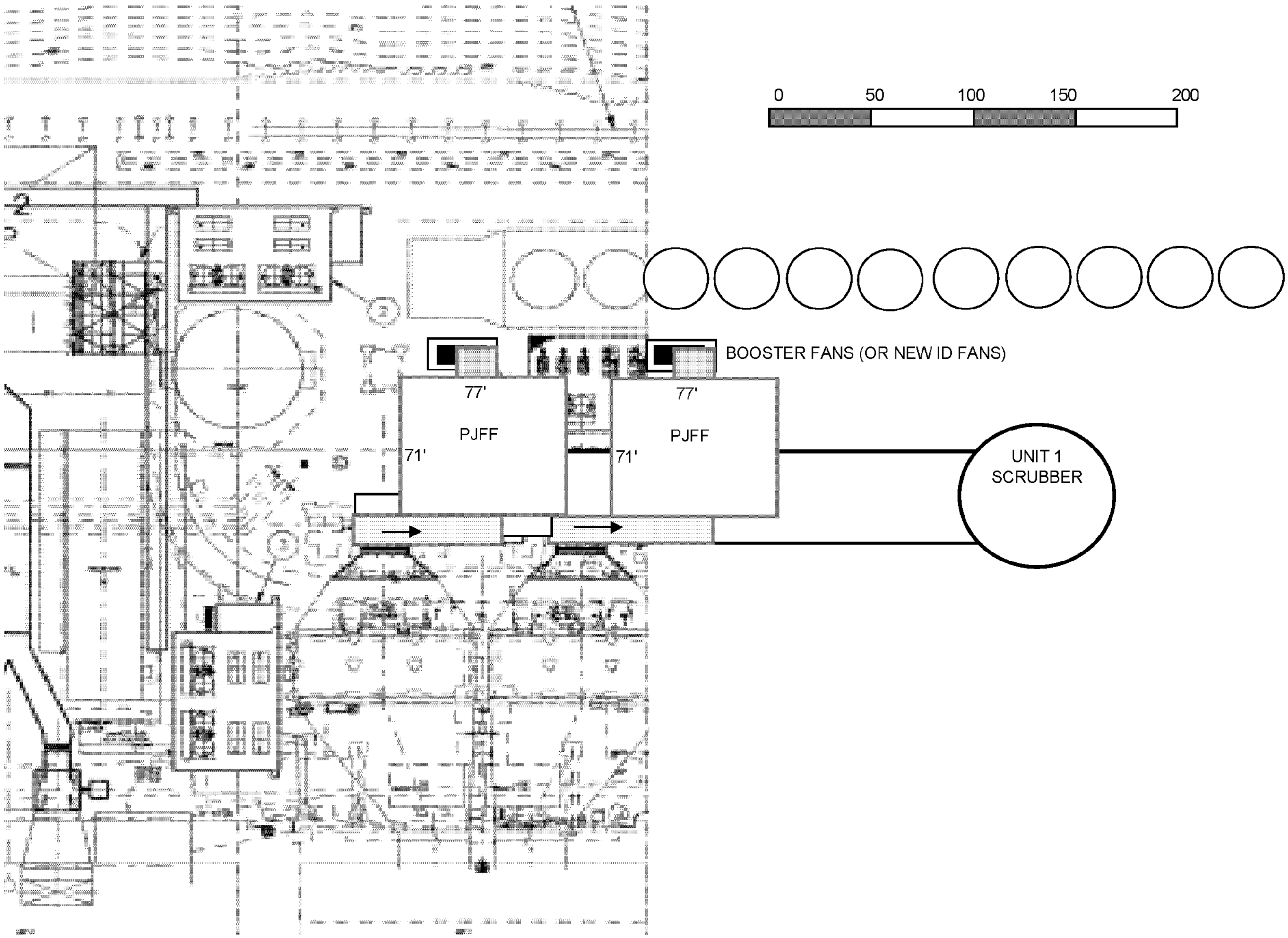
BUILDING A WORLD OF DIFFERENCE®

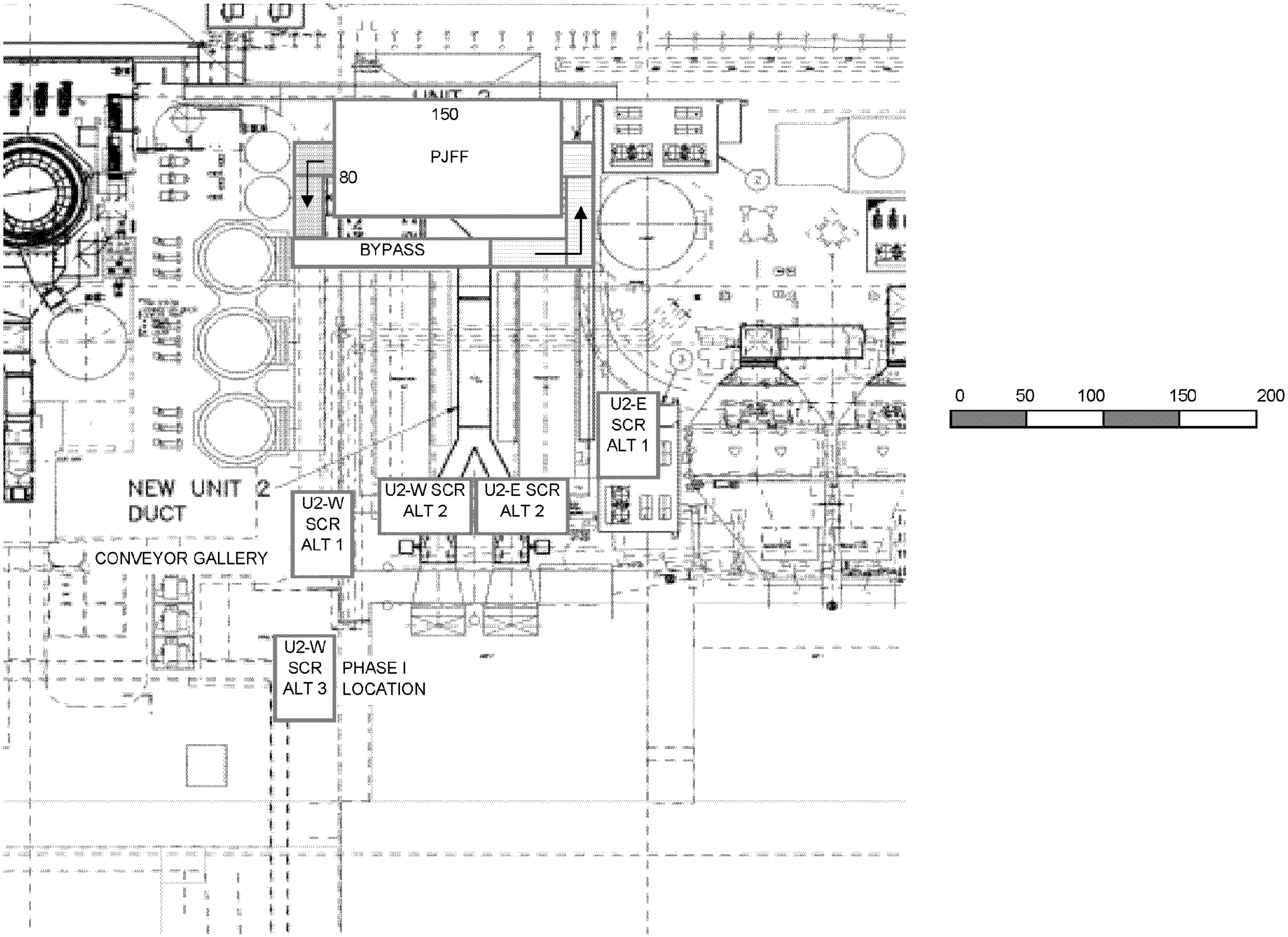
BLACK & VEATCH

Phase I implementation schedule

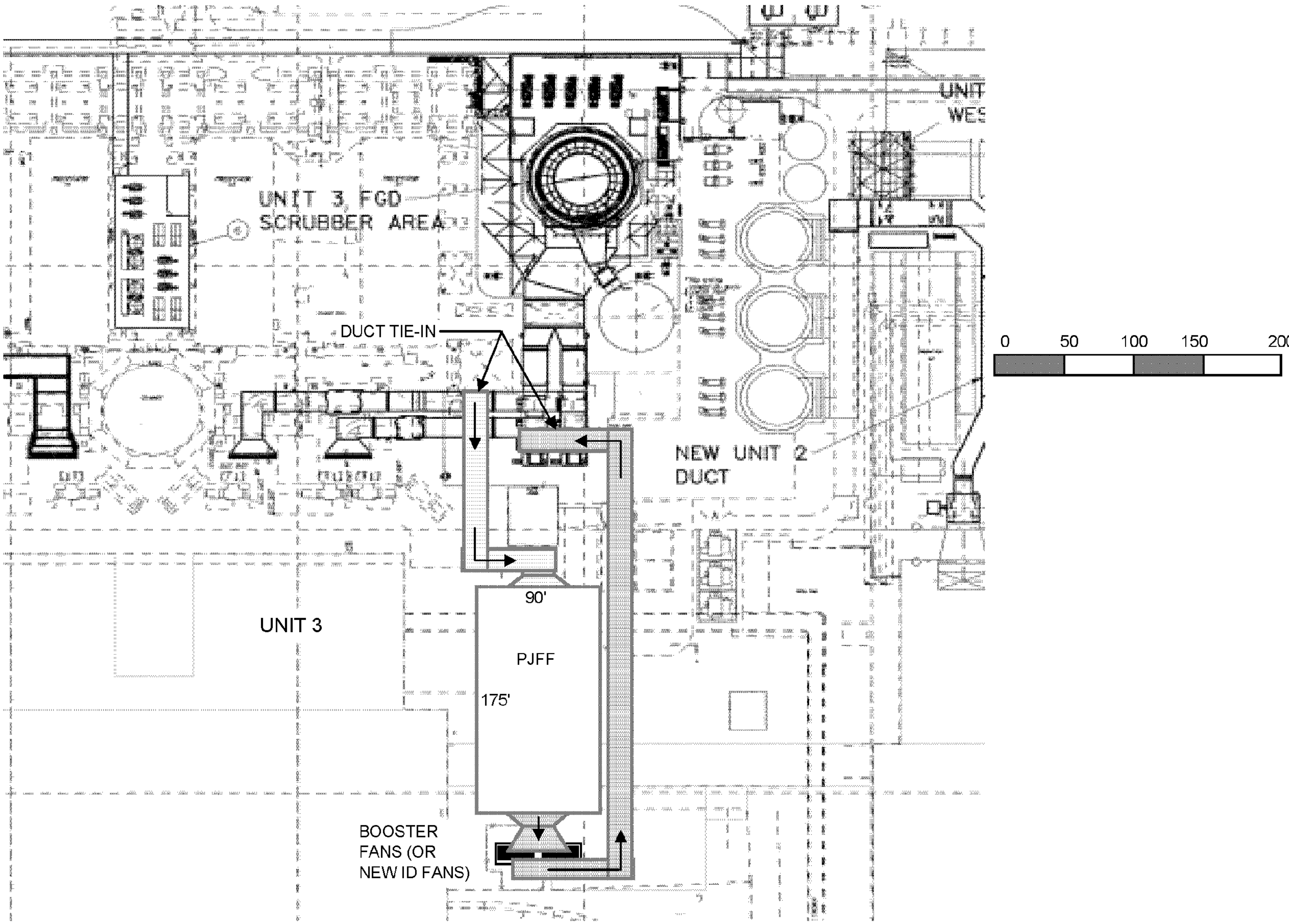
- Ghent Unit 1 PJFF – 36 months
- Ghent Unit 2 SCR & PJFF – 44 months
- Ghent Unit 3 PJFF – 32 months
- Ghent Unit 4 PJFF – 32 months

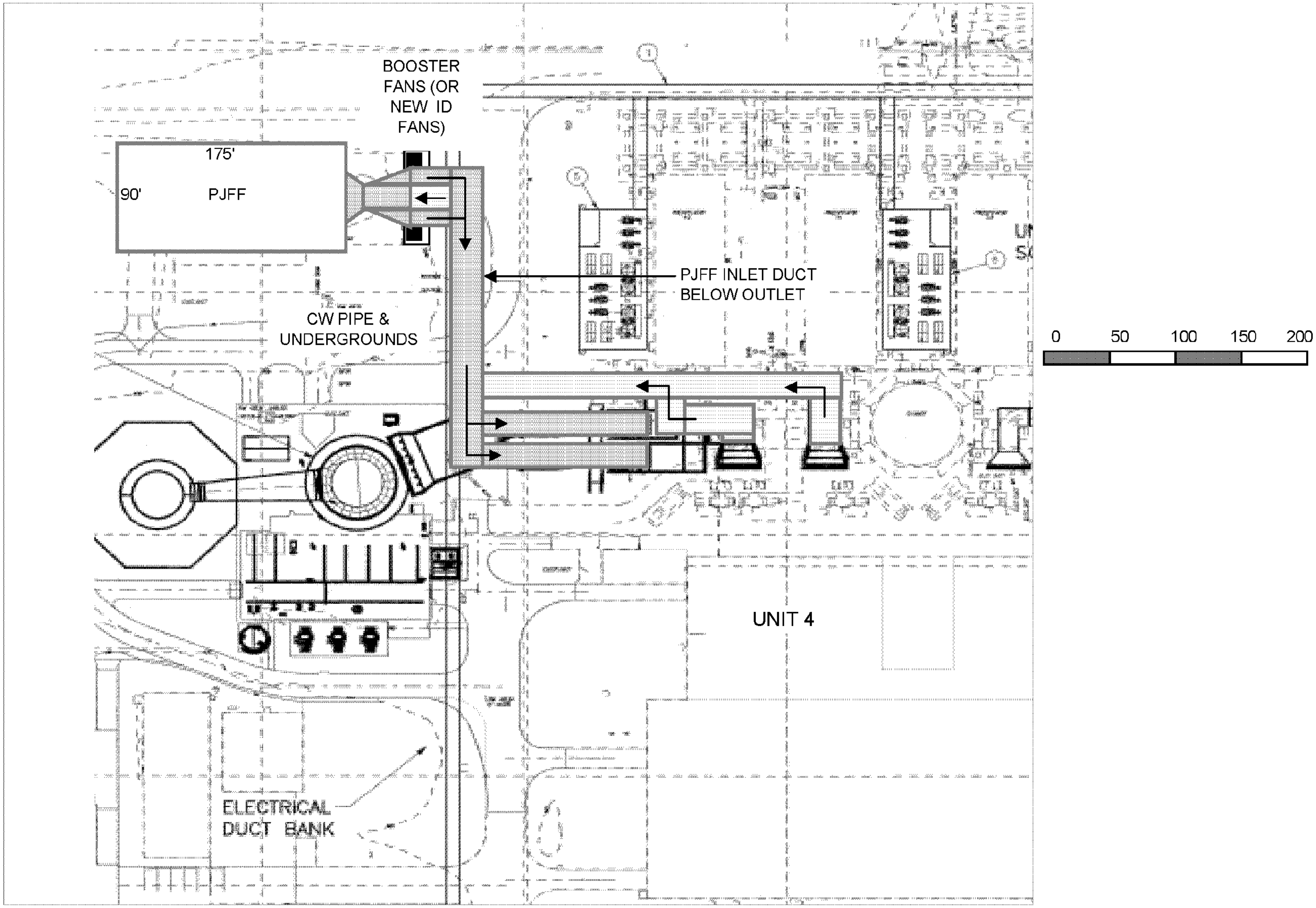


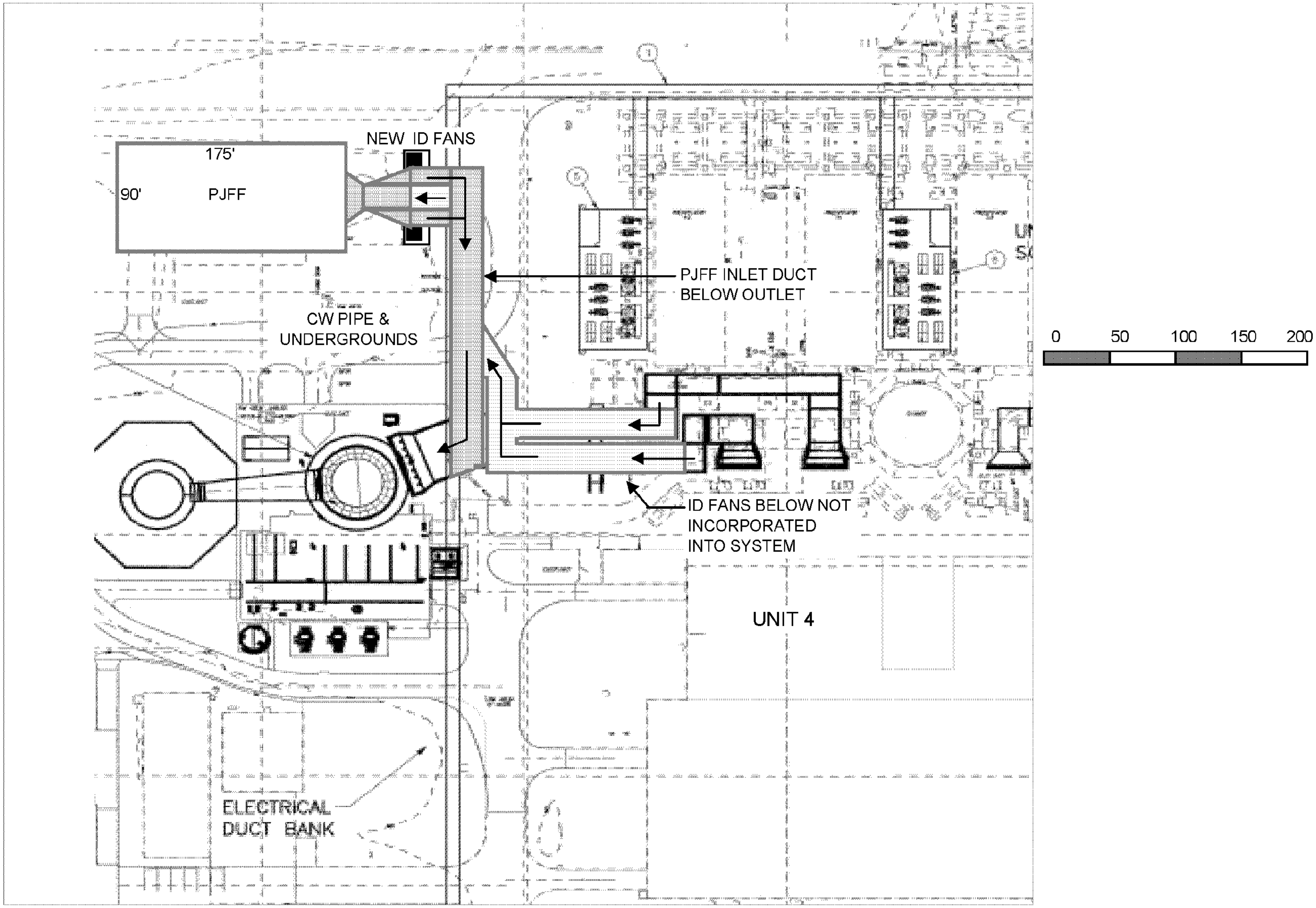

0
50
100
150
200
BOOSTER FANS (OR NEW ID FANS)
77'
77'
PJFF
PJFF
71'
71'
UNIT 1
SCRUBBER



UNIT 2
150
PJFF
80
BYPASS
NEW UNIT 2
DUCT
U2-W SCR ALT 1
U2-W SCR ALT 2
U2-E SCR ALT 2
U2-E SCR ALT 1
CONVEYOR GALLERY
U2-W SCR ALT 3
PHASE I LOCATION
0
50
100
150
200


UNIT 3 FGD
SCRUBBER AREA
DUCT TIE-IN
NEW UNIT 2
DUCT
0
50
100
150
200
90'
UNIT 3
PJFF
175'
BOOSTER
FANS (OR
NEW ID FANS)


BOOSTER FANS (OR NEW ID FANS)
175'
90'
PJFF
PJFF INLET DUCT BELOW OUTLET
CW PIPE & UNDERGROUNDS
0
50
100
150
200
UNIT 4
ELECTRICAL DUCT BANK


NEW ID FANS
175'
90'
PJFF
PJFF INLET DUCT
BELOW OUTLET
CW PIPE &
UNDERGROUNDS
ID FANS BELOW NOT
INCORPORATED
INTO SYSTEM
UNIT 4
ELECTRICAL
DUCT BANK
0
50
100
150
200

From:	Hillman, Timothy M.
To:	Saunders, Eileen
CC:	Wehrly, M. R.; Hintz, Monty E.; Lucas, Kyle J.; Lausman, Rick L.; Crabtree, Jonathan D.; Mahabaleshwarkar, Anand; King, Michael L. (Mike)
Sent:	9/10/2010 9:01:11 AM
Subject:	E.ON Mill Creek Kickoff Meeting - Final Agenda
Attachments:	EON Mill Creek Kickoff Meeting Agenda.doc

Eileen,

Attached is the final agenda. B&V personnel attendance is as follows:

Day 1 (9/14)	**Broadway Office Complex**	**Mill Creek**
	Tim Hillman	Anand Mahabaleshwarkar
	M.R. Wehrly	Rick Lausman
	Kyle Lucas	Monty Hintz
	Mike King	
Days 2 (9/15)		**Mill Creek**
		Anand Mahabaleshwarkar
		Rick Lausman
		Monty Hintz
		M.R. Wehrly
		Tim Hillman
		Kyle Lucas
Day 3 (9/16)		**Mill Creek**
		Anand Mahabaleshwarkar
		Monty Hintz
		M.R. Wehrly
		Tim Hillman

Best regards.

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Saunders, Eileen [mailto:Eileen.Saunders@eon-us.com]
Sent: Friday, September 10, 2010 6:34 AM
To: Hillman, Timothy M.
Cc: Wehrly, M. R.; Hintz, Monty E.; Lucas, Kyle J.; Lausman, Rick L.; Crabtree, Jonathan D.; Mahabaleshwarkar, Anand
Subject: RE: E.ON Mill Creek Kickoff Meeting - Draft Agenda

Tim,

It looks like you got everything! I am comfortable with the Agenda as written.

One thing I need from you today is a list of who will be at the station **each day**. I need to inform the guards and have one of my guys waiting for them at the gate. Please send that information today if possible.

Also, I will have lunch brought in on Wednesday for the group. On Thursday, I suggest running down the street to Subway and grabbing lunch.

I will provide a projector that we can use.

Thanks,

Eileen

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Subject: E.ON Mill Creek Kickoff Meeting - Draft Agenda

Eileen,

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A couple questions:
- On Sep 15th and 16th, would it be possible to have lunch on-site at Mill Creek, or will we need to go off-site?
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Best regards,

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Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Saunders, Eileen [mailto:Eileen.Saunders@eon-us.com]
Sent: Thursday, September 09, 2010 7:53 AM
To: Hillman, Timothy M.
Subject: Re: Draft AQCS Contract - Notice To Proceed

Tim,

Last time we met as a group, you sent me a sample agenda that I modified. Can you send me a draft that I can review? I would like to send something to the plant tomorrow.

Thanks,

Eileen

From: Hillman, Timothy M. <HillmanTM@bv.com>
To: Whitworth, Wayne
Cc: Saunders, Eileen; Clements, Joe; King, Michael L. (Mike) <kingml@bv.com>; Pollins, Kent D. <PollinsKD@bv.com>
Sent: Thu Sep 09 08:48:00 2010
Subject: RE: Draft AQCS Contract - Notice To Proceed

Thanks Wayne.

Best regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Whitworth, Wayne [mailto:Wayne.Whitworth@eon-us.com]
Sent: Thursday, September 09, 2010 7:42 AM
To: Hillman, Timothy M.
Cc: Saunders, Eileen; Clements, Joe; King, Michael L. (Mike); Pollins, Kent D.
Subject: RE: Draft AQCS Contract - Notice To Proceed
Importance: High

Tim,

Attached is an executed copy of the AQCS Contract. The duplicate original will be sent to you today via UPS Next Day Air. Please note that a number will be assigned to this contract prior to your first billing. The contract number will need to be included on all invoices.

Thanks for all your help. If you have any questions, please don't hesitate to call.

Best regards,

W. Wayne Whitworth
Project Engineering
E-ON U.S. Services Inc.
820 West Broadway
P.O. Box 32020
Louisville, KY 40202

email: wayne.whitworth@eon-us.com

Office: 502.627.2641
Fax: 502.217.2843
Cell: 502.762.6614

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
Sent: Wednesday, September 08, 2010 10:04 AM
To: Whitworth, Wayne
Cc: Saunders, Eileen; Clements, Joe; King, Michael L. (Mike); Pollins, Kent D.
Subject: RE: Draft AQCS Contract - Notice To Proceed

Wayne,

I understand that the contract has been signed and that originals were sent to you via FedEx yesterday.

Best regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services

Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Whitworth, Wayne [mailto:Wayne.Whitworth@eon-us.com]
Sent: Tuesday, September 07, 2010 9:01 AM
To: Hillman, Timothy M.
Cc: Saunders, Eileen; Clements, Joe; King, Michael L. (Mike)
Subject: RE: Draft AQCS Contract - Notice To Proceed
Importance: High

Tim,

Please find attached our Contract Notice To Proceed for Phase II Air Quality Control Study incorporating your comments of September 1, 2010. Please print two copies, sign both as originals and return to my attention. A countersigned duplicate original will be returned for your records.

Note that the attached does not include a contract number. Our Contract Number will be assigned when the project is established in our accounting systems, anticipated to be later this week. The Contract Number must be included on all invoices presented for payment.

Eileen Saunders will be contacting you to arrange a project kick-off meeting to be held in Louisville sometime next week.

Should you have any questions, please do not hesitate to call.

Best regards,

W. Wayne Whitworth
Project Engineering
E-ON U.S. Services Inc.
820 West Broadway
P.O. Box 32020
Louisville, KY 40202

email: wayne.whitworth@eon-us.com

Office: 502.627.2641
Fax: 502.217.2843
Cell: 502.762.6614

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
Sent: Wednesday, September 01, 2010 1:53 PM
To: Whitworth, Wayne
Cc: Saunders, Eileen; Clements, Joe; Pollins, Kent D.; King, Michael L. (Mike); Hillman, Timothy M.
Subject: RE: Draft AQCS Contract
Importance: High

Wayne,

Please find attached subject contract with a few minors edits/revisions in track-changes. You will find the track-changes on the following pages of the draft contract.

- Pg 2, Section 5.3
- Pg 3, Section 8.1
- Pg 4, Section 9.1.1
- Pg 4, Section 9.3.2
- Pg 17, Exhibit 1, Scope of work, Task 8
- Pg 20, Exhibit 1, Scope of work, Compensation

Don't hesitate to call me if you have any questions.

Regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Whitworth, Wayne [mailto:Wayne.Whitworth@eon-us.com]
Sent: Tuesday, August 31, 2010 11:34 AM
To: Hillman, Timothy M.
Cc: Saunders, Eileen; Clements, Joe
Subject: Draft AQCS Contract
Importance: High

Tim,

<<Contract DRAFT Black Veatch Rev 4 (8-27-2010-els) .docx>>

Attached is a draft for the Phase II Air Quality Control Study. Please let me know if you have any comments as we continue to seek the required approvals to proceed..

Regards

W. Wayne Whitworth

Project Engineering

E-ON U.S. Services Inc.

820 West Broadway

P.O. Box 32020

Louisville, KY 40202

email: wayne.whitworth@eon-us.com

Office: 502.627.2641

Fax: 502.217.2843

Cell: 502.762.6614

The information contained in this transmission is intended only for the person or entity to which it is directly addressed or copied. It may contain material of confidential and/or private nature. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient is not allowed. If you received this message and the information contained therein by error, please contact the sender and delete the material from your/any storage medium.

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AGENDA

Phase II Air Quality Control Study – Kickoff Meeting and Site Visit
E.ON - Mill Creek Station
September 14 - 16, 2010
Location: E.ON Broadway Office Complex and Mill Creek

Day 1, September 14th, Arrive 1 pm (Broadway Office Complex)

- I. Introductions
- II. Review Project Scope
- III. Review Project Schedule
- IV. Review Project Deliverables
- V. Project Administration
  - a. Communication
  - b. File System
  - c. Monthly Reports
  - d. Weekly Conference Calls/Action Item List
  - e. Invoicing
- VI. Project Documentation
- VII. Information Request

Day 1, September 14th, Arrive 1 pm (Mill Creek)

- I. Arrive on Site and Introductions
- II. Begin Initial Escorted Site Walk Down

Day 2, September 15th, Arrive 8 am (Mill Creek)

- I. Introductions
- II. Environmental Drivers Presentation (E.ON – Gary R.)
- III. Aug 5-6th AQC Workshop Results Presentation (B&V – Rick L and Anand M.)
- IV. Lunch (on site)
- V. Continue Escorted Site Walk Down and Data Collection

Day 3, September 16th, Arrive 8 am (Mill Creek)

- I. Continue Escorted Site Walk Down and Data Collection
- II. Lunch (off site)
- III. Site Debriefing Meeting
- IV. Depart (no later than 4 pm)

From: Drake, Michael
To: Saunders, Eileen
Sent: 10/14/2010 3:09:41 PM
Subject: RE: 168908.14.1000 101012 Ghent - Draft Kickoff and Site Visit Meeting Minutes
Attachments: image003.jpg

You forgot about flying monkeys…or did I just dream that part? I was not all there that day!

Best Regards,
Michael Drake

Friends of Coal

P Please consider the environment before printing this e-mail

---

From: Saunders, Eileen
Sent: Thursday, October 14, 2010 11:18 AM
To: Joyce, Jeff; Wright, Paul; Drake, Michael; Ayler, Danny; Bickers, Troy; Smith, Dave; Jones, Greg; Scott, Randy; Revlett, Gary
Cc: Hillman, Timothy M.
Subject: FW: 168908.14.1000 101012 Ghent - Draft Kickoff and Site Visit Meeting Minutes

All,

Here are the notes from our meeting. Please let me know if you have any comments so I can respond to B&V.

Thanks,

Eileen

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
Sent: Tuesday, October 12, 2010 1:53 PM
To: Saunders, Eileen
Cc: 168908 E.ON-AQC; Jackson, Audrey; Wehrly, M. R.; Lucas, Kyle J.; Mahabaleshwarkar, Anand; Lausman, Rick L.; Hintz, Monty E.; Goodlet, Roger F.; Crabtree, Jonathan D.
Subject: 168908.14.1000 101012 Ghent - Draft Kickoff and Site Visit Meeting Minutes

Eileen,

Please find attached draft meeting minutes from the Ghent kickoff. Please provide E.ON's comments by next Tuesday, 10/19.
Thanks,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From:	Saunders, Eileen
To:	Straight, Scott; Kirkland, Mike; Didelot, Joe; Buckner, Mike; Revlett, Gary; Bennett, Mike; Betz, Alex; Mooney, Mike (BOC 3); Moehrke, William; Craigmyle, Kenny
CC:	'Hillman, Timothy M.'; Heath, Rosie
Sent:	9/10/2010 9:13:26 AM
Subject:	FW: E.ON Mill Creek Kickoff Meeting - Final Agenda
Attachments:	EON Mill Creek Kickoff Meeting Agenda.doc

All,

Please see the enclosed agenda for our meeting next Wednesday. B&V will be meeting with me on Tuesday, September 14th at the BOC to discuss administrative processes but you will see in the email below, that they will have a few members of their team doing an initial walkdown at the site. Bill Moehrke and Kenny Craigmyle will take care of assisting B&V on that day.

On Wednesday, September 15th, we will meet in the Main Office Conference Room. As shown on the agenda, the first part of the meeting will be a technical discussion followed by site walkdowns. Lunch will be provided.

Also, B&V requested a return visit to the site on Thursday September 16th as well. Bill and Kenny can escort them as well on that day. The plant is always welcome to join us on these walkdowns but I did not want to tie-up personnel for three days. A debriefing meeting will be held at the site prior to B&V's departure. The time for that meeting will be determined Wednesday.

I have included the names of the personnel who will be coming to the site. Can someone provide these names to the guards and give them access to the site?

Please let me know if you have any questions.

Thanks,

Eileen

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
Sent: Friday, September 10, 2010 9:01 AM
To: Saunders, Eileen
Cc: Wehrly, M. R.; Hintz, Monty E.; Lucas, Kyle J.; Lausman, Rick L.; Crabtree, Jonathan D.; Mahabaleshwarkar, Anand; King, Michael L. (Mike)
Subject: E.ON Mill Creek Kickoff Meeting - Final Agenda

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	M.R. Wehrly	Rick Lausman
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	Mike King	
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		Anand Mahabaleshwarkar
		Rick Lausman
		Monty Hintz
		M.R. Wehrly
		Tim Hillman

Kyle Lucas

Day 3 (9/16)

Mill Creek
Anand Mahabaleshwarkar
Monty Hintz
M.R. Wehrly
Tim Hillman

Best regards.

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
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Email: **hillmantm@bv.com**

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To: Hillman, Timothy M.
Subject: Re: Draft AQCS Contract - Notice To Proceed

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To: Whitworth, Wayne
Cc: Saunders, Eileen; Clements, Joe; King, Michael L. (Mike) <kingml@bv.com>; Pollins, Kent D. <PollinsKD@bv.com>
Sent: Thu Sep 09 08:48:00 2010
Subject: RE: Draft AQCS Contract - Notice To Proceed

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W. Wayne Whitworth
Project Engineering
E-ON U.S. Services Inc.
820 West Broadway
P.O. Box 32020
Louisville, KY 40202

email: wayne.whitworth@eon-us.com

Office: 502.627.2641
Fax: 502.217.2843
Cell: 502.762.6614

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
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Email: **hillmantm@bv.com**

From: Whitworth, Wayne [mailto:Wayne.Whitworth@eon-us.com]
Sent: Tuesday, September 07, 2010 9:01 AM
To: Hillman, Timothy M.
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Subject: RE: Draft AQCS Contract - Notice To Proceed
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W. Wayne Whitworth
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820 West Broadway
P.O. Box 32020
Louisville, KY 40202

email: wayne.whitworth@eon-us.com

Office: 502.627.2641
Fax: 502.217.2843
Cell: 502.762.6614

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Sent: Wednesday, September 01, 2010 1:53 PM
To: Whitworth, Wayne
Cc: Saunders, Eileen; Clements, Joe; Pollins, Kent D.; King, Michael L. (Mike); Hillman, Timothy M.
Subject: RE: Draft AQCS Contract
Importance: High

Wayne,

Please find attached subject contract with a few minors edits/revisions in track-changes. You will find the track-changes on the following pages of the draft contract.

- Pg 2, Section 5.3
- Pg 3, Section 8.1
- Pg 4, Section 9.1.1
- Pg 4, Section 9.3.2
- Pg 17, Exhibit 1, Scope of work, Task 8
- Pg 20, Exhibit 1, Scope of work, Compensation

Don't hesitate to call me if you have any questions.

Regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Whitworth, Wayne [mailto:Wayne.Whitworth@eon-us.com]
Sent: Tuesday, August 31, 2010 11:34 AM
To: Hillman, Timothy M.
Cc: Saunders, Eileen; Clements, Joe
Subject: Draft AQCS Contract
Importance: High

Tim,

<<Contract DRAFT Black Veatch Rev 4 (8-27-2010-els) .docx>>

Attached is a draft for the Phase II Air Quality Control Study. Please let me know if you have any comments as we continue to seek the required approvals to proceed..

Regards

W. Wayne Whitworth

Project Engineering

E-ON U.S. Services Inc.

820 West Broadway

P.O. Box 32020

Louisville, KY 40202

email: wayne.whitworth@eon-us.com

Office: 502.627.2641

Fax: 502.217.2843

Cell: 502.762.6614

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AGENDA

Phase II Air Quality Control Study – Kickoff Meeting and Site Visit
E.ON - Mill Creek Station
September 14 - 16, 2010
Location: E.ON Broadway Office Complex and Mill Creek

Day 1, September 14th, Arrive 1 pm (Broadway Office Complex)

I. Introductions
II. Review Project Scope
III. Review Project Schedule
IV. Review Project Deliverables
V. Project Administration
  a. Communication
  b. File System
  c. Monthly Reports
  d. Weekly Conference Calls/Action Item List
  e. Invoicing
VI. Project Documentation
VII. Information Request

Day 1, September 14th, Arrive 1 pm (Mill Creek)

I. Arrive on Site and Introductions
II. Begin Initial Escorted Site Walk Down

Day 2, September 15th, Arrive 8 am (Mill Creek)

I. Introductions
II. Environmental Drivers Presentation (E.ON – Gary R.)
III. Aug 5-6th AQC Workshop Results Presentation (B&V – Rick L and Anand M.)
IV. Lunch (on site)
V. Continue Escorted Site Walk Down and Data Collection

Day 3, September 16th, Arrive 8 am (Mill Creek)

I. Continue Escorted Site Walk Down and Data Collection
II. Lunch (off site)
III. Site Debriefing Meeting
IV. Depart (no later than 4 pm)

From:	Conroy, Robert
To:	Schroeder, Andrea
Sent:	9/30/2010 12:40:58 PM
Subject:	
Attachments:	Environmental Summay alternate scenario Rev4 - Pras (2).xlsx

Robert M. Conroy
Director, Rates
E.ON U.S. Services Inc.
(502) 627-3324 (phone)
(502) 627-3213 (fax)
(502) 741-4322 (mobile)
robert.conroy@eon-us.com

	A	C	D	E	F	G	H	I	J	K
1	**Environmental Air - CATR by January 2015, NAAQS by January 2016, HAPs by January 2017**									
2	$ in thousands									
3		**Capital Cost**	**ECR Filing**	**pportable Docume**	**Start of Constructior**	2011	2012	2013	2014	2015
4	**Alternate Plan**									
5	**Brown**									
6	Brown 1 - SCR	$59,000	Dec-10			$2,950	$17,700	$23,600	$14,750	
7	Brown 1 - Baghouse	$34,000	Dec-10			$1,700	$11,900	$13,600	$6,800	
8	Brown 1 - PAC Injection	$1,599	Apr-12					$800	$800	
10	Brown 1 - SAM Mitigation	$4,000	Dec-10			$200	$1,200	$1,600	$1,000	
12	Brown 1 - Escalation	$15,476				$371	$3,679	$6,504	$4,922	
13	Total Brown 1	**$114,075**				**$5,221**	**$34,479**	**$46,103**	**$28,272**	**$0**
14										
15	Brown 2 - SCR	$92,000	Dec-10			$9,200.0	$34,500	$43,700	$4,600	
16	Brown 2 - Baghouse	$34,000	Jul-11				$1,360	$10,200	$10,880	$10,540
17	Brown 2 - PAC Injection	$2,476	Apr-13						$1,238	$1,238
20	Brown 2 - SAM Mitigation	$4,000	Dec-10			$200	$1,600	$2,200		
22	Brown 2 - Escalation	$21,300				$718	$4,475	$9,214	$3,524	$3,053
23	Total Brown 2	**$153,776**				**$10,118**	**$41,935**	**$65,314**	**$20,242**	**$14,831**
24										
27	Brown 3 - Baghouse	$61,000	Apr-12					$1,830	$21,350	$28,670
28	Brown 3 - PAC Injection	$5,426	Apr-13						$1,000	$3,426
31	Brown 3 - Escalation	$16,475				$0	$0	$301	$4,711	$8,320
32	Total Brown 3	**$82,901**				**$0**	**$0**	**$2,131**	**$27,061**	**$40,416**
33										
34	**Total Brown**	**$350,751**				**$15,339**	**$76,414**	**$113,547**	**$75,575**	**$55,248**
35										
36	**Ghent**									
37	Ghent 1 - Baghouse	$131,000	Apr-12					$3,930	$45,850	$61,570
38	Ghent 1 - PAC Injection	$6,380	Apr-13						$1,000	$4,380
42	Ghent 1 - Escalation	$34,012				$0	$0	$645	$9,876	$17,097
43	Total Ghent 1	**$171,392**				**$0**	**$0**	**$4,575**	**$56,726**	**$83,047**
44										
45	Ghent 2 - SCR	$227,000	Dec-10			$11,350	$68,100	$90,800	$56,750	
46	Ghent 2 - Baghouse	$120,000	Apr-12					$4,800	$42,000	$56,400
47	Ghent 2 - PAC Injection	$6,109	Apr-13						$1,000	$4,109
52	Ghent 2 - Escalation	$66,928				$867	$8,135	$15,701	$21,028	$15,686
53	Total Ghent 2	**$420,037**				**$12,217**	**$76,235**	**$111,301**	**$120,778**	**$76,195**
54										
55	Ghent 3 - Baghouse	$138,000	Apr-12					$16,560	$48,300	$66,240
56	Ghent 3 - PAC Injection	$6,173	Apr-13						$3,087	$3,087
60	Ghent 3 - Escalation	$33,660				$0	$0	$2,720	$10,832	$17,972
61	Total Ghent 3	**$177,833**				**$0**	**$0**	**$19,280**	**$62,219**	**$87,298**
62										
63	Ghent 4 - Baghouse	$117,000	Apr-12					$11,700	$40,950	$58,500
64	Ghent 4 - PAC Injection	$6,210	Apr-13						$3,105	$3,105
68	Ghent 4 - Escalation	$28,990				$0	$0	$1,922	$9,287	$15,970
69	Total Ghent 4	**$152,200**				**$0**	**$0**	**$13,622**	**$53,342**	**$77,575**
70										
71	**Total Ghent**	**$921,461**				**$12,217**	**$76,235**	**$148,777**	**$293,065**	**$324,115**
72										

	L	M	N	O	P
1					
2					
3	2016	2017	2018	Total	
4					
5					
6				$59,000	$0
7				$34,000	$0
8				$1,599	$0
10				$4,000	$0
12				$15,476	$0
13	**$0**	**$0**	**$0**	**$114,075**	**$0**
14					
15				$92,000	$0
16	$1,020			$34,000	$0
17				$2,476	$0
20				$4,000	$0
22	$316			$21,300	$0
23	**$1,336**	**$0**	**$0**	**$153,776**	**$0**
24					
27	$9,150			$61,000	$0
28	$1,000			$5,426	$0
31	$3,142			$16,475	$0
32	**$13,292**	**$0**	**$0**	**$82,901**	**$0**
33					
34	**$14,628**	**$0**	**$0**	**$350,751**	**$0**
35					
36					
37	$19,650			$131,000	$0
38	$1,000			$6,380	$0
42	$6,393			$34,012	$0
43	**$27,043**	**$0**	**$0**	**$171,392**	**$0**
44					
45				$227,000	$0
46	$16,800			$120,000	$0
47	$1,000			$6,109	$0
52	$5,511			$66,928	$0
53	**$23,311**	**$0**	**$0**	**$420,037**	**$0**
54					
55	$6,900			$138,000	$0
56				$6,173	$0
60	$2,136			$33,660	$0
61	**$9,036**	**$0**	**$0**	**$177,833**	**$0**
62					
63	$5,850			$117,000	$0
64				$6,210	$0
68	$1,811	$0	$0	$28,990	$0
69	**$7,661**	**$0**	**$0**	**$152,200**	**$0**
70					
71	**$67,052**	**$0**	**$0**	**$921,461**	**$0**
72					

	A	C	D	E	F	G	H	I	J	K
73	**Mill Creek**									
74	Mill Creek 1 - FGD Upgrade	$41,250	Apr-12					$10,313	$28,875	$2,063
75	Mill Creek 1 - SCR	$97,020	Apr-12					$2,911	$27,166	$29,106
76	Mill Creek 1 - Baghouse	$80,850	Jul-11				$8,085	$28,298	$40,425	$4,043
77	Mill Creek 1 - Electrostatic Precipitator	$0					$0	$0	$0	$0
78	Mill Creek 1 - PAC Injection	$4,290	Jul-11				$429	$1,502	$2,360	
81	Mill Creek 1 - SAM Mitigation	$7,920	Apr-12					$396	$792	$2,376
83	Mill Creek 1 - Escalation	$52,077				$0	$1,017	$7,131	$21,000	$9,744
84	Total Mill Creek 1	**$283,407**				**$0**	**$9,531**	**$50,549**	**$120,617**	**$47,331**
85										
86	Mill Creek 2 - FGD Upgrade	$41,250	Jul-11				$10,313	$28,875	$2,063	
87	Mill Creek 2 - SCR	$97,020	Jul-11				$2,911	$27,166	$29,106	$35,897
88	Mill Creek 2 - Baghouse	$80,850	Dec-10			$8,085	$28,298	$40,425	$4,043	
89	Mill Creek 2 - Electrostatic Precipitator	$33,000	Dec-10			$3,300	$11,550	$16,500	$1,650	
90	Mill Creek 2 - PAC Injection	$4,290	Dec-10			$429	$1,502	$2,360		
91	Mill Creek 2 - SAM Mitigation	$7,920	Jul-11				$396	$792	$2,376	$3,960
92	Mill Creek 2 - Escalation	$45,866				$903	$6,566	$19,070	$8,271	$10,332
93	Total Mill Creek 2	**$310,196**				**$12,717**	**$61,534**	**$135,188**	**$47,508**	**$50,190**
94										
97	Mill Creek 3 - FGD (U4 update and tie in)	$63,750	Apr-13						$47,813	$15,938
98	Mill Creek 3 - FGD (Unit 3 Removal)	$25,500	Apr-13						$6,375	$19,125
99	Mill Creek 3 - Baghouse	$104,125	Jul-11				$2,083	$31,238	$39,568	$31,238
100	Mill Creek 3 - PAC Injection	$5,525	Jul-11				$111	$1,658	$2,100	$1,658
101	Mill Creek 3 - Escalation	$43,488				$0	$262	$5,402	$20,206	$17,617
102	Total Mill Creek 3	**$242,388**				**$0**	**$2,455**	**$38,297**	**$116,061**	**$85,575**
103										
104	Mill Creek 4 - FGD	$236,250	Dec-10			$18,900	$80,325	$89,775	$47,250	
105	Mill Creek 4 - SCR Upgrade	$5,250	Dec-10			$4,200	$1,050			
106	Mill Creek 4 - Baghouse	$131,250	Dec-10			$5,250	$45,938	$52,500	$27,563	
107	Mill Creek 4 - PAC Injection	$6,825	Dec-10			$273	$2,389	$2,730	$1,433	
108	Mill Creek 4 - Ammonia	$10,500	Dec-10			$5,250	$5,250			
109	Mill Creek 4 - Escalation	$58,596				$2,588	$16,121	$23,815	$16,073	$0
110	Total Mill Creek 4	**$448,671**				**$36,461**	**$151,072**	**$168,820**	**$92,319**	**$0**
111										
112	**Total Mill Creek**	**$1,284,663**				**$49,177**	**$224,592**	**$392,854**	**$376,505**	**$183,095**
113										
114	**Trimble**									
115	Trimble 1 - Baghouse	$128,000	Apr-12					$12,800	$44,800	$64,000
116	Trimble 1 - PAC Injection	$6,451	Apr-13						$3,226	$3,226
117	Trimble 1 - Escalation	$31,635				$0	$0	$2,102	$10,124	$17,427
118	Total Trimble 1	**$166,086**				**$0**	**$0**	**$14,902**	**$58,149**	**$84,653**
119										
120	**Total Trimble**	**$166,086**				**$0**	**$0**	**$14,902**	**$58,149**	**$84,653**
121										
122	**Total Environmental Compliance Air - Alternate Plan**	**$2,722,961**				**$76,733**	**$377,241**	**$670,080**	**$803,294**	**$647,111**
123										
124										
125	Scope	$2,274,459								
126	Escalation	$448,502								
127		**$2,722,961**								

	L	M	N	O	P
73					
74				$41,250	$0
75	$35,897	$1,940		$97,020	$0
76				$80,850	$0
77				$0	$0
78				$4,290	$0
81	$3,960	$396		$7,920	$0
83	$12,340	$846		$52,077	$0
84	**$52,197**	**$3,182**	**$0**	**$283,407**	**$0**
85					
86				$41,250	$0
87	$1,940			$97,020	$0
88				$80,850	$0
89				$33,000	$0
90				$4,290	$0
91	$396			$7,920	$0
92	$723	$0		$45,866	$0
93	**$3,060**	**$0**	**$0**	**$310,196**	**$0**
94					
97				$63,750	$0
98				$25,500	$0
99				$104,125	$0
100				$5,525	$0
101	$0			$43,488	$0
102	**$0**	**$0**	**$0**	**$242,388**	**$0**
103					
104				$236,250	$0
105				$5,250	$0
106				$131,250	$0
107				$6,825	$0
108				$10,500	$0
109				$58,596	$0
110	**$0**	**$0**	**$0**	**$448,671**	**$0**
111					
112	**$55,257**	**$3,182**	**$0**	**$1,284,663**	**$0**
113					
114					
115	$6,400			$128,000	$0
116				$6,451	$0
117	$1,981			$31,635	$0
118	**$8,381**	**$0**	**$0**	**$166,086**	**$0**
119					
120	**$8,381**	**$0**	**$0**	**$166,086**	**$0**
121					
122	**$145,319**	**$3,182**	**$0**	**$2,722,961**	**$0**
123					
124					
125					
126					
127					

	A	C	D	E	F	G	H	I	J	K
128										
129										
130										
131										
132										
133										
134						3.5%	3.5%	3.5%	3.5%	3.5%
135						1	2	3	4	5

	L	M	N	O	P
128					
129					
130					
131					
132					
133					
134	3.5%	3.5%	3.5%		
135	6	7	8		

	A	B	D	E	F	G	H	I	J	K	L	M	N
1		**Environmental Air - CATR by January 2015, NAAQS by January 2016, HAPs by January 2017**											
2		$ in thousands											
3			**Capital Cost**		2011	2012	2013	2014	2015	2016	2017	2018	Total
4		**Alternate Plan**											
5	1	Brown 1 - SCR	$59,000		$2,950	$17,700	$23,600	$14,750					$59,000
6	1	Brown 1 - Baghouse	$34,000		$1,700	$11,900	$13,600	$6,800					$34,000
7	1	Brown 1 - SAM Mitigation	$4,000		$200	$1,200	$1,600	$1,000					$4,000
10	1	Brown 2 - SCR	$92,000		$9,200	$34,500	$43,700	$4,600					$92,000
11	1	Brown 2 - SAM Mitigation	$4,000		$200	$1,600	$2,200						$4,000
12	1	Ghent 2 - SCR	$227,000		$11,350	$68,100	$90,800	$56,750					$227,000
16	1	Mill Creek 2 - Baghouse	$80,850		$8,085	$28,298	$40,425	$4,043					$80,850
19	1	Mill Creek 2 - Electrostatic Precipitator	$33,000		$3,300	$11,550	$16,500	$1,650					$33,000
20	1	Mill Creek 2 - PAC Injection	$4,290		$429	$1,502	$2,360						$4,290
23	1	Mill Creek 4 - FGD	$236,250		$18,900	$80,325	$89,775	$47,250					$236,250
24	1	Mill Creek 4 - SCR Upgrade	$5,250		$4,200	$1,050							$5,250
28	1	Mill Creek 4 - Baghouse	$131,250		$5,250	$45,938	$52,500	$27,563					$131,250
29	1	Mill Creek 4 - PAC Injection	$6,825		$273	$2,389	$2,730	$1,433					$6,825
30	1	Mill Creek 4 - Ammonia	$10,500		$5,250	$5,250							$10,500
35	2	Brown 2 - Baghouse	$34,000			$1,360	$10,200	$10,880	$10,540	$1,020			$34,000
36	2	Mill Creek 1 - Baghouse	$80,850			$8,085	$28,298	$40,425	$4,043				$80,850
37	2	Mill Creek 1 - PAC Injection	$4,290			$429	$1,502	$2,360					$4,290
41	2	Mill Creek 2 - FGD Upgrade	$41,250			$10,313	$28,875	$2,063					$41,250
42	2	Mill Creek 2 - SCR	$97,020			$2,911	$27,166	$29,106	$35,897	$1,940			$97,020
46	2	Mill Creek 2 - SAM Mitigation	$7,920			$396	$792	$2,376	$3,960	$396			$7,920
47	2	Mill Creek 3 - Baghouse	$104,125			$2,083	$31,238	$39,568	$31,238				$104,125
48	2	Mill Creek 3 - PAC Injection	$5,525			$111	$1,658	$2,100	$1,658				$5,525
49	3	Brown 1 - PAC Injection	$1,599				$800	$800					$1,599
50	3	Brown 3 - Baghouse	$61,000				$1,830	$21,350	$28,670	$9,150			$61,000
53	3	Ghent 1 - Baghouse	$131,000				$3,930	$45,850	$61,570	$19,650			$131,000
55	3	Ghent 2 - Baghouse	$120,000				$4,800	$42,000	$56,400	$16,800			$120,000
56	3	Ghent 3 - Baghouse	$138,000				$16,560	$48,300	$66,240	$6,900			$138,000
57	3	Ghent 4 - Baghouse	$117,000				$11,700	$40,950	$58,500	$5,850			$117,000
58	3	Mill Creek 1 - FGD Upgrade	$41,250				$10,313	$28,875	$2,063				$41,250
59	3	Mill Creek 1 - SCR	$97,020				$2,911	$27,166	$29,106	$35,897	$1,940		$97,020
60	3	Mill Creek 1 - SAM Mitigation	$7,920				$396	$792	$2,376	$3,960	$396		$7,920
63	3	Trimble 1 - Baghouse	$128,000				$12,800	$44,800	$64,000	$6,400			$128,000
64	4	Brown 2 - PAC Injection	$2,476					$1,238	$1,238				$2,476
65	4	Brown 3 - PAC Injection	$5,426					$1,000	$3,426	$1,000			$5,426
66	4	Ghent 1 - PAC Injection	$6,380					$1,000	$4,380	$1,000			$6,380
67	4	Ghent 2 - PAC Injection	$6,109					$1,000	$4,109	$1,000			$6,109
68	4	Ghent 3 - PAC Injection	$6,173					$3,087	$3,087				$6,173
69	4	Ghent 4 - PAC Injection	$6,210					$3,105	$3,105				$6,210
70	4	Mill Creek 3 - FGD (U4 update and tie in)	$63,750					$47,813	$15,938				$63,750
71	4	Mill Creek 3 - FGD (Unit 3 Removal)	$25,500					$6,375	$19,125				$25,500
72	4	Trimble 1 - PAC Injection	$6,451					$3,226	$3,226				$6,451
73													
74													
75													

	O
1	
2	
3	
4	
5	$0
6	$0
7	$0
10	$0
11	$0
12	$0
16	$0
19	$0
20	$0
23	$0
24	$0
28	$0
29	$0
30	$0
35	$0
36	$0
37	$0
41	$0
42	$0
46	$0
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	A	B	D	E	F	G	H	I	J	K	L	M	N
76													
77													
78													
79					3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	
80					1	2	3	4	5	6	7	8	

From:	Conroy, Robert
To:	Straight, Scott
CC:	Saunders, Eileen; Schroeder, Andrea
Sent:	9/30/2010 2:25:07 PM
Subject:	ECR compliance plan filings.
Attachments:	Environmental Summay alternate scenario Rev4 - Pras (2).xlsx

Scott,

Here is the table that I gave you before you left. As we discussed, the column labeled "ECR Filing" was a place holder based on when spending would occur and in no way is it accurate. What I need is an understanding of what documentation we have to support a CCN and ECR filing for each of the projects. In addition, since most of the projects will require a CCN, I need to know when "construction" as defined by the CCN will begin so that I can plan accordingly on when to file the application with the KPSC.

You had mentioned "Black and Veatch" study supporting the projects. Would it be possible for me to get access to review that document so I can understand what we have? Thanks for your help and let me know what time you are available to discuss tomorrow.

Robert M. Conroy
Director, Rates
E.ON U.S. Services Inc.
(502) 627-3324 (phone)
(502) 627-3213 (fax)
(502) 741-4322 (mobile)
robert.conroy@eon-us.com

	A	C	D	E	F	G	H	I	J	K
1	**Environmental Air - CATR by January 2015, NAAQS by January 2016, HAPs by January 2017**									
2	$ in thousands									
3		**Capital Cost**	**ECR Filing**	**pportable Docume**	**tart of Constructior**	2011	2012	2013	2014	2015
4	**Alternate Plan**									
5	**Brown**									
6	Brown 1 - SCR	$59,000	Dec-10			$2,950	$17,700	$23,600	$14,750	
7	Brown 1 - Baghouse	$34,000	Dec-10			$1,700	$11,900	$13,600	$6,800	
8	Brown 1 - PAC Injection	$1,599	Apr-12					$800	$800	
10	Brown 1 - SAM Mitigation	$4,000	Dec-10			$200	$1,200	$1,600	$1,000	
12	Brown 1 - Escalation	$15,476				$371	$3,679	$6,504	$4,922	
13	Total Brown 1	**$114,075**				**$5,221**	**$34,479**	**$46,103**	**$28,272**	**$0**
14										
15	Brown 2 - SCR	$92,000	Dec-10			$9,200.0	$34,500	$43,700	$4,600	
16	Brown 2 - Baghouse	$34,000	Jul-11				$1,360	$10,200	$10,880	$10,540
17	Brown 2 - PAC Injection	$2,476	Apr-13						$1,238	$1,238
20	Brown 2 - SAM Mitigation	$4,000	Dec-10			$200	$1,600	$2,200		
22	Brown 2 - Escalation	$21,300				$718	$4,475	$9,214	$3,524	$3,053
23	Total Brown 2	**$153,776**				**$10,118**	**$41,935**	**$65,314**	**$20,242**	**$14,831**
24										
27	Brown 3 - Baghouse	$61,000	Apr-12					$1,830	$21,350	$28,670
28	Brown 3 - PAC Injection	$5,426	Apr-13						$1,000	$3,426
31	Brown 3 - Escalation	$16,475				$0	$0	$301	$4,711	$8,320
32	Total Brown 3	**$82,901**				**$0**	**$0**	**$2,131**	**$27,061**	**$40,416**
33										
34	**Total Brown**	**$350,751**				**$15,339**	**$76,414**	**$113,547**	**$75,575**	**$55,248**
35										
36	**Ghent**									
37	Ghent 1 - Baghouse	$131,000	Apr-12					$3,930	$45,850	$61,570
38	Ghent 1 - PAC Injection	$6,380	Apr-13						$1,000	$4,380
42	Ghent 1 - Escalation	$34,012				$0	$0	$645	$9,876	$17,097
43	Total Ghent 1	**$171,392**				**$0**	**$0**	**$4,575**	**$56,726**	**$83,047**
44										
45	Ghent 2 - SCR	$227,000	Dec-10			$11,350	$68,100	$90,800	$56,750	
46	Ghent 2 - Baghouse	$120,000	Apr-12					$4,800	$42,000	$56,400
47	Ghent 2 - PAC Injection	$6,109	Apr-13						$1,000	$4,109
52	Ghent 2 - Escalation	$66,928				$867	$8,135	$15,701	$21,028	$15,686
53	Total Ghent 2	**$420,037**				**$12,217**	**$76,235**	**$111,301**	**$120,778**	**$76,195**
54										
55	Ghent 3 - Baghouse	$138,000	Apr-12					$16,560	$48,300	$66,240
56	Ghent 3 - PAC Injection	$6,173	Apr-13						$3,087	$3,087
60	Ghent 3 - Escalation	$33,660				$0	$0	$2,720	$10,832	$17,972
61	Total Ghent 3	**$177,833**				**$0**	**$0**	**$19,280**	**$62,219**	**$87,298**
62										
63	Ghent 4 - Baghouse	$117,000	Apr-12					$11,700	$40,950	$58,500
64	Ghent 4 - PAC Injection	$6,210	Apr-13						$3,105	$3,105
68	Ghent 4 - Escalation	$28,990				$0	$0	$1,922	$9,287	$15,970
69	Total Ghent 4	**$152,200**				**$0**	**$0**	**$13,622**	**$53,342**	**$77,575**
70										
71	**Total Ghent**	**$921,461**				**$12,217**	**$76,235**	**$148,777**	**$293,065**	**$324,115**
72										

	L	M	N	O	P
1					
2					
3	2016	2017	2018	Total	
4					
5					
6				$59,000	$0
7				$34,000	$0
8				$1,599	$0
10				$4,000	$0
12				$15,476	$0
13	**$0**	**$0**	**$0**	**$114,075**	**$0**
14					
15				$92,000	$0
16	$1,020			$34,000	$0
17				$2,476	$0
20				$4,000	$0
22	$316			$21,300	$0
23	**$1,336**	**$0**	**$0**	**$153,776**	**$0**
24					
27	$9,150			$61,000	$0
28	$1,000			$5,426	$0
31	$3,142			$16,475	$0
32	**$13,292**	**$0**	**$0**	**$82,901**	**$0**
33					
34	**$14,628**	**$0**	**$0**	**$350,751**	**$0**
35					
36					
37	$19,650			$131,000	$0
38	$1,000			$6,380	$0
42	$6,393			$34,012	$0
43	**$27,043**	**$0**	**$0**	**$171,392**	**$0**
44					
45				$227,000	$0
46	$16,800			$120,000	$0
47	$1,000			$6,109	$0
52	$5,511			$66,928	$0
53	**$23,311**	**$0**	**$0**	**$420,037**	**$0**
54					
55	$6,900			$138,000	$0
56				$6,173	$0
60	$2,136			$33,660	$0
61	**$9,036**	**$0**	**$0**	**$177,833**	**$0**
62					
63	$5,850			$117,000	$0
64				$6,210	$0
68	$1,811	$0	$0	$28,990	$0
69	**$7,661**	**$0**	**$0**	**$152,200**	**$0**
70					
71	**$67,052**	**$0**	**$0**	**$921,461**	**$0**
72					

	A	C	D	E	F	G	H	I	J	K
73	**Mill Creek**									
74	Mill Creek 1 - FGD Upgrade	$41,250	Apr-12					$10,313	$28,875	$2,063
75	Mill Creek 1 - SCR	$97,020	Apr-12					$2,911	$27,166	$29,106
76	Mill Creek 1 - Baghouse	$80,850	Jul-11				$8,085	$28,298	$40,425	$4,043
77	Mill Creek 1 - Electrostatic Precipitator	$0					$0	$0	$0	$0
78	Mill Creek 1 - PAC Injection	$4,290	Jul-11				$429	$1,502	$2,360	
81	Mill Creek 1 - SAM Mitigation	$7,920	Apr-12					$396	$792	$2,376
83	Mill Creek 1 - Escalation	$52,077				$0	$1,017	$7,131	$21,000	$9,744
84	Total Mill Creek 1	**$283,407**				**$0**	**$9,531**	**$50,549**	**$120,617**	**$47,331**
85										
86	Mill Creek 2 - FGD Upgrade	$41,250	Jul-11				$10,313	$28,875	$2,063	
87	Mill Creek 2 - SCR	$97,020	Jul-11				$2,911	$27,166	$29,106	$35,897
88	Mill Creek 2 - Baghouse	$80,850	Dec-10			$8,085	$28,298	$40,425	$4,043	
89	Mill Creek 2 - Electrostatic Precipitator	$33,000	Dec-10			$3,300	$11,550	$16,500	$1,650	
90	Mill Creek 2 - PAC Injection	$4,290	Dec-10			$429	$1,502	$2,360		
91	Mill Creek 2 - SAM Mitigation	$7,920	Jul-11				$396	$792	$2,376	$3,960
92	Mill Creek 2 - Escalation	$45,866				$903	$6,566	$19,070	$8,271	$10,332
93	Total Mill Creek 2	**$310,196**				**$12,717**	**$61,534**	**$135,188**	**$47,508**	**$50,190**
94										
97	Mill Creek 3 - FGD (U4 update and tie in)	$63,750	Apr-13						$47,813	$15,938
98	Mill Creek 3 - FGD (Unit 3 Removal)	$25,500	Apr-13						$6,375	$19,125
99	Mill Creek 3 - Baghouse	$104,125	Jul-11				$2,083	$31,238	$39,568	$31,238
100	Mill Creek 3 - PAC Injection	$5,525	Jul-11				$111	$1,658	$2,100	$1,658
101	Mill Creek 3 - Escalation	$43,488				$0	$262	$5,402	$20,206	$17,617
102	Total Mill Creek 3	**$242,388**				**$0**	**$2,455**	**$38,297**	**$116,061**	**$85,575**
103										
104	Mill Creek 4 - FGD	$236,250	Dec-10			$18,900	$80,325	$89,775	$47,250	
105	Mill Creek 4 - SCR Upgrade	$5,250	Dec-10			$4,200	$1,050			
106	Mill Creek 4 - Baghouse	$131,250	Dec-10			$5,250	$45,938	$52,500	$27,563	
107	Mill Creek 4 - PAC Injection	$6,825	Dec-10			$273	$2,389	$2,730	$1,433	
108	Mill Creek 4 - Ammonia	$10,500	Dec-10			$5,250	$5,250			
109	Mill Creek 4 - Escalation	$58,596				$2,588	$16,121	$23,815	$16,073	$0
110	Total Mill Creek 4	**$448,671**				**$36,461**	**$151,072**	**$168,820**	**$92,319**	**$0**
111										
112	**Total Mill Creek**	**$1,284,663**				**$49,177**	**$224,592**	**$392,854**	**$376,505**	**$183,095**
113										
114	**Trimble**									
115	Trimble 1 - Baghouse	$128,000	Apr-12					$12,800	$44,800	$64,000
116	Trimble 1 - PAC Injection	$6,451	Apr-13						$3,226	$3,226
117	Trimble 1 - Escalation	$31,635				$0	$0	$2,102	$10,124	$17,427
118	Total Trimble 1	**$166,086**				**$0**	**$0**	**$14,902**	**$58,149**	**$84,653**
119										
120	**Total Trimble**	**$166,086**				**$0**	**$0**	**$14,902**	**$58,149**	**$84,653**
121										
122	**Total Environmental Compliance Air - Alternate Plan**	**$2,722,961**				**$76,733**	**$377,241**	**$670,080**	**$803,294**	**$647,111**
123										
124										
125	Scope	$2,274,459								
126	Escalation	$448,502								
127		**$2,722,961**								

	L	M	N	O	P
73					
74				$41,250	$0
75	$35,897	$1,940		$97,020	$0
76				$80,850	$0
77				$0	$0
78				$4,290	$0
81	$3,960	$396		$7,920	$0
83	$12,340	$846		$52,077	$0
84	**$52,197**	**$3,182**	**$0**	**$283,407**	**$0**
85					
86				$41,250	$0
87	$1,940			$97,020	$0
88				$80,850	$0
89				$33,000	$0
90				$4,290	$0
91	$396			$7,920	$0
92	$723	$0		$45,866	$0
93	**$3,060**	**$0**	**$0**	**$310,196**	**$0**
94					
97				$63,750	$0
98				$25,500	$0
99				$104,125	$0
100				$5,525	$0
101	$0			$43,488	$0
102	**$0**	**$0**	**$0**	**$242,388**	**$0**
103					
104				$236,250	$0
105				$5,250	$0
106				$131,250	$0
107				$6,825	$0
108				$10,500	$0
109				$58,596	$0
110	**$0**	**$0**	**$0**	**$448,671**	**$0**
111					
112	**$55,257**	**$3,182**	**$0**	**$1,284,663**	**$0**
113					
114					
115	$6,400			$128,000	$0
116				$6,451	$0
117	$1,981			$31,635	$0
118	**$8,381**	**$0**	**$0**	**$166,086**	**$0**
119					
120	**$8,381**	**$0**	**$0**	**$166,086**	**$0**
121					
122	**$145,319**	**$3,182**	**$0**	**$2,722,961**	**$0**
123					
124					
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126					
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	A	C	D	E	F	G	H	I	J	K
128										
129										
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132										
133										
134						3.5%	3.5%	3.5%	3.5%	3.5%
135						1	2	3	4	5

	L	M	N	O	P
128					
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131					
132					
133					
134	3.5%	3.5%	3.5%		
135	6	7	8		

	A	B	D	E	F	G	H	I	J	K	L	M	N
1		**Environmental Air - CATR by January 2015, NAAQS by January 2016, HAPs by January 2017**											
2		$ in thousands											
3			**Capital Cost**		2011	2012	2013	2014	2015	2016	2017	2018	Total
4		**Alternate Plan**											
5	1	Brown 1 - SCR	$59,000		$2,950	$17,700	$23,600	$14,750					$59,000
6	1	Brown 1 - Baghouse	$34,000		$1,700	$11,900	$13,600	$6,800					$34,000
7	1	Brown 1 - SAM Mitigation	$4,000		$200	$1,200	$1,600	$1,000					$4,000
10	1	Brown 2 - SCR	$92,000		$9,200	$34,500	$43,700	$4,600					$92,000
11	1	Brown 2 - SAM Mitigation	$4,000		$200	$1,600	$2,200						$4,000
12	1	Ghent 2 - SCR	$227,000		$11,350	$68,100	$90,800	$56,750					$227,000
16	1	Mill Creek 2 - Baghouse	$80,850		$8,085	$28,298	$40,425	$4,043					$80,850
19	1	Mill Creek 2 - Electrostatic Precipitator	$33,000		$3,300	$11,550	$16,500	$1,650					$33,000
20	1	Mill Creek 2 - PAC Injection	$4,290		$429	$1,502	$2,360						$4,290
23	1	Mill Creek 4 - FGD	$236,250		$18,900	$80,325	$89,775	$47,250					$236,250
24	1	Mill Creek 4 - SCR Upgrade	$5,250		$4,200	$1,050							$5,250
28	1	Mill Creek 4 - Baghouse	$131,250		$5,250	$45,938	$52,500	$27,563					$131,250
29	1	Mill Creek 4 - PAC Injection	$6,825		$273	$2,389	$2,730	$1,433					$6,825
30	1	Mill Creek 4 - Ammonia	$10,500		$5,250	$5,250							$10,500
35	2	Brown 2 - Baghouse	$34,000			$1,360	$10,200	$10,880	$10,540	$1,020			$34,000
36	2	Mill Creek 1 - Baghouse	$80,850			$8,085	$28,298	$40,425	$4,043				$80,850
37	2	Mill Creek 1 - PAC Injection	$4,290			$429	$1,502	$2,360					$4,290
41	2	Mill Creek 2 - FGD Upgrade	$41,250			$10,313	$28,875	$2,063					$41,250
42	2	Mill Creek 2 - SCR	$97,020			$2,911	$27,166	$29,106	$35,897	$1,940			$97,020
46	2	Mill Creek 2 - SAM Mitigation	$7,920			$396	$792	$2,376	$3,960	$396			$7,920
47	2	Mill Creek 3 - Baghouse	$104,125			$2,083	$31,238	$39,568	$31,238				$104,125
48	2	Mill Creek 3 - PAC Injection	$5,525			$111	$1,658	$2,100	$1,658				$5,525
49	3	Brown 1 - PAC Injection	$1,599				$800	$800					$1,599
50	3	Brown 3 - Baghouse	$61,000				$1,830	$21,350	$28,670	$9,150			$61,000
53	3	Ghent 1 - Baghouse	$131,000				$3,930	$45,850	$61,570	$19,650			$131,000
55	3	Ghent 2 - Baghouse	$120,000				$4,800	$42,000	$56,400	$16,800			$120,000
56	3	Ghent 3 - Baghouse	$138,000				$16,560	$48,300	$66,240	$6,900			$138,000
57	3	Ghent 4 - Baghouse	$117,000				$11,700	$40,950	$58,500	$5,850			$117,000
58	3	Mill Creek 1 - FGD Upgrade	$41,250				$10,313	$28,875	$2,063				$41,250
59	3	Mill Creek 1 - SCR	$97,020				$2,911	$27,166	$29,106	$35,897	$1,940		$97,020
60	3	Mill Creek 1 - SAM Mitigation	$7,920				$396	$792	$2,376	$3,960	$396		$7,920
63	3	Trimble 1 - Baghouse	$128,000				$12,800	$44,800	$64,000	$6,400			$128,000
64	4	Brown 2 - PAC Injection	$2,476					$1,238	$1,238				$2,476
65	4	Brown 3 - PAC Injection	$5,426					$1,000	$3,426	$1,000			$5,426
66	4	Ghent 1 - PAC Injection	$6,380					$1,000	$4,380	$1,000			$6,380
67	4	Ghent 2 - PAC Injection	$6,109					$1,000	$4,109	$1,000			$6,109
68	4	Ghent 3 - PAC Injection	$6,173					$3,087	$3,087				$6,173
69	4	Ghent 4 - PAC Injection	$6,210					$3,105	$3,105				$6,210
70	4	Mill Creek 3 - FGD (U4 update and tie in)	$63,750					$47,813	$15,938				$63,750
71	4	Mill Creek 3 - FGD (Unit 3 Removal)	$25,500					$6,375	$19,125				$25,500
72	4	Trimble 1 - PAC Injection	$6,451					$3,226	$3,226				$6,451
73													
74													
75													

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24	$0
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37	$0
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76													
77													
78													
79					3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	
80					1	2	3	4	5	6	7	8	

From: Saunders, Eileen
To: Billiter, Delbert
Sent: 9/30/2010 3:19:00 PM
Subject: FW: 168908.41.0100 100929 Mill Creek, Ghent and Brown Coal Fuel Question
Attachments: Environmental Compliance Proj quality data.xlsx; Mill Creek.xls

Hi Delbert,

I am now assigned to the Phase 2 portion of the Environmental Compliance work with Black and Veatch. Please take a look at the questions below. Essentially, they are asking which would be the best fuel design basis to use during the next phase of study/engineering.

Please let me know your thoughts as soon as possible. As usual, I appreciate your help on this issue.

Thanks,

Eileen

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
Sent: Wednesday, September 29, 2010 5:25 PM
To: Saunders, Eileen
Cc: Jackson, Audrey; 168908 E.ON-AQC; Crabtree, Jonathan D.; Wehrly, M. R.; Lucas, Kyle J.; Mehta, Pratik D.; Mahabaleshwarkar, Anand
Subject: 168908.41.0100 100929 Mill Creek, Ghent and Brown Coal Fuel Question

Eileen,

During the Phase I work, E.ON initially provided coal analysis data (included in the spreadsheet below) as the typical or "Current Coal" for Mill Creek. Coal data for Ghent and Brown were not initially provided.

Later during the course of the Phase I work, we were asked to use a different fuel (a "Future Coal", included in the spreadsheet below) for the Phase I work for Mill Creek, as well as for Ghent and Brown.

Accordingly, the Phase I study was conducted using the "Future Coal" as a design basis for Mill Creek, Ghent and Brown.

The analyses for the Mill Creek "Current Coal" and "Future Coal" are as follows:

Ultimate Coal Analysis (% by mass as received):	**Current Coal**	**Future Coal**
Carbon	64	61.21
Hydrogen	4.5	4.28
Sulfur	3.5	3.36
Nitrogen	1.3	1.27
Oxygen	4.62	6.89
Chlorine	0.08	0
Ash	12	12
Moisture	10	11
Total	100.00	100.00
Higher Heating Value, Btu/lb (as received)	11,471.82	11,200
SO2 Inlet Loading, lb/Mbtu	6.10	6.00

Additionally, during the Aug 5-6 Mill Creek AQC Workshop, a 6.2 lb/Mbtu SO2 coal was referenced, which is higher than the 6.10 and 6.00 lb/Mbtu SO2 for the "Current Coal" and "Future Coal", respectively.

Our question is, which fuel analysis should we use as the coal fuel design basis for Mill Creek, Ghent, and Brown in the Phase II work?

Regards,

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Black & Veatch - Building a World of Difference™
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Email: **hillmantm@bv.com**

E.ON U.S. Corporate Fuels

Environmental Compliance Project - Coal Quality Data

5/3/10

	Moisture	Ash AR	Volatile AR	ixed Carbon A	BTU AR	Sulfur AR	lkalinity AF	Carbon AR	Hydrogen AR	Nitrogen AF	Oxygen AR	uminum Oxi
								Ultimate				
Coal Quality Average for 2009	%	%	%	%	BTU/lb	%	mg/L	%	%	%	%	%
Brown Average	6.01	10.62	36.72	46.65	12,403	1.51	0.19	69.39	4.67	1.37	6.42	27.93
						2.44		100.00				
Green River Average	10.55	8.60	36.71	44.15	11,827	2.36	0.21	66.00	4.46	1.34	6.69	19.54
						3.99		100.00				
Cane Run Average	13.59	10.36	34.92	41.13	10,933	2.72	0.21	60.83	4.18	1.34	6.99	23.42
						4.97		100.00				
Ghent Average	10.77	11.27	35.66	42.30	11,286	2.81	0.22	62.70	4.31	1.27	6.88	21.41
						4.98		100.00				
Mill Creek Average	11.43	11.36	35.68	41.54	11,115	3.02	0.23	61.67	4.22	1.28	7.01	20.89
						5.44		100.00				
Trimble County Average	10.30	11.96	35.67	42.07	11,261	3.09	0.24	62.36	4.31	1.26	6.72	22.62
						5.48		100.00				
TYPICAL/Average Quality for Future Coals												
Ghent, Mill Creek, Cane Run, Trimble C	11.00	12.00	36.00	42.00	11,200	3.36	0.22	61.21	4.28	1.27	6.89	21.69
						6.00		100.01				
Brown Low Sulfur Coal	6.50	11.50	37.00	47.00	12,000	1.50	0.19	68.04	4.67	1.37	6.42	27.93
						2.50		100.00				
Green River Average	10.50	9.00	37.00	44.00	11,600	2.60	0.21	65.41	4.46	1.34	6.69	19.45
						4.48		100.00				
PRB for TC2 Blend	28.00	7.00	36.00	30.00	8,500	0.60	0.40	48.00	3.53	0.86	12.01	18.00
								100.00				

	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
1																
2																
3																
4																
5	Ash Analysis															
6	arium Oxic	alcium Oxic	Iron Oxide	agnesium Oxi	anganese Oxi	sphorus Pentox	otassium Oxid	licon Dioxi	odium Oxic	rontium Oxi	ulfur Trioxi	anium Diox	Silica	Undetermined	Antimony, SE	Arsenic, As
7	%	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm
8	0.13	1.40	12.63	0.84	0.03	0.35	2.21	51.11	0.33	0.15	1.09	1.55	77.53	0.25	0.76	21
9																
10	0.06	2.89	19.97	0.91	0.04	0.21	2.41	49.61	0.77	0.04	2.47	1.08	67.72		1.07	10
11																
12	0.05	1.21	22.91	0.99	0.03	0.24	2.63	45.95	0.31	0.05	0.95	1.10	64.72	0.17	1.37	15
13																
14	0.07	2.70	21.39	0.89	0.04	0.24	2.24	46.56	0.52	0.05	2.58	1.07	65.14	0.25	1.00	13
15																
16	0.08	3.41	21.84	0.92	0.04	0.27	2.37	45.26	0.48	0.04	3.36	1.00	63.44	0.04	1.12	12
17																
18	0.08	2.57	22.23	0.92	0.04	0.29	2.39	45.09	0.45	0.06	2.24	1.01	63.70		0.94	13
19																
20																
21																
22																
23	0.07	2.74	21.80	0.91	0.04	0.26	2.33	45.88	0.48	0.05	2.58	1.04	64.37	0.12	1.05	13
24																
25	0.13	1.40	12.63	0.84	0.03	0.35	2.21	51.11	0.33	0.15	1.09	1.55	77.53	0.25	0.76	21
26																
27	0.06	2.89	19.90	0.91	0.04	0.21	2.41	49.65	0.77	0.04	2.47	1.08	67.72	0.13	1.07	10
28																
29	0.40	17.00	5.10	3.60	0.03	0.50	0.90	40.27	1.60	0.40	11.00	1.20	58.00		2.00	4
30																

	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1														
2														
3														
4														
5	Trace Elements													
6	Barium, Ba	Cadmium, Cd	Chlorine, Cl	Chromium, Cr	Flourine, Fl	Lead, Pb	Magnesium, Mg	Mercury, Hg	Nickel, Ni	Selenium, Se	Strontium, Sr	Vanadium, V	Zinc, Zn	
7	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
8	115	0.08	863	20	85	8	547	0.12	15	4.73	135	31	14	
9														
10	49	0.30	1,845	17	71	11	509	0.10	14	1.93	30	40	50	
11														
12	63	0.20	155	23	86	12	721	0.09	29	2.32	58	48	32	
13														
14	72	0.60	964	21	93	12	663	0.13	19	3.16	56	40	44	
15														
16	77	0.68	622	23	102	10	703	0.13	20	2.65	47	37	51	
17														
18	79	0.89	624	25	108	11	693	0.12	21	3.02	67	39	59	
19														
20														
21														
22														
23	74	0.65	1,600	23	98	11	684	0.12	20	2.94	56	40	48	
24														
25	115	0.08	863	20	85	8	547	0.12	15	4.73	135	31	14	
26														
27	49	0.30	1,845	17	71	11	509	0.10	14	1.93	30	40	50	
28														
29	270	1.40	125	10	63	4	1,525	0.08	7	2.00	250	28	11	
30														

Limestone Quality

Mill Creek, Trimble County and Ghent

§6.1 Specifications. The limestone delivered hereunder shall conform to the foll

specifications on a "dry" basis:

Active Ingredient Proportions	(%) Guaranteed
Surface Moisture	7.0% Maximum
$CaCO_3$	90.0% Minimum *
$MgCO_3$	6.0% Maximum
SiO_2	3.5% Maximum
Fe_2O_3	1.5% Maximum
Al_2O_3	4.30% Maximum
Inerts	7.0% Maximum
Flouride	500 PPM
Chloides	550PPM
Bond Work Index	12 Maximum

	R	S
5	owing	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
51																	
52				* The Seller shall use its best efforts to supply limestone containing a minimum of 9													
53				$CaCO_3$.													
54																	
55																	
56																	
57																	
58																	

	R	S
51		
52	92.0%	
53		
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Limestone Quality

Brown

§6.1 Specifications. The limestone delivered hereunder shall conform to the follo

specifications on an "as received" basis:

Active Ingredient Proportions	(%) Guaranteed
Surface Moisture	4.0% Maximum
$CaCO_3$	92.0% Minimum
$MgCO_3$	6.0% Maximum
SiO_2	3.5% Maximum
Fe_2O_3	1.0% Maximum
$R_2O_3(Al_2O_3+Fe_2O_3)$	.90% Typical
S	.05% Maximum
P_2O_5	.40% Maximum
Alkali (Na_2O+K_2O)	1.0% Maximum
Al_2O_3	1.5% Maximum

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Inerts	3.0% Maximum
Flouride	1,250 PPM
Chlorides	250 PPM
Bond Work Index	10.5 Maximum

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	A	B	C	D	E	F	G	H	I
1			Black & Veatch AQCS Information Needs						
2									
3	Power Plant:				Owner:				
4	Unit				Project:				
5									
6		**References:**							
7	1)								
8	2)								
9	3)								
10	4)								
11		Yellow highlight denotes Critical Focus Needs.							
12		**Fuel Data**							
13		Ultimate Coal Analysis (% by mass as received):				**Typical**	**Minimum**	**Maximum**	
14		Carbon				64			%
15		Hydrogen				4.5			%
16		Sulfur				3.5			%
17		Nitrogen				1.3			%
18		Oxygen				4.62			%
19		Chlorine				0.08			%
20		Ash				12			%
21		Moisture				10			%
22		Total				100.00			
23		Higher Heating Value, Btu/lb (as received)				11471.82			Btu/lb
24		Ash Mineral Analysis (% by mass):							
25		Silica(SiO_2)							%
26		Alumina (Al_2O_3)							%
27		Titania (TiO_2)							%
28		Phosphorous Pentoxide (P_2O_5)							%
29		Calcium Oxide (CaO)							%
30		Magnesium Oxide (MgO)							%
31		Sodium Oxide (Na_2O)							%
32		Iron Oxide (Fe_2O_3)							%
33		Sulfur Trioxide (SO_3)							%
34		Potassium Oxide (K_2O)							%
35		Coal Trace Element Analysis (mercury and especially arsenic if fly ash is returned to boiler)							

	J	K
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13	**Notes**	
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	A	B	C	D	E	F	G	H	I
36		Vanadium					%		
37		Arsenic					%		
38		Mercury					% or ppm		
39		Other	LOI				%		
40		Natural gas firing capability (if any at all)							
41		Natural gas line (into the station) capacity (if applicable)							
42		Current Lost on Ignition (LOI)							
43		Start-up Fuel							
44		Ash Fusion Temperature							
45		Initial Deformation					°F		
46		Softening					°F		
47		Hemispherical					°F		
48		Hardgrove Grindability Index							

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	A	B	C	D	E	F	G	H	I
49		**Plant Size and Operation Data: (provide for each unit)**				**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**
50		Maximum (Design) Fuel Burn Rate				B&V can determine some values from previous VISTA			
51		Boiler Type (e.g. wall-fired, tangential fired, cyclone)				Tangential fired	Tangential fired	opposed wall	opposed wall
52		Boiler Manufacturer				CE	CE	B&W	B&W
53		Net MW Rating (specify plant or turbine MW)		Winter ratings		303MW	303MW	397MW	492MW
54		Gross MW Rating		Winter ratings		330MW	330MW	423MW	525MW
55		Net Unit Heat Rate				10639	10929	10602	10410
56		Net Turbine Heat Rate							
57		Boiler SO2 to SO3 Conversion Rate (if known)							
58		Fly Ash/Bottom Ash Split				80/20	80/20	80/20	80/20
59		Flue Gas Recirculation (FGR)							
60			Installed? (Y/N)			N	N	N	N
61			In operation? (Y/N)						
62		Flue Gas Recirculation (if installed)							
63		Type of Air Heater				Air Preheater Co.	Air Preheater Co.	Ljungstrom	Ljungstrom
64		Air Heater Configuration (horizontal or vertical flow or shaft)				Vertical Flow	Vertical Flow	Vertical Flow	Vertical Flow
65		Design Pressure/Vacuum Rating for Steam Generator			+/-				
66		Design Pressure/Vacuum Rating for Particulate Control			+/-				
67									
68		**Electrical / Control**							
69		DCS Manufacturer (e.g. Westinghouse, Foxboro, Honeywell, etc.)				Honeywell	Honeywell	Honeywel	Honeywell
70		Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 30				TC3000			Experion
71		Neural Network Installed? (Y/N)				Y	Y	N	N
72		Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)				Neuco	Neuco		
73		Extra Capacity available in DCS?				minimal	minimal	minimal	minimal
74		Historian Manufacturer				Honeywell	Honeywell	Honeywell	Honeywell
75		Additional Controls from DCS or local PLC w/tie-in							
76		Transformer Rating for Intermediate Voltage Switchgear							
77		Capacity of Spare Electrical Cubicles in Existing MCC's and LCUS's (S							
78		Auxiliary Electric Limited (Y/N)				N	N	N	N
79									
80		**Operating Conditions**							
81		Economizer Outlet Temperature				760	760	690	640

	J	K
49		**Notes**
50	MBtu/hr	
51		
52		
53	MW	
54	MW	
55	Btu/kWh	
56	Btu/kWh	
57	%	
58	%	
59		
60		
61		
62	%	
63		
64		
65	in wg.	
66	in wg.	
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79		
80		
81	°F	

	A	B	C	D	E	F	G	H	I
82		Economizer Outlet Pressure				-5	-5	-5	-5
83		Excess Air or Oxygen at Economizer Outlet (full load/min load)				5	5	5	5
84		Economizer Outlet Gas Flow				1524804	1524804	1958726	2239453
85						2976508	2976508	4056287	4848440
86		Air Heater Outlet Temperature				375	375	325	315
87		Air Heater Outlet Pressure				-10	-10	-18	-18
88		Particulate Control Equipment Outlet Temperature				375	375	325	315
89		Particulate Control Equipment Outlet Pressure				-14	-14	-23	-21
90		FGD Outlet Temperature (if applicable)				133	133	130	130
91		FGD Outlet Pressure (if applicable)				1	1	1	1

	J	K
82	in wg.	
83	%	
84	acfm	
85	lb/hr	
86	°F	
87	in wg.	
88	°F	
89	in wg.	
90	°F	
91	in wg.	

	A	B	C	D	E	F	G	H	I
92		**NOx Emissions**				**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**
93		Emissions Limit						0.7	0.7
94		Type of NOx Control (if any) - LNB, OFA, etc.				LNB/OFA	LNB/OFA	LNB/SCR	LNB/SCR
95		Current NOx Reduction with existing controls						90%	90%
96		Type of Ammonia Reagent Used (Anhydrous or % H_2O or Urea)						Anhydrous	Anhydrous
97		Reagent Cost						500	500
98		Current Emissions				0.32	0.32	0.05	0.05
99									
100									
101									
102		**Particulate Emissions**							
103		Emissions Limit				0.115	0.115	0.105	0.105
104		Type of Emission Control - Hot Side ESP, Cold Side ESP or FF				Cold Side ESP	Cold Side ESP	Cold Side ESP	Cold Side ESP
105		Oxygen Content of Flue Gas @ Air Heater Outlet				4	4	4	4
106		Oxygen Content of Flue Gas @ ESP/FF Outlet				4	4	4	4
107		Current Emissions				0.36	0.48	0.05	0.04
108		Fly Ash Sold (Y/N) - See Economic Section				Y	Y	Y	Y
109									
110			**ESP**						
111			Specific Collection Area (SCA)						
112			Discharge Electrode Type						
113			Supplier						
114			Efficiency						
115			No. of Electrical Sections						
116			% of Fly Ash Sold						
117									
118			**Fabric Filter**						
119			Air to Cloth Ratio (net)						
120			Number of Compartments						
121			Number of Bags per Compartments						
122			Efficiency						
123			% of Fly Ash Sold						
124									
125		**SO_2 Emissions**							
126		Emissions Limit				1.2	1.2	1.2	1.2

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92		**Notes**
93	lb/MBtu	
94		
95	%	
96		
97	$/ton	
98	lb/hr	
99	ton/yr	
100	lb/MBtu	
101		
102		
103	lb/MBtu	
104		
105	%	
106	%	
107	lb/MBtu	
108		Very minimal at this point in time
109		
110		
111	ft^2/1000 acfm	
112		
113		
114	%	
115		
116	%	
117		
118		
119	ft/min	
120		
121		
122	%	
123	%	
124		
125		
126	lb/MBtu	

	A	B	C	D	E	F	G	H	I
127		Type of Emission Control - wet or semi-dry FGD (if any)				Wet FGD	Wet FGD	Wet FDG	Wet FGD
128		Current Emissions				0.47	0.47	0.58	0.47
129									
130									
131		Byproduct Sold (Y/N) - See Economic Section							
132									

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127		
128	lb/hr	
129	ton/yr	
130	lb/MBtu	
131		
132		

	A	B	C	D	E	F	G	H	I
133		**ID Fan Information (at Full Load):**				**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**
134		ID Fan Inlet Pressure				-16	-16.5	-22	-23
135		ID Fan Discharge Pressure				-2	-1		
136		ID Fan Inlet Temperature				340	340	330	330
137		Oxygen Content of Flue Gas @ ID Fan Inlet				4	4	4	4
138		ID Fan Motor Voltage (Rated)				4160	4160	4160	4160
139		ID Fan Motor Amps (Operating)				275	275	920	1115
140		ID Fan Motor Amps (Rated)				320	320	1176	
141		ID Fan Motor Power (Rated)				2500	2500	9000	9500
142		ID Fan Motor Service Factor (1.0 or 1.15)				1.15	1.15	1	1.15
143									
144		**Chimney Information:**							
145		Flue Liner Material				C276	C276	C276	C276
146		Flue Diameter				15' 6"	15' 6"	19' 6"	19' 6"
147		Chimney Height				623	623	630	630
148		Number of Flues				1	1	1	1
149									
150		**Drawing and Other Information Needs:**							
151		Baseline pollutant emissions data for AQC analysis							
152		Technical evaluations performed to support recent consent decree activity							
153		Existing Plant/AQC system general design and performance issues							
154		Full detailed boiler front, side, and rear elevation drawings							
155		Boiler Design Data (Boiler Data Sheet)							
156		Ductwork Arrangement Drawing (emphasis from economizer outlet to air heater inlet)							
157		Ductwork Arrangement Drawing (emphasis from air heater outlet to stack)							
158		Plant Arrangement Drawings (showing column row spacing)							
159		CEM Quarterly and Annual Data (required if base emissions are to be verified)							
160		Recent Particulate Emission Test Report (If available)							
161		Current Mercury Testing Results (If available)							
162		Current Site Arrangement Drawing							
163		Foundation Drawings and/or Soils Report							
164		Underground Utilities Drawings							
165		Plant One Line Electrical Drawing							
166		Fan Curves for Existing ID Fans (including current system resistance curve)							
167		Acceptable Fan Operating Margins							

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133		**Notes**
134	in wg.	
135	in wg.	
136	F	
137	%	
138	volts	
139	A	
140	A	
141	hp	
142		
143		
144		
145		
146	ft	top of liner
147	ft	
148		1&2 share a common stack
149		
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	A	B	C	D	E	F	G	H	I
168		Plant Outage Schedule							
169		Specific burner and overfire air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of over							
170									

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	A	B	C	D	E	F	G	H	I
171		**Economic Evaluation Factors:**				**Unit X**	**Unit X**	**Unit X**	**Unit X**
172		Remaining Plant Life/Economic Life							
173		Annual Capacity Factor (over life of study/plant)							
174		Contingency Margin (can be determined by B&V)							
175		Owner Indirects Cost Margin							
176		Interest During Construction							
177		Levelized Fixed Charge Rate or Capital Recovery Factor							
178		Present Worth Discount Rate							
179		Capital Escalation Rate							
180		O&M Escalation Rate							
181		Energy Cost (energy to run in-house equipment)							
182		Replacement Energy Cost (required to be							
183		purchased during unit outage)							
184		Year-by-Year Fuel Prices (over life of study/plant)							
185									
186		Base Fuel Price							
187									
188		Fuel Price Escalation Rate							
189		Water Cost							
190		Limestone Cost							
191		Lime Cost							
192		Ammonia Cost							
193		Fully Loaded Labor Rate (per person)							
194		Fly Ash Sales							
195		Bottom Ash Sales							
196		FGD Byproduct Sales							
197		Waste Disposal Cost							
198		Fly Ash							
199		Bottom Ash							
200		Scrubber Waste							

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171		**Notes**
172	years	
173	%	
174	%	
175	%	
176	%	
177	%	
178	%	
179	%	
180	%	
181	$/MWh	
182		
183	$/MWh	
184	$/MBtu	
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From: Hillman, Timothy M.
To: Saunders, Eileen
CC: Wehrly, M. R.; Lucas, Kyle J.; Mahabaleshwarkar, Anand; Lausman, Rick L.; Hintz, Monty E.; 168908 E.ON-AQC; Jackson, Audrey
Sent: 9/22/2010 10:48:08 AM
Subject: 168908.28.3000 100922 - Monday Weekly Meeting and Action Item List
Attachments: 168908 EON ACTION ITEM LIST.xls

Eileen,

I'm setting up a weekly project meeting for Monday at 2 pm your time (Outlook meeting invitation to follow). As you requested, the format will be similar to what we did for Phase I, where we used the following standing agenda. We can always add to the agenda as circumstances arise, but let me know if you want anything else added to the standing agenda.

Standing Agenda:

1) Project Status

2) Action Item List

3) Activities Scheduled for the Week

I've also attached the first action item list. You will note that most of the action items came from our kick-off meeting and Mill Creek site walk down.
Best regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

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1	ITEM #	SOURCE		DESCRIPTION	FILE NO.	FACILITY	RESPONSIBILITY		)ATE ADDE	IG DUE DA	RR DUE D/	OMPL DAT	STATUS
2		DOC/MTNG	DATE				CO.	INITIAL					
3		**GENERAL**				--	A						
4	8	KO & MC Site Vi	9/20/10	Determine if a Monday, 2 pm EST project conference ca	14.1000	--	B&V	TH/MW	09/21/10	09/23/10			Open
5	3	KO & MC Site Vi	9/20/10	Provide DVD copy of Phase I Report	14.1000	--	B&V	TH	09/21/10	09/24/10			Open
6	6	KO & MC Site Vi	9/20/10	Create IBackup FTP site for large file transfer	14.1000	--	B&V	KL	09/21/10	09/24/10			Open
7	5	KO & MC Site Vi	9/20/10	Provide engineering cost estimate at end of each month	14.1000	--	B&V	TH	09/21/10	09/30/10			Open
8	11	KO & MC Site Vi	9/20/10	Evaluate pros and cons of NID system for November tec	14.1000	--	B&V	AM/RL	09/21/10	Nov. 2010			Open
9	13	KO & MC Site Vi	9/20/10	Provide structural steel study assessments	14.1000	--	E.ON	ES	09/21/10	09/24/10			Open
10	14	KO & MC Site Vi	9/20/10	Provide minimum access dimension box	14.1000	--	E.ON	ES	09/21/10	09/24/10			Open
11	17	Email 14.1000 1	9/20/10	Provide E.ON comments on Kick Off Meeting and Mill C	14.1000	--	E.ON	ES	09/21/10	09/24/10			Open
12	4	KO & MC Site Vi	9/20/10	Use B&V file system to set up E.ON document storage	14.1000	--	E.ON	ES	09/21/10	TBD			Open
13	7	KO & MC Site Vi	9/20/10	Determine personnel assignments for document review	14.1000	--	E.ON	ES	09/21/10	TBD			Open
14	12	KO & MC Site Vi	9/20/10	Schedule vendors for evaluation of existing scrubbers	14.1000	--	E.ON	ES	09/21/10	TBD			Open
15		**GHENT**				Ghent	A						
16	2	KO & MC Site Vi	9/20/10	Determine dates for Ghent kick-off meeting	14.1000	Ghent	E.ON	ES	09/21/10	09/23/10			Open
17		**MILL CREEK**				Mill Creek	A						
18	10	KO & MC Site Vi	9/20/10	Prepare data inventory and information request	14.1000	Mill Creek	B&V	MW/JC	09/21/10	09/24/10			Open
19	15	KO & MC Site Vi	9/20/10	Review B&V electrical study conducted in the 1990s	14.1000	Mill Creek	B&V	JB	09/21/10	09/24/10			Open
20	1	KO & MC Site Vi	9/20/10	Determine location for Mill Creek Task 6 Technology Se	14.1000	Mill Creek	E.ON	ES	09/21/10	10/15/10			Open
21	16	KO & MC Site Vi	9/20/10	Evaluate the possibility of accelerating the installation of	14.1000	Mill Creek	E.ON & B	ES &TH	09/21/10	TBD			Open
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21	See B&V email 9/17/2010 addressing the acceleration of the SCR install for MC 1 & 2.					
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2		DOC/MTNG	DATE				CO.	INITIAL					
3	9	KO & MC Site \	9/20/10	Update PIM with Eileen's Ghent contact information	14.1000	--	B&V	MW	09/21/10	09/24/10		09/21/10	Complete
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1	E.ON	E.ON U.S. SERVICES INC. COMPANY			
2	ES	Eileen Saunders			
3	GB	Greg Black			
4	GR	Gary Revlett			
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15	BV	Black & Veatch (B&V)			
16	TH	Tim Hillman			
17	KL	Kyle Lucas			
18	AM	Anand Mahabaleshwarker			
19	MK	Mike King			
20	RL	Rick Lausman			
21	MW	M.R. Wehrly			
22	MH	Monty Hintz			
23	JB	Jim Bayless			
24	JC	Jonathan Crabtree			

From:	Conroy, Robert
To:	Bellar, Lonnie; Lovekamp, Rick
CC:	Elzy, Tammy
Sent:	9/23/2010 2:50:04 PM
Subject:	Draft ROC agenda
Attachments:	ROC September 24, 2010.docx

Here is a proposed draft agenda for tomorrow. Add/delete as you see fit.

Robert M. Conroy
Director, Rates
E.ON U.S. Services Inc.
(502) 627-3324 (phone)
(502) 627-3213 (fax)
(502) 741-4322 (mobile)
robert.conroy@eon-us.com

Regulatory Oversight Committee
September 24, 2010

- Open Proceedings Update
  - Complaints – 2 active (1 – KU / 1 – LG&E)
  - CPCN Transmission Line – Grahamville to DOE
  - ITO Application (SPP)
  - ECR Reviews – 6 month (period ending expense month 02/28/10)
  - FAC Reviews – 6 month (period ending expense month 04/30/10)
  - Financing Cases (KY, VA, TN)

- Administrative Case
  - EISA 2007 Standards
  - Natural Gas Retail Competition

- Change of Control – PPL Corp Acquisition
  - Kentucky, Virginia, Tennessee
  - FERC

- KPSC Audit of CCS

- Future Proceedings
  - DSM Plan filing
  - 2009 Virginia AIF
  - Virginia Rate Case (TY 2010)
  - Tennessee Rate Case
  - ECR Modification / Environmental Regulations

From:	Lovekamp, Rick
To:	Conroy, Robert; Bellar, Lonnie
CC:	Elzy, Tammy
Sent:	9/23/2010 3:09:23 PM
Subject:	RE: Draft ROC agenda
Attachments:	ROC September 24 2010_RELedits.docx

Made one change.

From: Conroy, Robert
Sent: Thursday, September 23, 2010 2:50 PM
To: Bellar, Lonnie; Lovekamp, Rick
Cc: Elzy, Tammy
Subject: Draft ROC agenda

Here is a proposed draft agenda for tomorrow. Add/delete as you see fit.

<< File: ROC September 24, 2010.docx >>

Robert M. Conroy
Director, Rates
E.ON U.S. Services Inc.
(502) 627-3324 (phone)
(502) 627-3213 (fax)
(502) 741-4322 (mobile)
robert.conroy@eon-us.com

Regulatory Oversight Committee
September 24, 2010

- Open Proceedings Update
  - Complaints – 2 active (1 – KU / 1 – LG&E)
  - CPCN Transmission Line – Grahamville to DOE
  - ITO Application (SPP)
  - ECR Reviews – 6 month (period ending expense month 02/28/10)
  - FAC Reviews – 6 month (period ending expense month 04/30/10)
  - Financing Cases (KY, VA, TN)

- Administrative Case
  - EISA 2007 Standards
  - Natural Gas Retail Competition

- Change of Control – PPL Corp Acquisition
  - Kentucky, Virginia, Tennessee
  - FERC

- KPSC Management Audit of Customer Service Related Functions

- Future Proceedings
  - DSM Plan filing
  - 2009 Virginia AIF
  - Virginia Rate Case (TY 2010)
  - Tennessee Rate Case
  - ECR Modification / Environmental Regulations

From:	Hillman, Timothy M.
To:	Saunders, Eileen
CC:	168908 E.ON-AQC; Crabtree, Jonathan D.; Wehrly, M. R.; Lausman, Rick L.; Mahabaleshwarkar, Anand; Hintz, Monty E.; Lucas, Kyle J.
Sent:	9/20/2010 5:08:58 PM
Subject:	168908.14.1000 100920 Mill Creek - Draft Kickoff and Site Visit Meeting Minutes
Attachments:	Mill Creek Kickoff and Site Walkdown Meeting Minutes with Attachments - Draft.pdf

Eileen,

Please find attached draft meeting minutes from last week's kickoff and Mill Creek site visit. Please provide E.ON's comments back to me by Friday, 9/24.

Best regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

DRAFT

BLACK & VEATCH CORPORATION
CONFERENCE MEMORANDUM

E.ON US	B&V Project 168908
Phase II: Air Quality Control Study	B&V File 14.1000
Project Kick-off and Mill Creek Site Visit	September 20, 2010

A project administrative kick-off meeting and Mill Creek site visit and walk down were held September 14-16th for the Phase II: Air Quality Control Study Project. The administrative kick-off meeting was held at E.ON's Broadway Office Complex in Louisville, while the site visit and walk down were held at the Mill Creek Generating Station.

Recorded by: Tim Hillman

Attending:

Administrative Kick-off Meeting, September 14th.

Eileen Saunders	E.ON
Mike Rooney	E.ON
Mike King	B&V
Tim Hillman	B&V
M.R. Wehrly	B&V
Kyle Lucas	B&V

Mill Creek Kick-off Meeting, September 15th.

Eileen Saunders	E.ON
Mike Rooney	E.ON
Bill Moehrke	E.ON
Kenny Craigmyle	E.ON
Kevin Siers	E.ON
Michael Stevens	E.ON
Jim Nichols	E.ON
Gary Revlett	E.ON
Joe Didelot	E.ON
Scott Straight	E.ON
Mike Kirkland	LG&E
Mike Buckner	LG&E
Alex Betz	LG&E
Tim Hillman	B&V
M.R. Wehrly	B&V
Anand Mahabaleshwarkar	B&V
Kyle Lucas	B&V
Rick Lausman	B&V
Monty Hintz	B&V

The purpose of the meetings was to 1) provide an administrative kick-off of the project, 2) present the project scope and purpose of the project to Mill Creek personnel, and 3) provide for a site visit and walk down of the Mill Creek facility. The above attendance roster reflects those attending the administrative kick-off meeting in Louisville and the initial kick-off meeting at Mill Creek. The meeting agenda and attendance sign-up sheets are attached herein for reference.

MEETING DISCUSSION

Day 1, September 14, 2010

As noted in the agenda, the meetings began at 1 pm on September 14th, with an administrative meeting in the Broadway Office Complex and an initial escorted site walk down at Mill Creek with part of the B&V team. The following is an account of the administrative kick-off meeting.

1. The meeting began with introductions and distribution of the agenda.
2. B&V distributed a copy of the project scope of work contained in the contract and provided a summary of each task along with the associated deliverable.
   - It was noted that a Project Design Memorandum (Task 5) would be developed for each facility.
   - E.ON commented that the Fabric Filter Vendor Workshop scope of work may not start until after the Ghent project has been kicked-off, but likely before the Brown kick-off.
3. B&V reviewed the major milestone schedule contained in the scope of work.
   - The possibility of holding the Mill Creek Task 6, AQC Technology Selection Meeting during the second week of November in B&V offices in Kansas City was discussed. E.ON to review and make recommendation. [Action Item #1]
   - E.ON to determine dates for Ghent kick-off meeting. The milestone schedule tentatively has this schedule for the week of October 4th. [Action Item #2]
4. E.ON requested B&V provide a DVD of the Phase I report. [Action Item #3]
5. B&V distributed a draft copy of the Project Instruction Memorandum (PIM). The communication contacts and project filing system were discussed in some detail.
   - E.ON will investigate setting up a document storage file system to mimic the Documentum system proposed by B&V in the PIM. [Action item #4]
   - B&V to copy Eileen on all correspondence with the plants.
   - Copy Audrey.Jackson@eon-us.com for copy to E.ON file mailbox.
   - B&V will establish and iBackup FTP site to facilitate large file transfer. [Action item #6]
   - E.ON will determine personnel assignments for document review. [Action Item #7]
6. B&V distributed a template of a standard monthly report. E.ON approved of the basic format and data of the monthly report template.
   - In addition to the Summary of Engineering Costs contained in the standard monthly report, E.ON requested a financial engineering cost estimate at the end of each month. Copy Mike Rooney on monthly reports. [Action Item #5]
   - Monthly reports will typically be sent during the second week of the following month.
7. E.ON requested to use the same weekly telephone conference date of Monday, 2 pm EST. B&V will check for conflicts and advise. [Action item #8]

8. B&V distributed an example action item list used during the Phase I work. It was agreed to use the same format for Phase II. The action item list will be divided by facility.
9. E.ON prefers to provide document review comments in a table log format.
10. E.ON is purchasing a trailer for the Mill Creek site that may offer some additional project meeting space.
11. Eileen Saunders provided an alternate contact number for her at Ghent (502-347-4023). B&V to update PIM with contact information. [Action Item #9]
12. B&V distributed a draft data request and inventory of data/information already in B&V's possession. E.ON asked B&V to carefully scrutinize the information request so as to not request information we may already have. B&V to finalize the initial data request and inventory list and submit it to E.ON as soon as possible. [Action item #10]
13. The administrative kick-off meeting concluded at approximately 4:30 pm.

Day 2, September 15, 2010

The second day of kick-off meetings began at 9 am at Mill Creek.

14. Eileen began the meeting with introductions and a brief summary of the project scope.
15. Gary Revlett provided a presentation of the main regulatory drivers influencing the coal-fired fleet. These drivers include the new NOx and SO2 NAAQS standards, Utility MACT for hazardous air pollutants, and the proposed Clean Air Transport Rule (CATR). Gary explained that these current and pending regulations are the drivers for the Phase II work. Gary provided an updated table that can be used as the initial design basis titled "Estimated Limits & Compliance Dates for Future New Air Requirement Mill Creek Station".
16. Scott Straight addressed the meeting stating that the current company strategy does not have E.ON self-compliant (as a fleet) with NOx credits until 2016. E.ON would like to be self-compliant by 2013-2014. Scott asked the group to evaluate the possibility of accelerating the installation of SCRs on Mill Creek Units 1 and 2. This is also being considered at Ghent. (Note: Over the course of the next two days, this scenario was given consideration. A separate email correspondence addressing this issue was prepared and sent to E.ON on September 17, 2010, a copy of which is attached herein.) [Action Item #16]
17. B&V provided a presentation summary of the results of the August 5th and 6th Mill Creek AQC Screen Workshop. The presentation summarized the workshop purpose and attendees, an overview of the current plant basis, AQC technologies and options considered, and recommendations of the workshop. A copy of the workshop presentation summary slides is attached here in for reference.
    - E.ON requested B&V review the pros and cons of the NID system as part of the technology validation task. Action item #11]
18. E.ON advised that Alex Betz would be the Mill Creek plant contact for information requests.
19. E.ON will be contacting Hitachi, BPI, Foster Wheeler, and Alstom, and/or others to evaluate the status of the existing scrubbers and determine the extent they can be

refurbished. E.ON is to lead this effort with support from B&V as requested. [Action item #12] Results of the evaluation will be provided to B&V

20. If the new Unit 4 WFGD and stack requires the relocation of the ammonia storage area, it may be possible to consolidate it with the ammonia storage requirements for the new Unit 1 and 2 SCRs.
21. It may be possible to reuse Unit 4's fans on Unit 3 should the existing fans become superfluous in the new Unit 4 arrangement. It then may be possible to reuse the Unit 3 fans on Unit 1 and/or unit 2.
22. E.ON confirmed there is no "sacred ground" around the existing units, areas reserved for other uses and unavailable for use in the AQCS upgrade. B&V requested if any balance-of-plant upgrades are currently under consideration that should be taken into account in the AQCS work, beyond the plans for an additional ball mill at the limestone prep building.
23. Following lunch, E.ON and B&V personnel continue site walk down activities, concluding at approximately 5:30 pm. Some observations from this walk down are identified below.
    - Unit 4 fabric filter likely to be required to be installed above the Unit 4 scrubber electrical building.
    - Unit 3 would be tied into the current Unit 4 scrubber after the new Unit 4 FGD is built. The old Unit 3 scrubber would be torn down to allow new AQC equipment to be potentially located in that area.
    - Unit 3 and 4 structural steel was generally in good shape for lower areas that could be inspected. Higher areas of Unit 3 & 4 could not be assessed due to the large flue gas leaks in the duct that limited access for personal safety reasons.
    - Duct configuration will be complicated, but appears possible, and will depend on the specific fan arrangement and if new ID fans or booster fans will be used.

Day 3, September 16, 2010

The third and final day of meetings began at 9 am at Mill Creek.

24. B&V summarized the major findings of the walk downs for Eileen and began preparing white board sketches of the preliminary AQC control configurations discussed over the last two days in preparation for a site de-briefing scheduled for the early afternoon.
25. After a break in the morning rain, an additional walk down of Units 1 and 2 was conducted before lunch to review the structural integrity of the Unit 1 and Unit 2 steel for additional AQC equipment.
26. At 1:15 pm, B&V presented de-briefing of the site walk down findings and preliminary AQC control configurations. Two sketches were prepared for the meeting. One illustrated the preliminary AQC configuration options for Units 3 and 4, while the second sketch addressed Units 1 and 2 and the possibility of accelerating the SCR schedule. Pictures of the two white board sketches are attached here in for reference.
    - As a result of the workshop discussions, the potential for locating the Unit 4 fabric filter/NIDs unit and new scrubber, plus a new chimney, to the south of Unit 4 was

considered. The original location for the new scrubber and chimney considered was in the area of the demolished thickener south of the limestone prep building. This location, however, involved crossing the limestone conveyor with relatively high ductwork, plus moving both an overhead Unit 3 and Unit 4 345kV T-line and the ammonia tanks and electrical building to provide necessary working space for new construction.

- Alternately, it was determined that there is likely sufficient space for the new Unit 4 AQCS train directly south of Unit 4, running more or less straight east to west with the new chimney located opposite of the Unit 4 turbine building. This arrangement, if it fits, has the advantage of relatively short ductwork runs, no impact to the overhead T-line, and no impact to the existing ammonia tank farm. It would, however, require relocation of the existing annex building and lab, plus limit construction access to one side of the train. B&V will continue evaluation of this arrangement as first choice for Unit 4, with the thickener area location used as a fall-back alternate.
- Should either of the above arrangements fit, it appeared that it would be advantageous to upgrade the existing Unit 4 scrubber in place and reuse it for Unit 3. The flue gas from Unit 3 would be rerouted to the Unit 4 scrubber in the short term (Phase I) and the Unit 3 scrubber demo'd. A new Unit 3 fabric filter/NIDs unit could be built in its place and tied into the Unit 3 ductwork as Phase II of a two phase construction sequence at Unit 3.
- Both Unit 1 and Unit 2 offer significant challenges in the addition of an SCR as an immediate modification (refer to Sep 17th email, attached herein for reference). The existing ESP at both units is located within a few feet of the boiler structure, leaving insufficient room to route ductwork to a new SCR overhead of the ESP. The ESP would have to be demolished or extensively modified before the SCR could be constructed, resulting in either an extended outage while the ESP is moved or reconstructed or the installation of a separate new ESP in another location prior to installation of the SCR. In addition, area available for new structures for either Units 1 or 2 is very limited, by the narrow alleyway between Units 1 and 3 for Unit 1 and by the new RO facility north of the powerblock at Unit 2. No obvious arrangement for the AQCS upgrades at Units 1 and 2 were immediately noted, and additional investigation will be required.

27. B&V commented on the poor condition of the structural steel at the existing scrubbers, especially at Units 1 and 2. Relatively isolated examples of steel corrosion, most likely due to exposure to flue gas, were noted in the superstructures at the Unit 3 and 4 scrubbers. However, severe corrosion and loss of structural mass was noted in a significant number of areas at Units 1 and 2. The most severe damage noted was in lighter components, such as platform and grating, but instances of chemical attack on the major structural steel members were also noted on Units 1 and 2. E.ON agreed to provide the results of recent studies assessing the structural steel. [Action Item #13]
28. New AQC will likely restrict vehicle and maintenance access in some areas of the facility. E.ON agreed to provide the minimum access dimensions for use in the analysis. [Action Item #14]
29. E.ON noted that the existing Unit 4 AQCS (ESP and scrubber) were powered by the Unit 4 aux power supply. Should the Unit 4 scrubber be reused for Unit 3, an alternate source of aux power for the refurbished equipment must be included. Otherwise, an outage on Unit 4 would result in the loss of AQCS for Unit 3.

30. E.ON noted that no aux power supply greater than 4160V is currently available in the immediate plant area. However, two free 14kV breakers are available in the switchyard as potential sources of medium voltage power for new loads such as fans in the AQCS upgrade. E.ON also noted that B&V Ann Arbor completed a short circuit study for the plant in the 1990's. B&V to review this study. [Action item #15]
31. The meeting concluded at approximately 3 pm.

ACTION ITEMS

#	Description	Responsible	Due Date
1	Determine location for Mill Creek Task 6 Technology Selection meeting during 2nd wk of November	E.ON	10/15/10
2	Determine dates for Ghent kick-off meeting	E.ON	9/23/10
3	Provide DVD copy of Phase I Report	B&V	9/24/10
4	Use B&V file system to set up E.ON document storage	E.ON	TBD
5	Provide engineering cost estimate at end of each month and copy Mike Rooney on monthly reports	B&V	End of Month
6	Create IBackup FTP site for large file transfer	B&V	9/24/10
7	Determine personnel assignments for document review	E.ON	TBD
8	Determine if a Monday, 2 pm EST project conference call time will work for B&V project team	B&V	9/23/10
9	Update PIM with Eileen's Ghent contact information	B&V	9/24/10
10	Prepare data inventory and information request	B&V	9/24/10
11	Evaluate pros and cons of NID system for November technology validation presentation	B&V	Nov 2010
12	Schedule vendors for evaluation of existing scrubbers	E.ON	TBD
13	Provide structural steel study assessments	E.ON	9/24/10
14	Provide minimum access dimension box	E.ON	9/24/10
15	Review B&V electrical study conducted in the 1990s	B&V	9/24/10
16	Evaluate the possibility of accelerating the installation of SCRs on Mill Creek Units 1 and 2	E.ON and B&V	TBD

ATTACHMENTS

- Agenda
- Attendance roster
- B&V email of September 17, 2010 addressing the acceleration of the SCR installation schedule for Mill Creek Units 1 and 2.
- August 5th and 6th Mill Creek AQC Workshop Summary Presentation.
- Pictures of the September 16, 2010 white board sketches from the de-brief meeting.

cc: All Attendees
File

AGENDA

Phase II Air Quality Control Study – Kickoff Meeting and Site Visit
E.ON - Mill Creek Station
September 14 - 16, 2010
Location: E.ON Broadway Office Complex and Mill Creek

Day 1, September 14th, Arrive 1 pm (Broadway Office Complex)

I. Introductions
II. Review Project Scope
III. Review Project Schedule
IV. Review Project Deliverables
V. Project Administration
    a. Communication
    b. File System
    c. Monthly Reports
    d. Weekly Conference Calls/Action Item List
    e. Invoicing
VI. Project Documentation
VII. Information Request

Day 1, September 14th, Arrive 1 pm (Mill Creek)

I. Arrive on Site and Introductions
II. Begin Initial Escorted Site Walk Down

Day 2, September 15th, Arrive 8 am (Mill Creek)

I. Introductions
II. Environmental Drivers Presentation (E.ON – Gary R.)
III. Aug 5-6th AQC Workshop Results Presentation (B&V – Rick L and Anand M.)
IV. Lunch (on site)
V. Continue Escorted Site Walk Down and Data Collection

Day 3, September 16th, Arrive 8 am (Mill Creek)

I. Continue Escorted Site Walk Down and Data Collection
II. Lunch (off site)
III. Site Debriefing Meeting
IV. Depart (no later than 4 pm)

Eon AQC Mill Creek 1pm-4:30p. 9/14/10

Admin Kick-off Meeting

Kyle Lucas 913-458-9062 lucaskj@bv.com
M.R. WEHRLY 913-458-7131 wehrlymr.com
Mike Mooney 502-627-3671 mike.mooney@eon-us.com
Eileen Saunders 502-627-2431 eileen.saunders@eon-us.com
MIKE KING 913 618-8657 kingml@bv.com
Tim Hillman 913-458-7928 hillmantm@bv.com.

EON AQC Mill Creek Plant Kickoff 9/15/10
9am -11:30

Kyle Lucas	B&V	913-458-9062 lucaskj@bv.com	Asst PM / EON MNG
Rick Lausman	B&V	913 458 7528 LAUSMANRL@BV.COM	AQC Eng
Mike Mooney	EON	mike.mooney@EON-US.com 502-627-3671	Budget Analyst
Bill Moehrke		william.moehrke@eon-us.com 502-627-6369	PROJECT COORD.
Tim Hillman	B+V	913-458-7928 hillmantm@bv.com	B+V PM
MONTY HINTZ	B&V	913-458-2464 hintzme@bv.com	B&V civil/struct
M.R. WEHRLY	B&V	913 458-7131 wehrlymr@bv.com	B&V ENG. MGR.
Kevin Siers	EON-US	502-817-3545	Production Leader
Michael Stevens	EON-US	502-933-6518	Production Supv / Comp.
Jim Nichols	EON-US	502-933-6643	Prod Supv.
Mike Buckner	LG&E	502-933-6515	Production Manager
Mike Kirkland	LG&E	502-933-6565	General Manager
KENNY CRAIGMYLE	EON	502-627-6366	PROJECT COORDINATOR
Eileen Saunders	EON	502-627-2431	MGR, Major Capital Project
Gary Revlett	EON	502-627-4621	MGR, Environmental Affairs
JOE DIDELOT	EON	502-933-6559	MGR, MAINT. MC
Scott Straight	"	" 627-2701	Director - PE
Alex Betz	LG&E	502-933-6602	Mech. Eng., Mill Creek
Anand Mahabaleshwarkar	B&V	913 4587736	AQC Section Lead

Hillman, Timothy M.

From: Hillman, Timothy M.
Sent: Friday, September 17, 2010 12:01 PM
To: 'Saunders, Eileen'
Cc: Lausman, Rick L.; Lucas, Kyle J.; Mahabaleshwarkar, Anand; Wehrly, M. R.; Hintz, Monty E.
Subject: 168908.14.1000 100917 Mill Creek - Acceleration of MC 1 and 2 SCR Installation

Eileen,

Anand and the rest of the team combined notes in this email to present both a high level and somewhat detailed summary of the issues surrounding Scott's inquiry about accelerating the installation schedule of SCRs at Mill Creek Units 1 and 2. Hopefully this will assist you in the pending management decision process.

Thanks for all you planning and organization this week. I thought the meetings and site walk downs were very helpful and meaningful.

Tim.

Summary

The most direct path of accelerating the installation of SCRs on Units 1 and 2 would be to construct the new SCRs with the existing ESPs in place. Unfortunately, this is hampered by the close proximity of the existing dry ESPs to the boilers. As a result, there is no room to route ductwork to and from the new SCRs. Therefore, any acceleration of Unit 1 and 2's new SCR schedule would likely require the original Phase 1 approach of building a new ESP and/or PJFF/NID *first*, in order that the existing ESP could be demolished to make room for the new SCR and ductwork.

Details and Basis

Available SCR Options for MC 1 & 2:
Option 1. High-dust SCR located above the existing dry ESP
Option 2. High-dust SCR located at new location with new air heater placed directly under the new SCR reactor
Option 3. Tail-end, low-dust SCR located on new ground downstream of existing ESP, with flue gas reheat

Challenges Presented by the Economizer Outlet and the Close Proximity of the Existing Dry ESP:

- For SCR Options 1 and 2, the economizer outlet duct would need to be routed eastwards out of the boiler building through the east boiler building wall to flow the flue gas to the SCR reactor inlet, located either per Option 1 or 2. The arrangement of the existing dry ESP, located to the east and at approximately same elevation as the economizer outlet duct, along with its close proximity to the boiler building wall, are all preventing the routing of new SCR inlet duct towards the east direction. Similarly, due to presence of boiler support steel inside the boiler building, it is nearly impossible to route the ductwork out to either the north or south side.
- Also, for Option 1, the new SCR outlet duct needs to be connected back to the existing air heater, which is located directly underneath the economizer. This creates additional congestion in the same area and presents ductwork support challenges with the current boiler steel. On the other hand, for Option 2, it is possible to install a new air heater underneath the new SCR reactor at another location and connect the flue gas stream to the new dry ESP and/or PJFF/NID. However, the routing of the SCR inlet ductwork out of the boiler building for Option 2 still faces the same challenges as Option 1.
- The tail-end, low-dust SCR (Option 3) will increase the capital and O&M cost due to the need for flue gas reheating and another air heater to maintain the SCR operating temperature. Therefore, Option 3 is not considered feasible in this preliminary review.

Solutions to above challenges:

- For SCR Options 1 and 2, routing of the new SCR ductwork makes the demolition of the existing dry ESPs inevitable.

Therefore, in order to create room for a new SCR, a new dry ESP and/or PJFF/NID system will need to be installed first, while the units are online. Once the new dry ESP and/or PJFF/NID system is installed and operating, the existing dry ESP can be demolished to create room for the new SCR. The ID fan and or booster fan requirements can also be finalized based on the BOP challenges, including aux power availability.

- Option 3 is believed to be capital and O&M cost intensive, and is therefore not considered feasible in this preliminary review.

Regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
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Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

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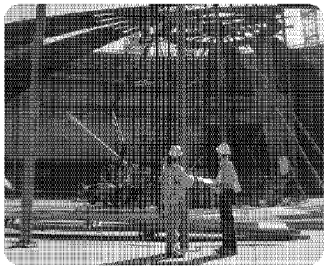
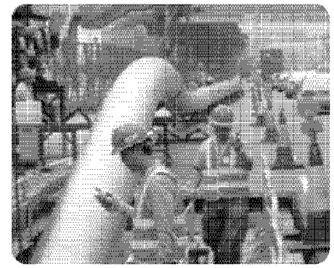
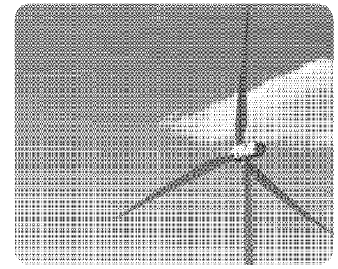


Alternative FGD Technology Workshop Review

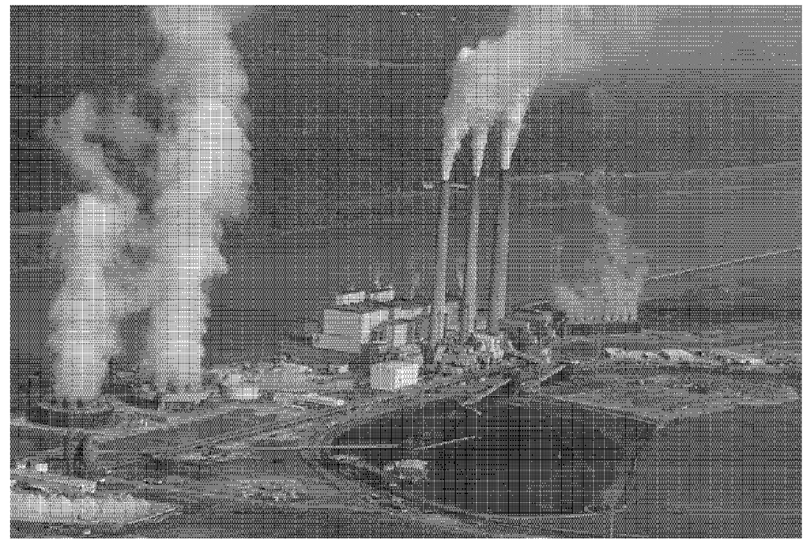
e·on U.S.

Black & Veatch

September 2010

Agenda

- Drivers
- Overview workshop
- Current plant basis
- Technologies and options discussed
- Recommendations of workshop



Regulatory drivers – still uncertainty

Program Name	Regulated Pollutants	Forecasted Date for Compliance
BART	SAM (MC3 Only)	Within 6 months of final Title V
1-hour NAAQS for NO_x	NO_x	2015 -2017
1-hour NAAQS for SO_2	SO_2	2016
Clean Air Transport Rule	NO_x SO_2	Beginning in 2012 Phase in 2014
New EGU MACT	Mercury Acids (HCl) Metals (PM) Metals (AS) Organics (CO) Dioxin/Furan	Estimated January, 2015; with 1-yr extension - January, 2016

Workshop attendees

E.ON US

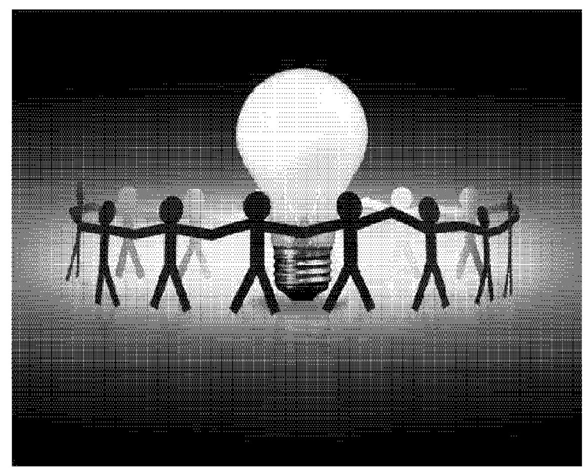
- Scott Straight — Dir. Proj. Engineering
- Phillip Imber — Sr. Chem. Engineer
- Ronald Gregory — Mgr Major Projects
- Gary Revlett — Mgr Air Section & Environmental Affairs
- Mike Kirkland — Mill Creek Plant Manager

Black & Veatch

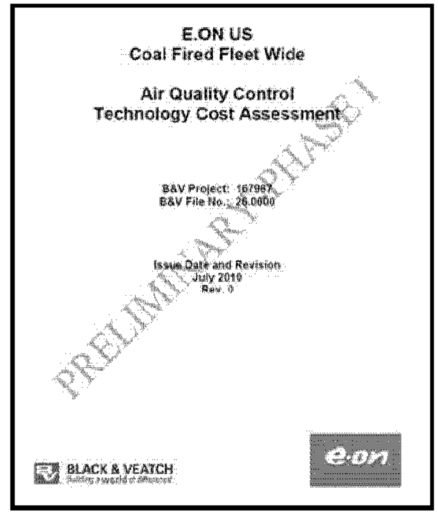
- Tim Hillman — Project Manager
- Mike Ballard — Construction
- Anand Mahabaleshwarkar — AQCS
- Rick Lausman — AQCS

Workshop purpose

- Review Phase 1 B&V evaluation
- Review current plant constraints
- Brainstorm potential for lower cost yet effective alternatives



Phase 1 B&V evaluation



E.ON US
Coal Fired Fleet Wide

Air Quality Control
Technology Cost Assessment

B&V Project: 167967
B&V File No.: 26.0000

Issue Date and Revision
July 2010
Rev. 0

PRELIMINARY PHASE 1

BLACK & VEATCH

e-on

- Fleet wide review
- Screen technologies
- Conceptual design
- Limited time constraints
- New wet FGD and fabric filters for each Mill Creek unit

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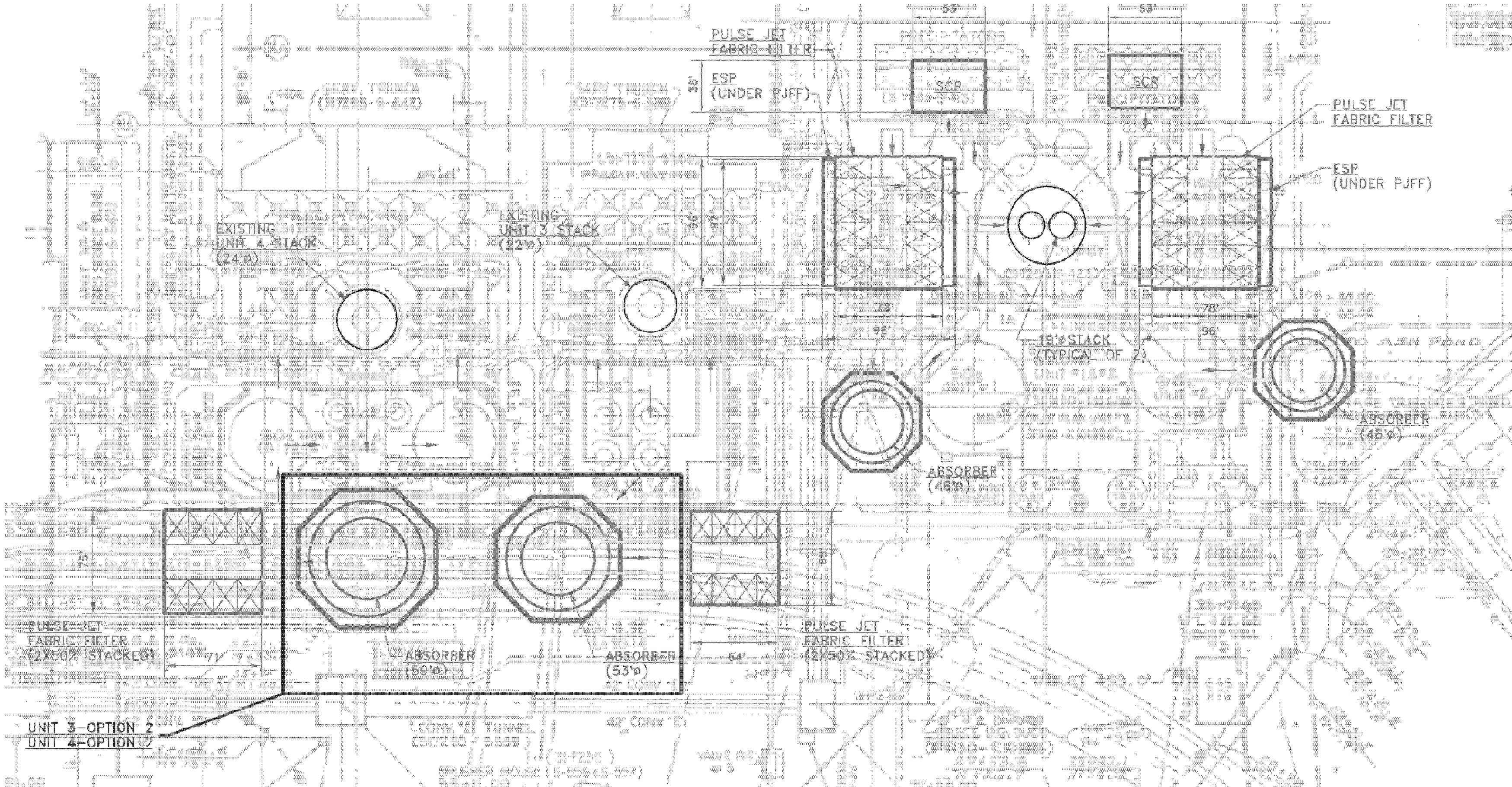
BLACK & VEATCH

Mill Creek phase 1 potential layout - example



Current conditions and future targets

Unit	MW	Current Emissions lb/MBtu	Current Removal %	Future Removal %
1	330	0.48	92	96
2	330	0.48	92	96
3	425	0.36	86	96
4	525	0.12	92	98
Plant	1610	0.36		
Plant	Targets	0.25 lb/MBtu		96%

Uncontrolled SO2 Emissions 6.2 lb/MBtu

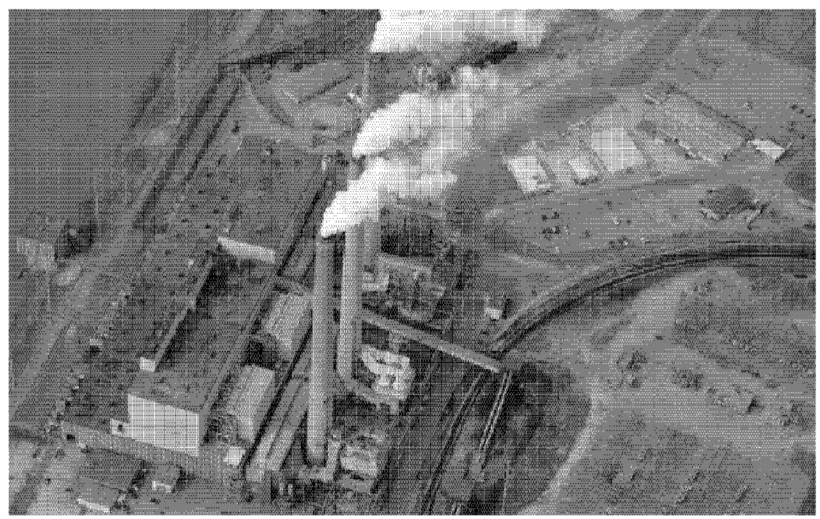
HAPS Issues

- E.ON.US emissions tests are just being finished
- Hg controls are expected for MC units
- Acid gases are likely acceptable
- Uncertainty if plant-wide averaging for Hg will be available
- Speciated metal emissions are also low at MC units

Hg

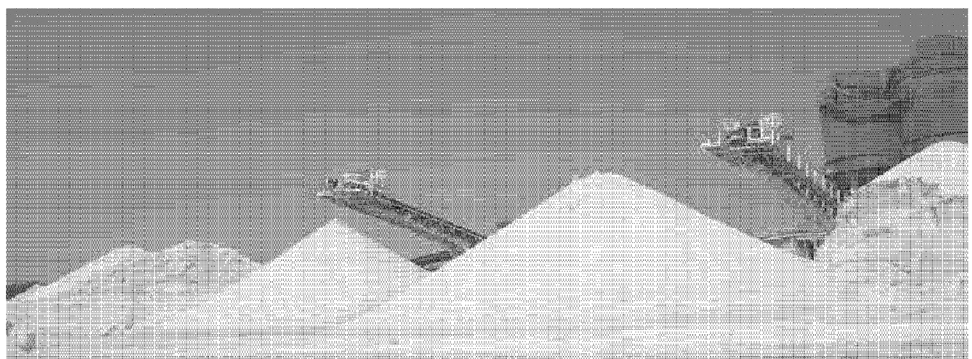
Site specific criteria

- Existing wet FGD
- Condition of FGD and structural steel
- Dewatering system and material handling in place
- Limestone grinding issues
- High sulfur fuel
- Fly ash sale requirement
- Mercury control
- Available space
- ....Other ....



Byproduct Issues

- Mill Creek needs to be able to sell ash due to landfill limitations
- Water emission issues and future limitations may be an issue
- Wastewater stream is currently going to ash ponds



Current FGD conditions

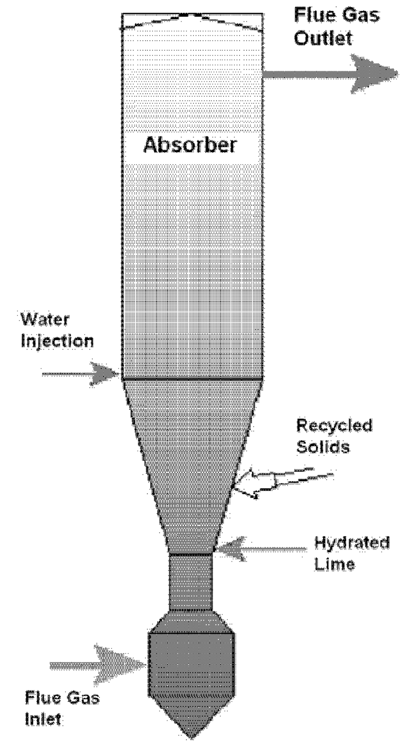
- All scrubbers are basically in a constant rebuilding mode
- Scrubbers are good for another 20 years structurally speaking
- MC1 and MC2 had trays added in 2002 which are now wearing thin
- Top of modules need to be placed
- MC1 and MC2 all duct work has been replaced that wasn't replaced during the wet stack conversion
- Pumps conditions are acceptable with some on MC 1 and MC2 previously replaced

Current FGD conditions - continued

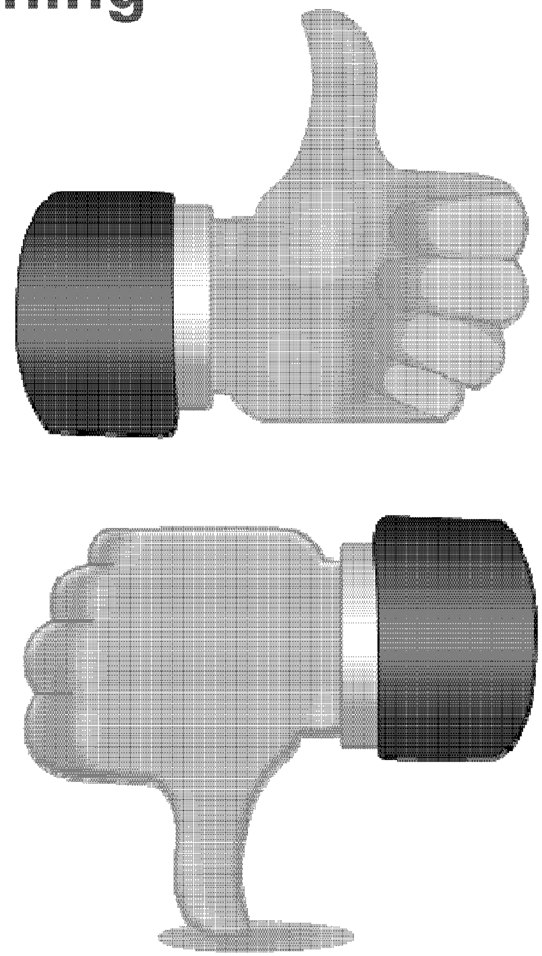
- MC3 and MC4 FGD had trays added in 2000
- MC4 top of modules and duct work needs to be replaced
- MC4 contact trays need replacement
- MC3 scrubber structure is good, although mixing is poor
- MC3 has underground reaction tanks and recycle pumps which cause maintenance and reliability issues.

Technology review

- Semi-dry FGD
  - Provides acid gas control (SO_3)
  - Limits waste water production
  - High sulfur fuel is an issue
  - Reagent costs
  - Different technologies provide different advantages - NIDS vs CDS



Factors for upgrading or abandoning existing FGD



- Expected life of unit
- Improvement level required
- Condition of existing FGD
- Space considerations
- Cost comparison to new FGD
- Technical or physical limitations
- Orphaned components

Preliminary workshop results

- Build a new WFGD for MC4
- Upgrade MC4's existing WFGD and use it for MC3
- Upgrade MC1 and MC2's existing WFGDs
- Add fabric filters to all four units
- Add PAC for Hg control
- Add duct injection systems for SO_3 control.
- As an alternative to the fabric filter, add NID system

Workshop results

Planned Future

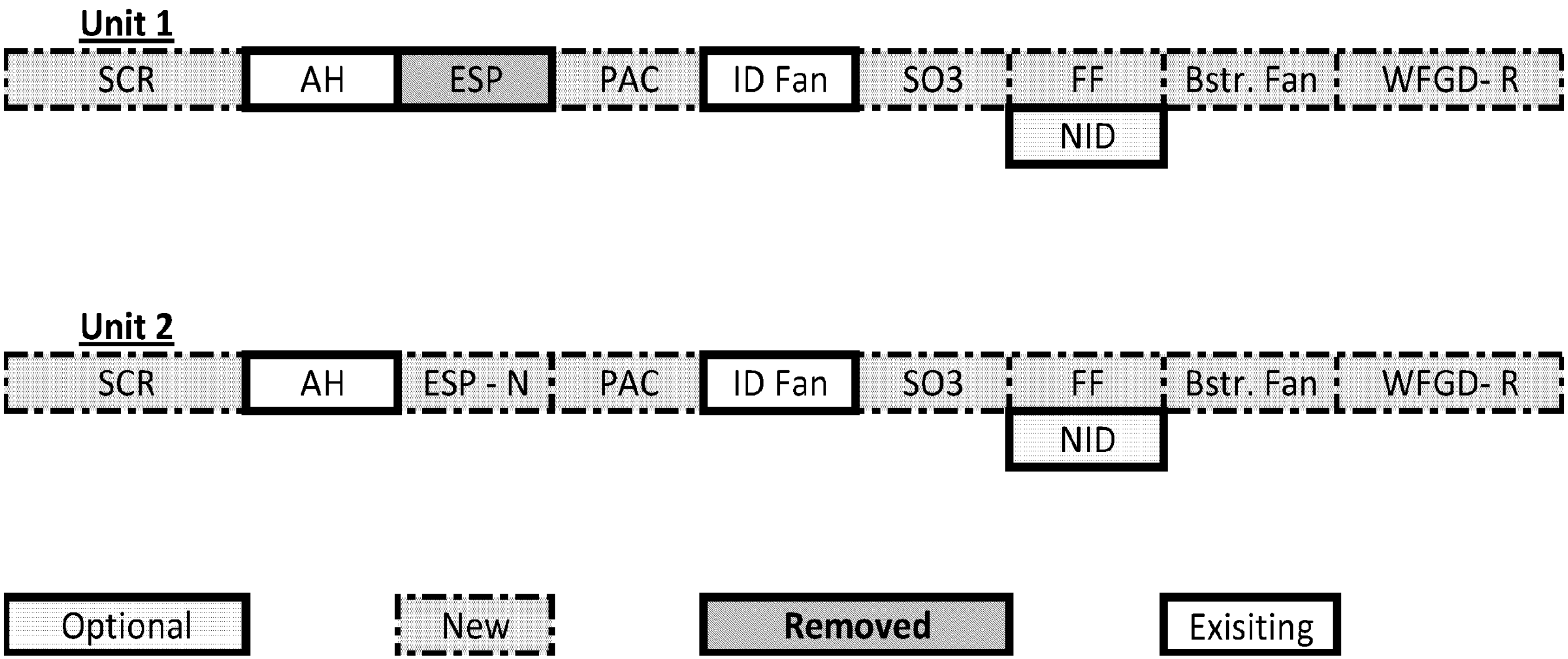
Unit No.	Technology	Schedule Priority
1	FGD upgrade	1
2	FGD upgrade	4
3	Unit 4 FGD with modification	3
4	New FGD	2

Workshop results

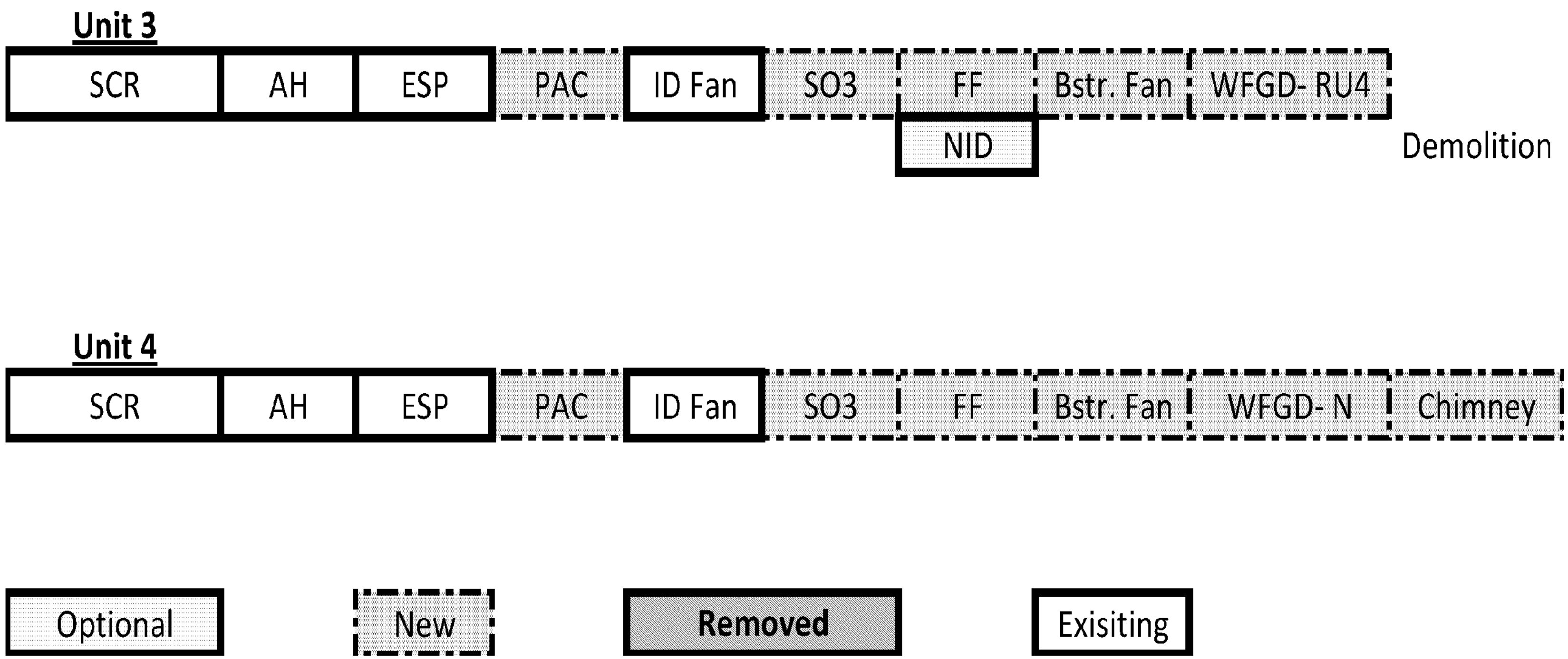
Preliminary Schedule

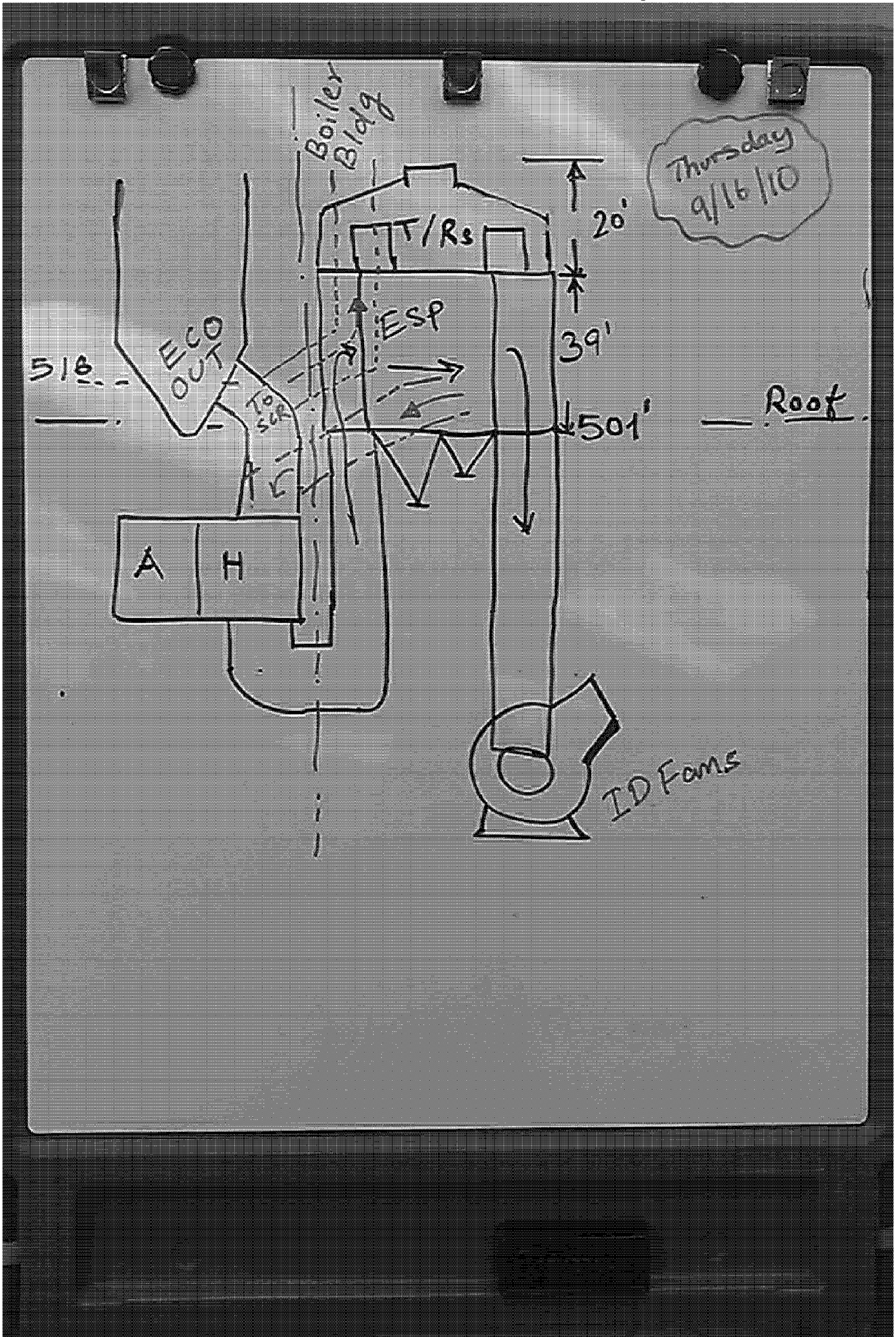
Unit	FGD	FF	SCR	Fans	Chimney	FF Location
1	2012	2014	2016	2014	Existing	In road
2	2013 or 4th - 2013	2013	2015	2013	Existing	To open area north
3	1st Qtr 2014	Apr 2015		2015	Existing	Road with fans in Unit 3 FGD area
4	4th - 2013	4th - 2013	Relocate NH3	2013	Likely New	South side of plant

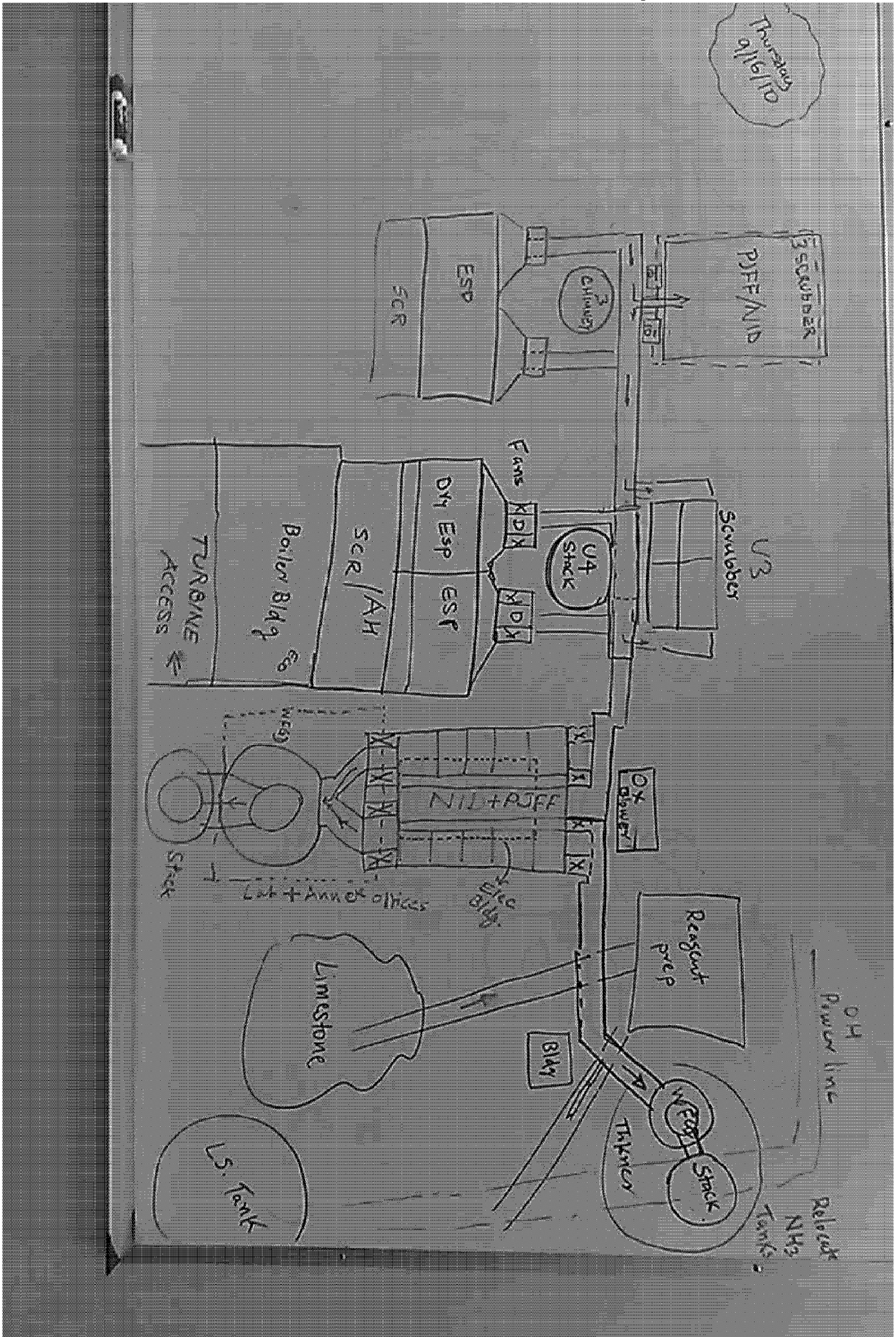
Proposed equipment lineups- Unit 1 & 2



Proposed equipment lineups- Unit 3 & 4




Boiler Bldg
Thursday 9/16/10
T/Rs
20'
ESP
39'
518
ECO OUT
To SCR
Roof
501'
A
H
ID Fans


Thursday 9/16/10
3 Scrubber
PJFF/ID
3 Chimney
ESP
SCR
Fans
Dry ESP
ESP
SCR/AH
Boiler Bldg
TURBINE ACCESS
U4 Stack
U3 Scrubber
NID + PJFF
Ox blower
Stack
Lab + Annex offices
Elec Bldg.
Reagent prep
OH Power line
Limestone
Bldg
WFGD
Stack
Relocate NH3 Tanks
L.S. Tank

From: Hillman, Timothy M.
To: Saunders, Eileen
CC: 168908 E.ON-AQC; Wehrly, M. R.; Lucas, Kyle J.; Jackson, Audrey; Hillman, Timothy M.
Sent: 9/24/2010 2:17:04 PM
Subject: 168908.14.1000 100924 Mill Creek - Final Kickoff and Site Visit Meeting Minutes
Attachments: Mill Creek Kickoff and Site Walkdown Meeting Minutes - Final with Attachments.pdf

Eileen,

Please find attached the final Mill Creek Kickoff meeting minutes incorporating E.ON's comments.
Best regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Hillman, Timothy M.
Sent: Monday, September 20, 2010 4:09 PM
To: 'Saunders, Eileen'
Cc: 168908 E.ON-AQC; Crabtree, Jonathan D.; Wehrly, M. R.; Lausman, Rick L.; Mahabaleshwarkar, Anand; Hintz, Monty E.; Lucas, Kyle J.
Subject: 168908.14.1000 100920 Mill Creek - Draft Kickoff and Site Visit Meeting Minutes

Eileen,

Please find attached draft meeting minutes from last week's kickoff and Mill Creek site visit. Please provide E.ON's comments back to me by Friday, 9/24.

<< File: Mill Creek Kickoff and Site Walkdown Meeting Minutes with Attachments - Draft.pdf >>
Best regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

BLACK & VEATCH CORPORATION
CONFERENCE MEMORANDUM

E.ON US	B&V Project 168908
Phase II: Air Quality Control Study	B&V File 14.1000
Project Kick-off and Mill Creek Site Visit	September 24, 2010

A project administrative kick-off meeting and Mill Creek site visit and walk down were held September 14-16th for the Phase II: Air Quality Control Study Project. The administrative kick-off meeting was held at E.ON's Broadway Office Complex in Louisville, while the site visit and walk down were held at the Mill Creek Generating Station.

Recorded by: Tim Hillman

Attending:

Administrative Kick-off Meeting, September 14th.

Eileen Saunders	E.ON
Mike Mooney	E.ON
Mike King	B&V
Tim Hillman	B&V
M.R. Wehrly	B&V
Kyle Lucas	B&V

Mill Creek Kick-off Meeting, September 15th.

Eileen Saunders	E.ON
Mike Mooney	E.ON
Bill Moehrke	E.ON
Kenny Craigmyle	E.ON
Kevin Siers	E.ON
Michael Stevens	E.ON
Jim Nichols	E.ON
Gary Revlett	E.ON
Joe Didelot	E.ON
Scott Straight	E.ON
Mike Kirkland	LG&E
Mike Buckner	LG&E
Alex Betz	LG&E
Tim Hillman	B&V
M.R. Wehrly	B&V
Anand Mahabaleshwarkar	B&V
Kyle Lucas	B&V
Rick Lausman	B&V
Monty Hintz	B&V

The purpose of the meetings was to 1) provide an administrative kick-off of the project, 2) present the project scope and purpose of the project to Mill Creek personnel, and 3) provide for a site visit and walk down of the Mill Creek facility. The above attendance roster reflects those attending the administrative kick-off meeting in Louisville and the initial kick-off meeting at Mill Creek. The meeting agenda and attendance sign-up sheets are attached herein for reference.

MEETING DISCUSSION

Day 1, September 14, 2010

As noted in the agenda, the meetings began at 1 pm on September 14th, with an administrative meeting in the Broadway Office Complex and an initial escorted site walk down at Mill Creek with part of the B&V team. The following is an account of the administrative kick-off meeting.

1. The meeting began with introductions and distribution of the agenda.
2. B&V distributed a copy of the project scope of work contained in the contract and provided a summary of each task along with the associated deliverable.
   - It was noted that a Project Design Memorandum (Task 5) would be developed for each facility.
   - E.ON commented that the Fabric Filter Vendor Workshop scope of work may not start until after the Ghent project has been kicked-off, but likely before the Brown kick-off.
3. B&V reviewed the major milestone schedule contained in the scope of work.
   - The possibility of holding the Mill Creek Task 6, AQC Technology Selection Meeting during the second week of November in B&V offices in Kansas City was discussed. E.ON to review and make recommendation. [Action Item #1]
   - E.ON to determine dates for Ghent kick-off meeting. The milestone schedule tentatively has this schedule for the week of October 4th. [Action Item #2]
4. E.ON requested B&V provide a DVD of the Phase I report. [Action Item #3]
5. B&V distributed a draft copy of the Project Instruction Memorandum (PIM). The communication contacts and project filing system were discussed in some detail.
   - E.ON will investigate setting up a document storage file system to mimic the Documentum system proposed by B&V in the PIM. [Action item #4]
   - B&V to copy Eileen on all correspondence with the plants.
   - Copy Audrey.Jackson@eon-us.com for copy to E.ON file mailbox.
   - B&V will establish and iBackup FTP site to facilitate large file transfer. [Action item #6]
   - E.ON will determine personnel assignments for document review. [Action Item #7]
6. B&V distributed a template of a standard monthly report. E.ON approved of the basic format and data of the monthly report template.
   - In addition to the Summary of Engineering Costs contained in the standard monthly report, E.ON requested a financial engineering cost estimate at the end of each month. Copy Mike Rooney on monthly reports. [Action Item #5]
   - Monthly reports will typically be sent during the second week of the following month.
7. E.ON requested to use the same weekly telephone conference date of Monday, 2 pm EST. B&V will check for conflicts and advise. [Action item #8]

8. B&V distributed an example action item list used during the Phase I work. It was agreed to use the same format for Phase II. The action item list will be divided by facility.
9. E.ON prefers to provide document review comments in a table log format.
10. E.ON is purchasing a trailer for the Mill Creek site that may offer some additional project meeting space.
11. Eileen Saunders provided an alternate contact number for her at Ghent (502-347-4023). B&V to update PIM with contact information. [Action Item #9]
12. B&V distributed a draft data request and inventory of data/information already in B&V's possession. E.ON asked B&V to carefully scrutinize the information request so as to not request information we may already have. B&V to finalize the initial data request and inventory list and submit it to E.ON as soon as possible. [Action item #10]
13. The administrative kick-off meeting concluded at approximately 4:30 pm.

Day 2, September 15, 2010

The second day of kick-off meetings began at 9 am at Mill Creek.

14. Eileen began the meeting with introductions and a brief summary of the project scope.
15. Gary Revlett provided a presentation of the main regulatory drivers influencing the coal-fired fleet. These drivers include the new NOx and SO2 NAAQS standards, Utility MACT for hazardous air pollutants, and the proposed Clean Air Transport Rule (CATR). Gary explained that these current and pending regulations are the drivers for the Phase II work. Gary provided an updated table that can be used as the initial design basis titled "Estimated Limits & Compliance Dates for Future New Air Requirement Mill Creek Station".
16. Scott Straight addressed the meeting stating that the current company strategy does not have E.ON self-compliant (as a fleet) with NOx credits until 2016. E.ON would like to be self-compliant by 2013-2014. Scott asked the group to evaluate the possibility of accelerating the installation of SCRs on Mill Creek Units 1 and 2. This is also being considered at Ghent. (Note: Over the course of the next two days, this scenario was given consideration. A separate email correspondence addressing this issue was prepared and sent to E.ON on September 17, 2010, a copy of which is attached herein.) [Action Item #16]
17. B&V provided a presentation summary of the results of the August 5th and 6th Mill Creek AQC Screen Workshop. The presentation summarized the workshop purpose and attendees, an overview of the current plant basis, AQC technologies and options considered, and recommendations of the workshop. A copy of the workshop presentation summary slides is attached here in for reference.
    - E.ON requested B&V review the pros and cons of the NID system as part of the technology validation task. Action item #11]
18. E.ON advised that Alex Betz would be the Mill Creek plant contact for information requests.
19. E.ON will be contacting Hitachi, BPI, Foster Wheeler, and Alstom, and/or others to evaluate the status of the existing scrubbers and determine the extent they can be

refurbished. E.ON is to lead this effort with support from B&V as requested. [Action item #12] Results of the evaluation will be provided to B&V

20. If the new Unit 4 WFGD and stack requires the relocation of the ammonia storage area, it may be possible to consolidate it with the ammonia storage requirements for the new Unit 1 and 2 SCRs.
21. It may be possible to reuse Unit 4's fans on Unit 3 should the existing fans become superfluous in the new Unit 4 arrangement. It then may be possible to reuse the Unit 3 fans on Unit 1 and/or unit 2.
22. E.ON confirmed there is no "sacred ground" around the existing units, areas reserved for other uses and unavailable for use in the AQCS upgrade. B&V requested if any balance-of-plant upgrades are currently under consideration that should be taken into account in the AQCS work, beyond the plans for an additional ball mill at the limestone prep building.
23. Following lunch, E.ON and B&V personnel continue site walk down activities, concluding at approximately 5:30 pm. Some observations from this walk down are identified below.
    - Unit 4 fabric filter likely to be required to be installed above the Unit 4 scrubber electrical building.
    - Unit 3 would be tied into the current Unit 4 scrubber after the new Unit 4 FGD is built. The old Unit 3 scrubber would be torn down to allow new AQC equipment to be potentially located in that area.
    - Unit 3 and 4 structural steel was generally in good shape for lower areas that could be inspected. Higher areas of Unit 3 & 4 could not be assessed due to the large flue gas leaks in the duct that limited access for personal safety reasons.
    - Duct configuration will be complicated, but appears possible, and will depend on the specific fan arrangement and if new ID fans or booster fans will be used.

Day 3, September 16, 2010

The third and final day of meetings began at 9 am at Mill Creek.

24. B&V summarized the major findings of the walk downs for Eileen and began preparing white board sketches of the preliminary AQC control configurations discussed over the last two days in preparation for a site de-briefing scheduled for the early afternoon.
25. After a break in the morning rain, an additional walk down of Units 1 and 2 was conducted before lunch to review the structural integrity of the Unit 1 and Unit 2 steel for additional AQC equipment.
26. At 1:15 pm, B&V presented de-briefing of the site walk down findings and preliminary AQC control configurations. Two sketches were prepared for the meeting. One illustrated the preliminary AQC configuration options for Units 3 and 4, while the second sketch addressed Units 1 and 2 and the possibility of accelerating the SCR schedule. Pictures of the two white board sketches are attached here in for reference.
    - As a result of the workshop discussions, the potential for locating the Unit 4 fabric filter/NIDs unit and new scrubber, plus a new chimney, to the south of Unit 4 was

considered. The original location for the new scrubber and chimney considered was in the area of the demolished thickener south of the limestone prep building. This location, however, involved crossing the limestone conveyor with relatively high ductwork, plus moving both an overhead Unit 3 and Unit 4 345kV T-line and the ammonia tanks and electrical building to provide necessary working space for new construction.

- Alternately, it was determined that there is likely sufficient space for the new Unit 4 AQCS train directly south of Unit 4, running more or less straight east to west with the new chimney located opposite of the Unit 4 turbine building. This arrangement, if it fits, has the advantage of relatively short ductwork runs, no impact to the overhead T-line, and no impact to the existing ammonia tank farm. It would, however, require relocation of the existing annex building and lab, plus limit construction access to one side of the train. B&V will continue evaluation of this arrangement as first choice for Unit 4, with the thickener area location used as a fall-back alternate.
- Should either of the above arrangements fit, it appeared that it would be advantageous to upgrade the existing Unit 4 scrubber in place and reuse it for Unit 3. The flue gas from Unit 3 would be rerouted to the Unit 4 scrubber in the short term (Phase I) and the Unit 3 scrubber demo'd. A new Unit 3 fabric filter/NIDs unit could be built in its place and tied into the Unit 3 ductwork as Phase II of a two phase construction sequence at Unit 3.
- Both Unit 1 and Unit 2 offer significant challenges in the addition of an SCR as an immediate modification (refer to Sep 17th email, attached herein for reference). The existing ESP at both units is located within a few feet of the boiler structure, leaving insufficient room to route ductwork to a new SCR overhead of the ESP. The ESP would have to be demolished or extensively modified before the SCR could be constructed, resulting in either an extended outage while the ESP is moved or reconstructed or the installation of a separate new ESP in another location prior to installation of the SCR. In addition, area available for new structures for either Units 1 or 2 is very limited, by the narrow alleyway between Units 1 and 3 for Unit 1 and by the new RO facility north of the powerblock at Unit 2. No obvious arrangement for the AQCS upgrades at Units 1 and 2 were immediately noted, and additional investigation will be required.

27. B&V commented on the poor condition of the structural steel at the existing scrubbers, especially at Units 1 and 2. Relatively isolated examples of steel corrosion, most likely due to exposure to flue gas, were noted in the superstructures at the Unit 3 and 4 scrubbers. However, severe corrosion and loss of structural mass was noted in a significant number of areas at Units 1 and 2. The most severe damage noted was in lighter components, such as platform and grating, but instances of chemical attack on the major structural steel members were also noted on Units 1 and 2. E.ON agreed to provide the results of recent studies assessing the structural steel. [Action Item #13]
28. New AQC will likely restrict vehicle and maintenance access in some areas of the facility. E.ON agreed to provide the minimum access dimensions for use in the analysis. [Action Item #14]
29. E.ON noted that the existing Unit 4 AQCS (ESP and scrubber) were powered by the Unit 4 aux power supply. Should the Unit 4 scrubber be reused for Unit 3, an alternate source of aux power for the refurbished equipment must be included. Otherwise, an outage on Unit 4 would result in the loss of AQCS for Unit 3.

30. E.ON noted that no aux power supply greater than 4160V is currently available in the immediate plant area. However, there are spare cubicles which might be able to be modified to accept feeder breakers as potential sources of medium voltage power for new loads such as fans in the AQCS upgrade. E.ON also noted that B&V Ann Arbor completed a short circuit study for the plant in the 1990's. B&V to review this study. [Action item #15]

31. The meeting concluded at approximately 3 pm.

ACTION ITEMS

#	Description	Responsible	Due Date
1	Determine location for Mill Creek Task 6 Technology Selection meeting during 2nd wk of November	E.ON	10/15/10
2	Determine dates for Ghent kick-off meeting	E.ON	9/23/10
3	Provide DVD copy of Phase I Report	B&V	9/24/10
4	Use B&V file system to set up E.ON document storage	E.ON	TBD
5	Provide engineering cost estimate at end of each month and copy Mike Rooney on monthly reports	B&V	End of Month
6	Create IBackup FTP site for large file transfer	B&V	9/24/10
7	Determine personnel assignments for document review	E.ON	TBD
8	Determine if a Monday, 2 pm EST project conference call time will work for B&V project team	B&V	9/23/10
9	Update PIM with Eileen's Ghent contact information	B&V	9/24/10
10	Prepare data inventory and information request	B&V	9/24/10
11	Evaluate pros and cons of NID system for November technology validation presentation	B&V	Nov 2010
12	Schedule vendors for evaluation of existing scrubbers	E.ON	TBD
13	Provide structural steel study assessments	E.ON	9/24/10
14	Provide minimum access dimension box	E.ON	9/24/10
15	Review B&V electrical study conducted in the 1990s	B&V	9/24/10
16	Evaluate the possibility of accelerating the installation of SCRs on Mill Creek Units 1 and 2	E.ON and B&V	TBD

ATTACHMENTS

- Agenda
- Attendance roster
- B&V email of September 17, 2010 addressing the acceleration of the SCR installation schedule for Mill Creek Units 1 and 2.
- August 5th and 6th Mill Creek AQC Workshop Summary Presentation.
- Pictures of the September 16, 2010 white board sketches from the de-brief meeting.

cc: All Attendees
File

AGENDA

Phase II Air Quality Control Study – Kickoff Meeting and Site Visit
E.ON - Mill Creek Station
September 14 - 16, 2010
Location: E.ON Broadway Office Complex and Mill Creek

Day 1, September 14th, Arrive 1 pm (Broadway Office Complex)

I. Introductions
II. Review Project Scope
III. Review Project Schedule
IV. Review Project Deliverables
V. Project Administration
   a. Communication
   b. File System
   c. Monthly Reports
   d. Weekly Conference Calls/Action Item List
   e. Invoicing
VI. Project Documentation
VII. Information Request

Day 1, September 14th, Arrive 1 pm (Mill Creek)

I. Arrive on Site and Introductions
II. Begin Initial Escorted Site Walk Down

Day 2, September 15th, Arrive 8 am (Mill Creek)

I. Introductions
II. Environmental Drivers Presentation (E.ON – Gary R.)
III. Aug 5-6th AQC Workshop Results Presentation (B&V – Rick L and Anand M.)
IV. Lunch (on site)
V. Continue Escorted Site Walk Down and Data Collection

Day 3, September 16th, Arrive 8 am (Mill Creek)

I. Continue Escorted Site Walk Down and Data Collection
II. Lunch (off site)
III. Site Debriefing Meeting
IV. Depart (no later than 4 pm)

Eon AQC Mill Creek 1pm-4:30p. 9/14/10

Admin Kick-off Meeting

Kyle Lucas	913-458-9062	lucaskj@bv.com
M.R. WEHRLY	913-458-7131	wehrlymr.com
Mike Mooney	502-627-3671	mike.mooney@eon-us.com
Eileen Saunders	502-627-2431	eileen.saunders@eon-us.com
MIKE KING	313 618-8657	kingml@bv.com
Tim Hillman	913-458-7928	hillmantm@bv.com.

EON AQC Mill Creek Plant Kickoff 9/15/10
9am - 11:30

Kyle Lucas	B&V	913-458-9062 lucaskj@bv.com	Asst PM / EON MNG
Rick Lausman	B&V	913 458 7528 LAUSMANRL@BV.COM	AQC Eng
Mike Mooney	EON	mike.mooney@eon-us.com 502-627-3671	Budget Analyst
Bill Moehrke		william.moehrke@eon-us.com 502-627-6369	Project Coord.
Tim Hillman	B&V	913-458-7928 hillmantm@bv.com	B&V PM
Monty Hintz	B&V	913-458-2464 hintzme@bv.com	B&V civil/struct
M.R. Wehrly	B&V	913 458-7131 wehrlymr@bv.com	B&V Eng. Mgr.
Kevin Siers	EON-US	502-817-3545	Production Leader
Michael Stevens	EON-US	502-933-6518	Production Supv / Comp.
Jim Nichols	EON-US	502-933-6643	Prod Supv.
Mike Buckner	LG&E	502-933-6515	Production Manager
Mike Kirkland	LG&E	502-933-6565	General Manager
Kenny Craigmyle	EON	502-627-6366	Project Coordinator
Eileen Saunders	EON	502-627-2431	MGR, Major Capital Project
Gary Revlett	EON	502-627-4621	MGR, Environmental Affairs
Joe Didelot	EON	502-933-6559	MGR, MAINT. MC
Scott Straight	"	" 627-2701	Director - PE
Alex Betz	LG&E	502-933-6602	Mech. Eng., Mill Creek
Anand Mahabaleshwarkar	B&V	913 4587736	AQC Section Lead

Hillman, Timothy M.

From: Hillman, Timothy M.
Sent: Friday, September 17, 2010 12:01 PM
To: 'Saunders, Eileen'
Cc: Lausman, Rick L.; Lucas, Kyle J.; Mahabaleshwarkar, Anand; Wehrly, M. R.; Hintz, Monty E.
Subject: 168908.14.1000 100917 Mill Creek - Acceleration of MC 1 and 2 SCR Installation

Eileen,

Anand and the rest of the team combined notes in this email to present both a high level and somewhat detailed summary of the issues surrounding Scott's inquiry about accelerating the installation schedule of SCRs at Mill Creek Units 1 and 2. Hopefully this will assist you in the pending management decision process.

Thanks for all you planning and organization this week. I thought the meetings and site walk downs were very helpful and meaningful.

Tim.

Summary

The most direct path of accelerating the installation of SCRs on Units 1 and 2 would be to construct the new SCRs with the existing ESPs in place. Unfortunately, this is hampered by the close proximity of the existing dry ESPs to the boilers. As a result, there is no room to route ductwork to and from the new SCRs. Therefore, any acceleration of Unit 1 and 2's new SCR schedule would likely require the original Phase 1 approach of building a new ESP and/or PJFF/NID *first*, in order that the existing ESP could be demolished to make room for the new SCR and ductwork.

Details and Basis

Available SCR Options for MC 1 & 2:

Option 1.	High-dust SCR located above the existing dry ESP
Option 2.	High-dust SCR located at new location with new air heater placed directly under the new SCR reactor
Option 3.	Tail-end, low-dust SCR located on new ground downstream of existing ESP, with flue gas reheat

Challenges Presented by the Economizer Outlet and the Close Proximity of the Existing Dry ESP:

- For SCR Options 1 and 2, the economizer outlet duct would need to be routed eastwards out of the boiler building through the east boiler building wall to flow the flue gas to the SCR reactor inlet, located either per Option 1 or 2. The arrangement of the existing dry ESP, located to the east and at approximately same elevation as the economizer outlet duct, along with its close proximity to the boiler building wall, are all preventing the routing of new SCR inlet duct towards the east direction. Similarly, due to presence of boiler support steel inside the boiler building, it is nearly impossible to route the ductwork out to either the north or south side.
- Also, for Option 1, the new SCR outlet duct needs to be connected back to the existing air heater, which is located directly underneath the economizer. This creates additional congestion in the same area and presents ductwork support challenges with the current boiler steel. On the other hand, for Option 2, it is possible to install a new air heater underneath the new SCR reactor at another location and connect the flue gas stream to the new dry ESP and/or PJFF/NID. However, the routing of the SCR inlet ductwork out of the boiler building for Option 2 still faces the same challenges as Option 1.
- The tail-end, low-dust SCR (Option 3) will increase the capital and O&M cost due to the need for flue gas reheating and another air heater to maintain the SCR operating temperature. Therefore, Option 3 is not considered feasible in this preliminary review.

Solutions to above challenges:

- For SCR Options 1 and 2, routing of the new SCR ductwork makes the demolition of the existing dry ESPs inevitable.

Therefore, in order to create room for a new SCR, a new dry ESP and/or PJFF/NID system will need to be installed first, while the units are online. Once the new dry ESP and/or PJFF/NID system is installed and operating, the existing dry ESP can be demolished to create room for the new SCR. The ID fan and or booster fan requirements can also be finalized based on the BOP challenges, including aux power availability.

- Option 3 is believed to be capital and O&M cost intensive, and is therefore not considered feasible in this preliminary review.

Regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

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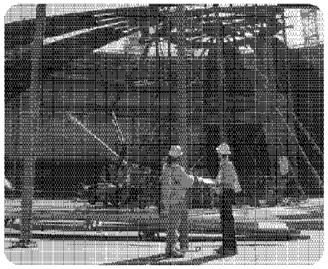

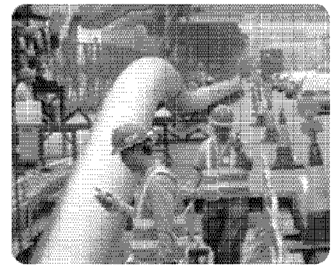
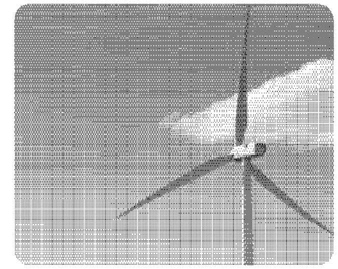

Alternative FGD Technology Workshop Review

e·on | U.S.

Black & Veatch

September 2010

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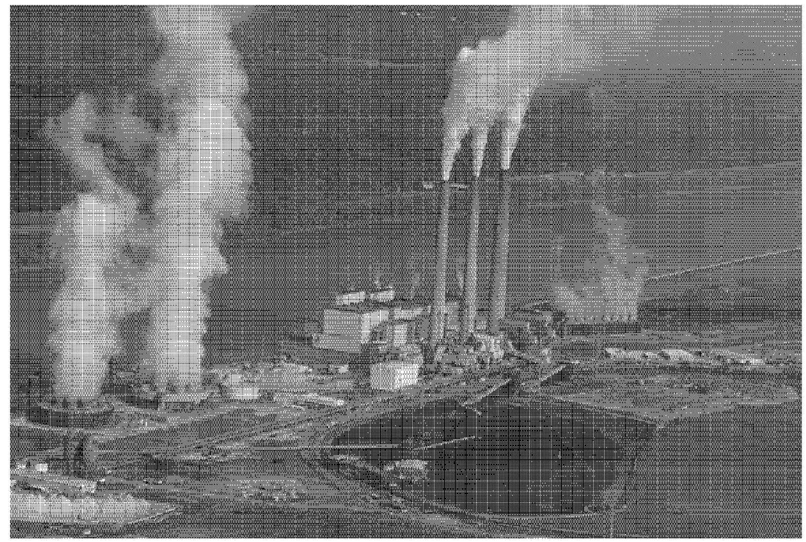
Agenda

- Drivers
- Overview workshop
- Current plant basis
- Technologies and options discussed
- Recommendations of workshop



Regulatory drivers – still uncertainty

Program Name	Regulated Pollutants	Forecasted Date for Compliance
BART	SAM (MC3 Only)	Within 6 months of final Title V
1-hour NAAQS for NO_x	NO_x	2015 -2017
1-hour NAAQS for SO_2	SO_2	2016
Clean Air Transport Rule	NO_x SO_2	Beginning in 2012 Phase in 2014
New EGU MACT	Mercury Acids (HCl) Metals (PM) Metals (AS) Organics (CO) Dioxin/Furan	Estimated January, 2015; with 1-yr extension - January, 2016

Workshop attendees

E.ON US

• Scott Straight	Dir. Proj. Engineering
• Phillip Imber	Sr. Chem. Engineer
• Ronald Gregory	Mgr Major Projects
• Gary Revlett	Mgr Air Section & Environmental Affairs
• Mike Kirkland	Mill Creek Plant Manager

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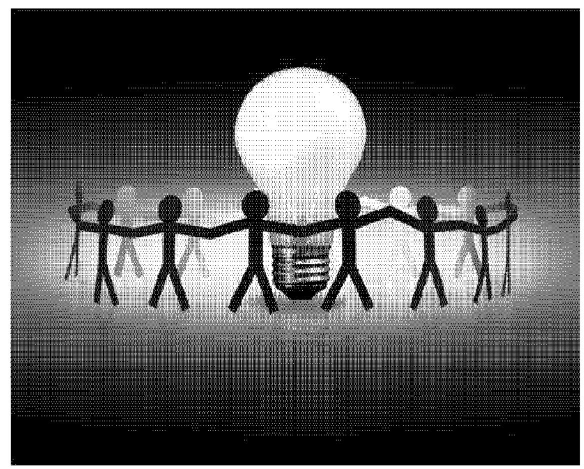
• Tim Hillman	Project Manager
• Mike Ballard	Construction
• Anand Mahabaleshwarkar	AQCS
• Rick Lausman	AQCS

Workshop purpose

- Review Phase 1 B&V evaluation
- Review current plant constraints
- Brainstorm potential for lower cost yet effective alternatives



Phase 1 B&V evaluation


E.ON US
Coal Fired Fleet Wide

Air Quality Control
Technology Cost Assessment

B&V Project: 167967
B&V File No.: 26.0000

Issue Date and Revision
July 2010
Rev. 0

PRELIMINARY PHASE 1

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- Fleet wide review
- Screen technologies
- Conceptual design
- Limited time constraints
- New wet FGD and fabric filters for each Mill Creek unit

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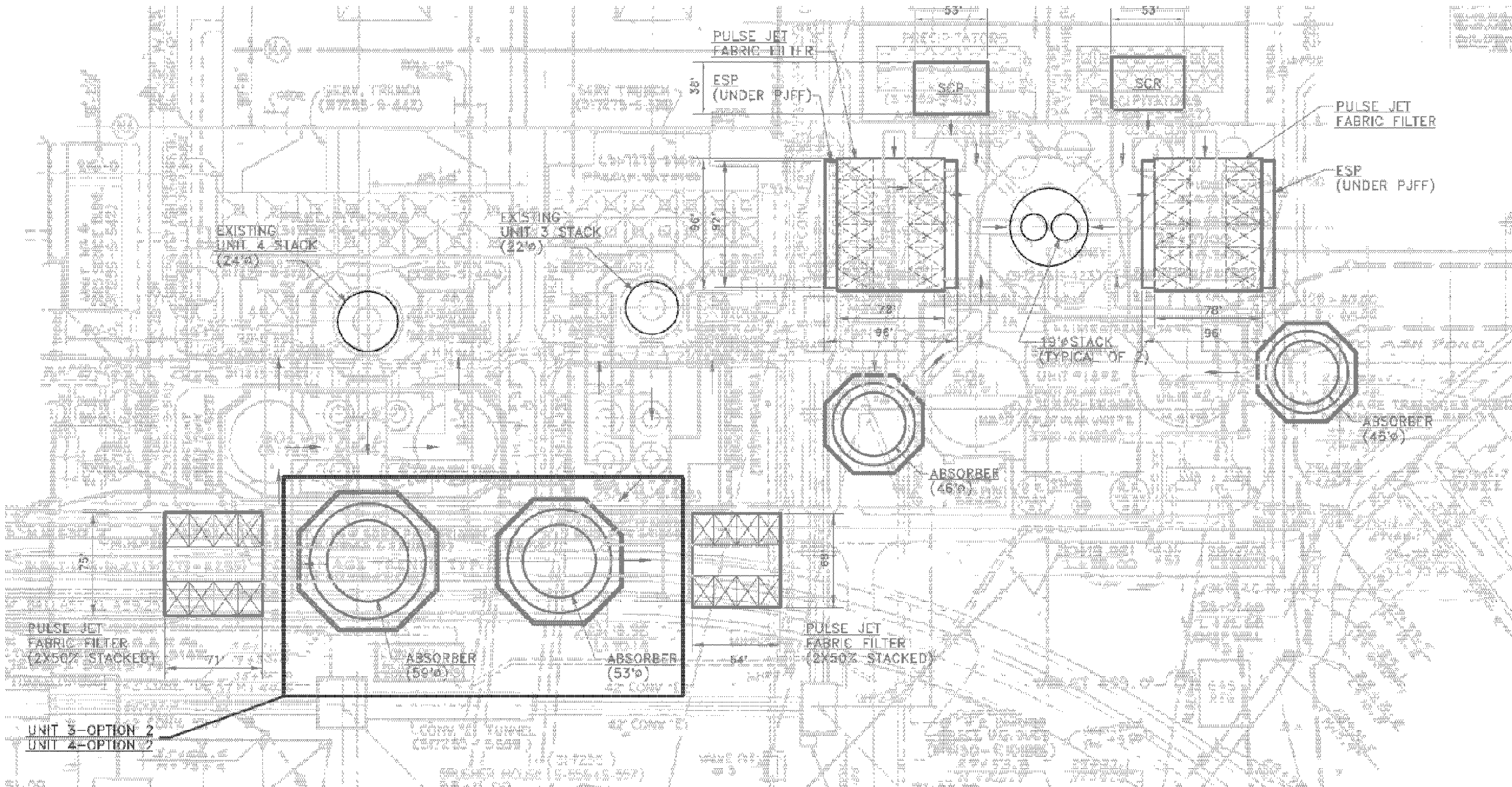
Mill Creek phase 1 potential layout - example



Current conditions and future targets

Unit	MW	Current Emissions lb/MBtu	Current Removal %	Future Removal %
1	330	0.48	92	96
2	330	0.48	92	96
3	425	0.36	86	96
4	525	0.12	92	98
Plant	1610	0.36		
Plant	Targets	0.25 lb/MBtu		96%

Uncontrolled SO2 Emissions 6.2 lb/MBtu

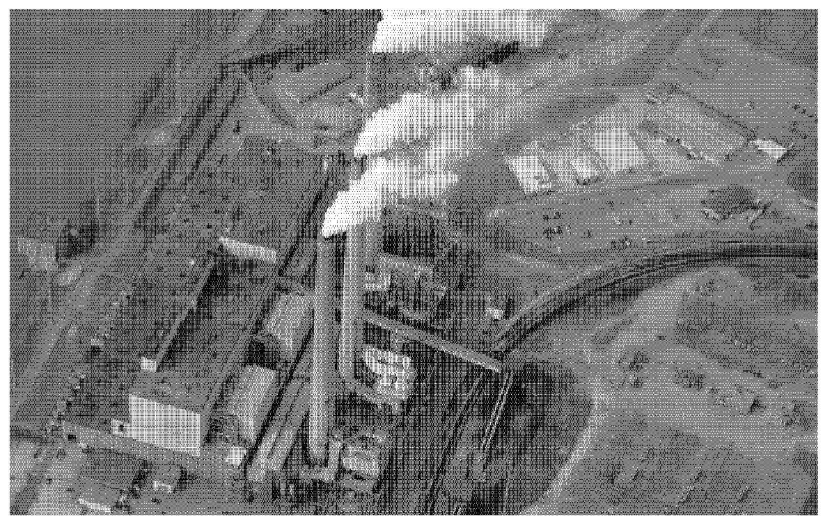
HAPS Issues

- E.ON.US emissions tests are just being finished
- Hg controls are expected for MC units
- Acid gases are likely acceptable
- Uncertainty if plant-wide averaging for Hg will be available
- Speciated metal emissions are also low at MC units

Hg

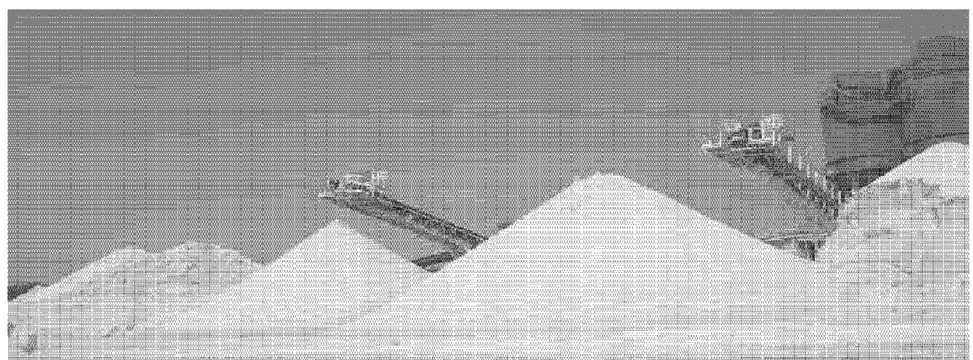
Site specific criteria

- Existing wet FGD
- Condition of FGD and structural steel
- Dewatering system and material handling in place
- Limestone grinding issues
- High sulfur fuel
- Fly ash sale requirement
- Mercury control
- Available space
- …….Other ……..



Byproduct Issues

- Mill Creek needs to be able to sell ash due to landfill limitations
- Water emission issues and future limitations may be an issue
- Wastewater stream is currently going to ash ponds



Current FGD conditions

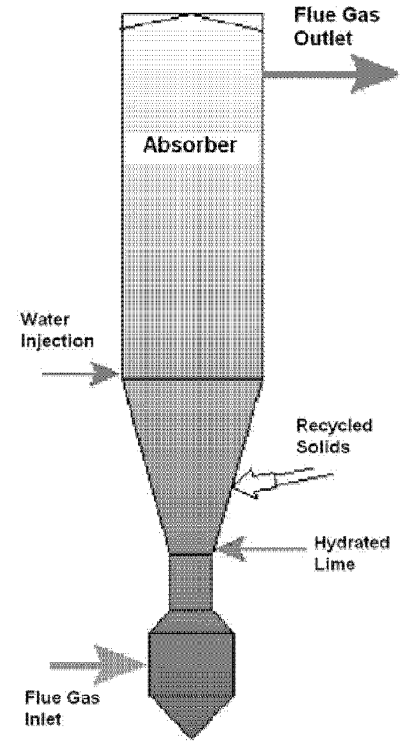
- All scrubbers are basically in a constant rebuilding mode
- Scrubbers are good for another 20 years structurally speaking
- MC1 and MC2 had trays added in 2002 which are now wearing thin
- Top of modules need to be placed
- MC1 and MC2 all duct work has been replaced that wasn't replaced during the wet stack conversion
- Pumps conditions are acceptable with some on MC 1 and MC2 previously replaced

Current FGD conditions - continued

- MC3 and MC4 FGD had trays added in 2000
- MC4 top of modules and duct work needs to be replaced
- MC4 contact trays need replacement
- MC3 scrubber structure is good, although mixing is poor
- MC3 has underground reaction tanks and recycle pumps which cause maintenance and reliability issues.

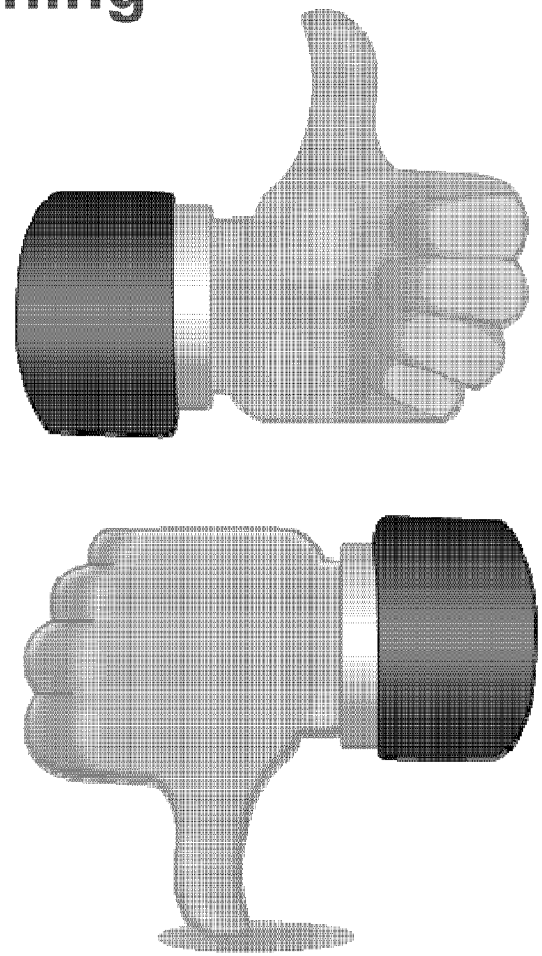
Technology review

- Semi-dry FGD
  - Provides acid gas control (SO_3)
  - Limits waste water production
  - High sulfur fuel is an issue
  - Reagent costs
  - Different technologies provide different advantages - NIDS vs CDS



Factors for upgrading or abandoning existing FGD

- Expected life of unit
- Improvement level required
- Condition of existing FGD
- Space considerations
- Cost comparison to new FGD
- Technical or physical limitations
- Orphaned components



Preliminary workshop results

- Build a new WFGD for MC4
- Upgrade MC4's existing WFGD and use it for MC3
- Upgrade MC1 and MC2's existing WFGDs
- Add fabric filters to all four units
- Add PAC for Hg control
- Add duct injection systems for SO_3 control.
- As an alternative to the fabric filter, add NID system

Workshop results

Planned Future

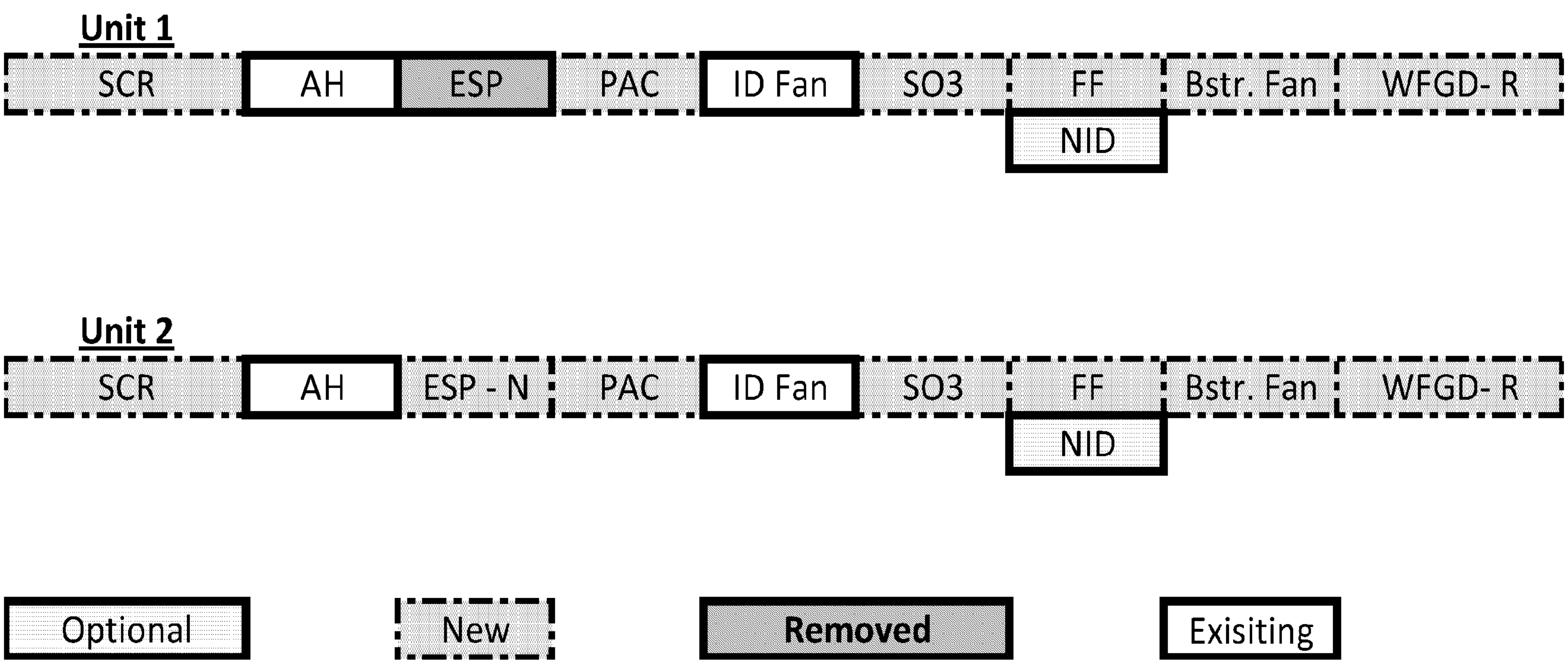
Unit No.	Technology	Schedule Priority
1	FGD upgrade	1
2	FGD upgrade	4
3	Unit 4 FGD with modification	3
4	New FGD	2

Workshop results

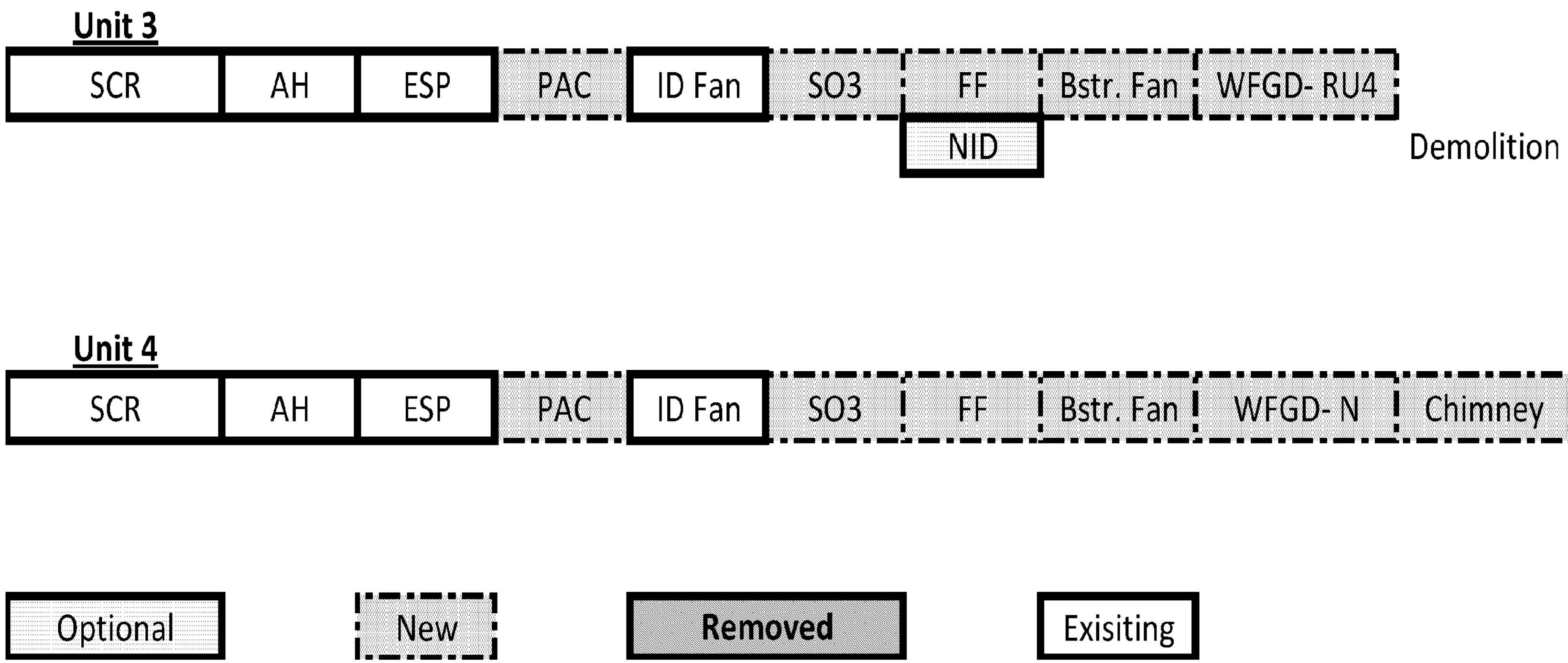
Preliminary Schedule

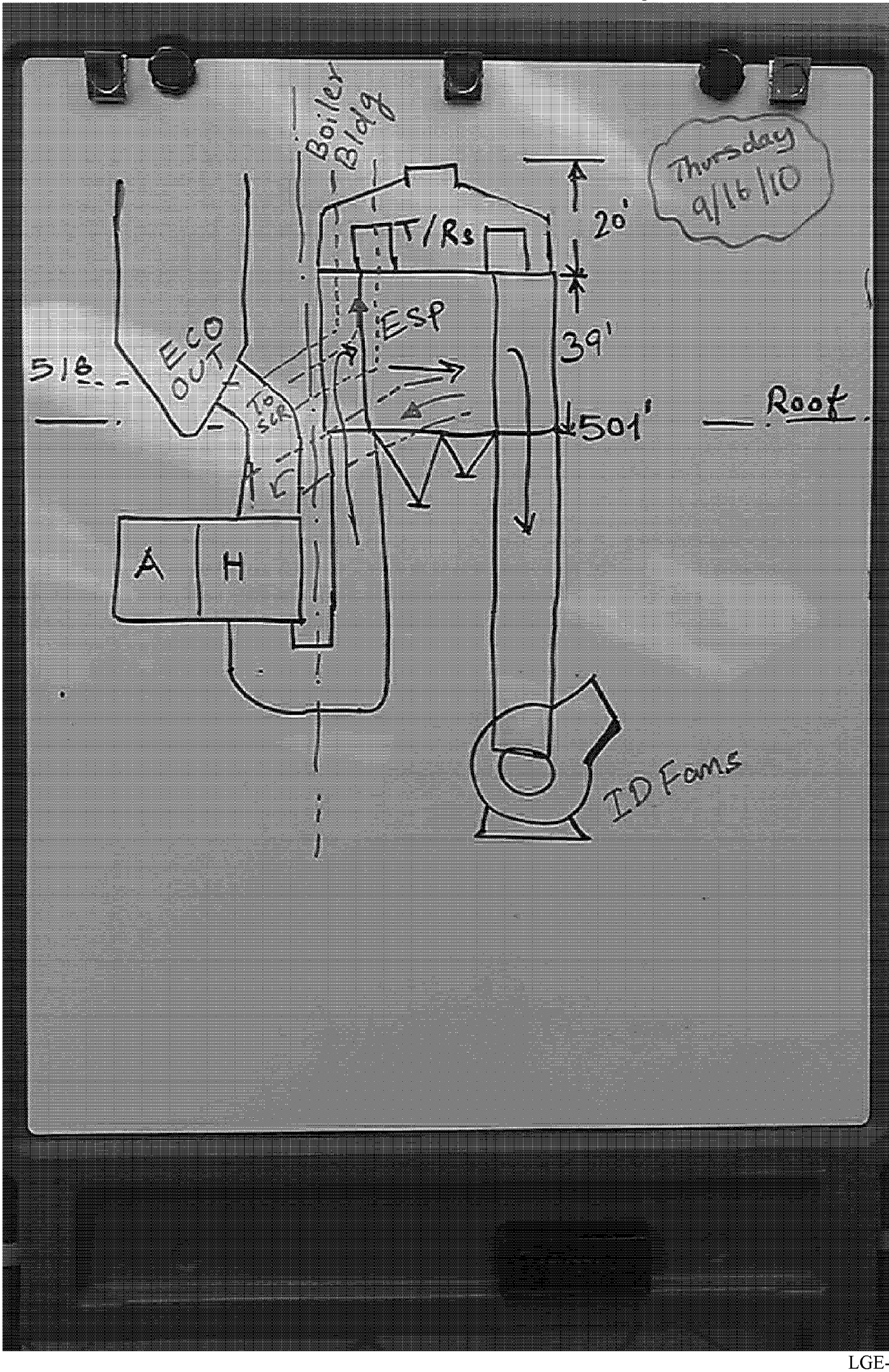
Unit	FGD	FF	SCR	Fans	Chimney	FF Location
1	2012	2014	2016	2014	Existing	In road
2	2013 or 4th - 2013	2013	2015	2013	Existing	To open area north
3	1st Qtr 2014	Apr 2015		2015	Existing	Road with fans in Unit 3 FGD area
4	4th - 2013	4th - 2013	Relocate NH3	2013	Likely New	South side of plant

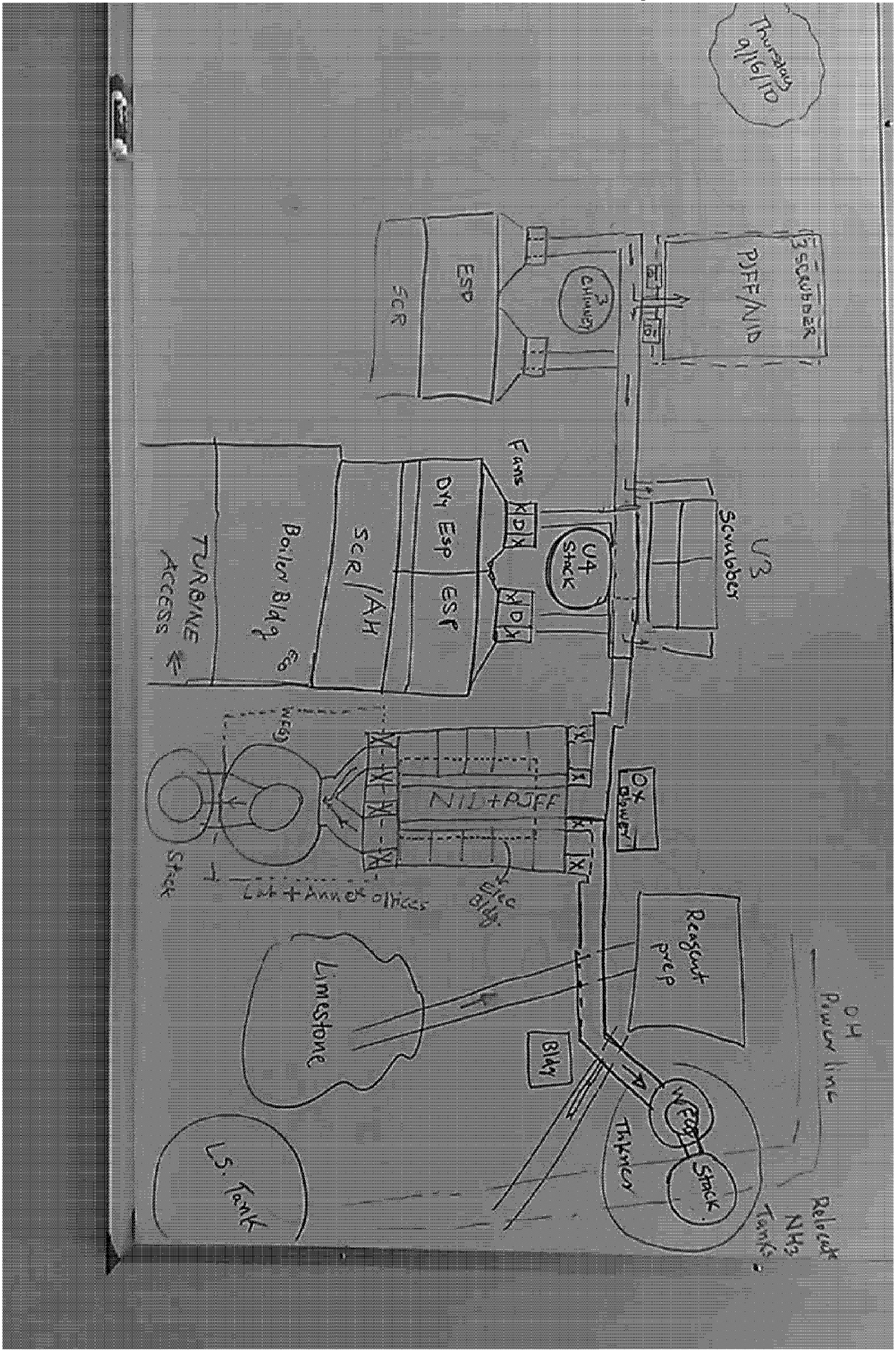
Proposed equipment lineups- Unit 1 & 2



Proposed equipment lineups- Unit 3 & 4




Boiler Bldg
Thursday 9/16/10
T/Rs
20'
ESP
39'
ECO OUT
518
To SCR
Roof
501'
A
H
ID Fans


Thursday 9/16/10
3 Scrubber
PJFF/ID
3 Chimney
ESP
SCR
Fans
Dry ESP
ESP
SCR/AH
Boiler Bldg
TURBINE ACCESS
U4 Stack
U3 Scrubber
NID + PJFF
Ox blower
Stack
Lab + Annex offices
Elec Bldg.
Reagent prep
Limestone
Bldg
OH Power line
WFGD
Stack
Thickener
Relocate NH3 Tanks
L.S. Tank

From:	Saunders, Eileen
To:	Straight, Scott; Kirkland, Mike; Didelot, Joe; Buckner, Mike; Betz, Alex; Nichols, Jim (Mill Creek); Stevens, Michael; Revlett, Gary; Siers, Kevin; Moehrke, William; Mooney, Mike (BOC 3); Craigmyle, Kenny; Imber, Philip
Sent:	9/21/2010 7:51:38 AM
Subject:	FW: 168908.14.1000 100920 Mill Creek - Draft Kickoff and Site Visit Meeting Minutes
Attachments:	Mill Creek Kickoff and Site Walkdown Meeting Minutes with Attachments - Draft.pdf

All,

Please see the attached minutes from our B&V meeting and let me know if you have any comments by Thursday so I can respond to Tim by Friday.

Thanks,

Eileen

From: Hillman, Timothy M. [mailto:HillmanTM@bv.com]
Sent: Monday, September 20, 2010 5:09 PM
To: Saunders, Eileen
Cc: 168908 E.ON-AQC; Crabtree, Jonathan D.; Wehrly, M. R.; Lausman, Rick L.; Mahabaleshwarkar, Anand; Hintz, Monty E.; Lucas, Kyle J.
Subject: 168908.14.1000 100920 Mill Creek - Draft Kickoff and Site Visit Meeting Minutes

Eileen,

Please find attached draft meeting minutes from last week's kickoff and Mill Creek site visit. Please provide E.ON's comments back to me by Friday, 9/24.

Best regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

DRAFT

BLACK & VEATCH CORPORATION
CONFERENCE MEMORANDUM

E.ON US	B&V Project 168908
Phase II: Air Quality Control Study	B&V File 14.1000
Project Kick-off and Mill Creek Site Visit	September 20, 2010

A project administrative kick-off meeting and Mill Creek site visit and walk down were held September 14-16th for the Phase II: Air Quality Control Study Project. The administrative kick-off meeting was held at E.ON's Broadway Office Complex in Louisville, while the site visit and walk down were held at the Mill Creek Generating Station.

Recorded by: Tim Hillman

Attending:

Administrative Kick-off Meeting, September 14th.

Eileen Saunders	E.ON
Mike Rooney	E.ON
Mike King	B&V
Tim Hillman	B&V
M.R. Wehrly	B&V
Kyle Lucas	B&V

Mill Creek Kick-off Meeting, September 15th.

Eileen Saunders	E.ON
Mike Rooney	E.ON
Bill Moehrke	E.ON
Kenny Craigmyle	E.ON
Kevin Siers	E.ON
Michael Stevens	E.ON
Jim Nichols	E.ON
Gary Revlett	E.ON
Joe Didelot	E.ON
Scott Straight	E.ON
Mike Kirkland	LG&E
Mike Buckner	LG&E
Alex Betz	LG&E
Tim Hillman	B&V
M.R. Wehrly	B&V
Anand Mahabaleshwarkar	B&V
Kyle Lucas	B&V
Rick Lausman	B&V
Monty Hintz	B&V

The purpose of the meetings was to 1) provide an administrative kick-off of the project, 2) present the project scope and purpose of the project to Mill Creek personnel, and 3) provide for a site visit and walk down of the Mill Creek facility. The above attendance roster reflects those attending the administrative kick-off meeting in Louisville and the initial kick-off meeting at Mill Creek. The meeting agenda and attendance sign-up sheets are attached herein for reference.

DRAFT

MEETING DISCUSSION

Day 1, September 14, 2010

As noted in the agenda, the meetings began at 1 pm on September 14th, with an administrative meeting in the Broadway Office Complex and an initial escorted site walk down at Mill Creek with part of the B&V team. The following is an account of the administrative kick-off meeting.

1. The meeting began with introductions and distribution of the agenda.
2. B&V distributed a copy of the project scope of work contained in the contract and provided a summary of each task along with the associated deliverable.
   - It was noted that a Project Design Memorandum (Task 5) would be developed for each facility.
   - E.ON commented that the Fabric Filter Vendor Workshop scope of work may not start until after the Ghent project has been kicked-off, but likely before the Brown kick-off.
3. B&V reviewed the major milestone schedule contained in the scope of work.
   - The possibility of holding the Mill Creek Task 6, AQC Technology Selection Meeting during the second week of November in B&V offices in Kansas City was discussed. E.ON to review and make recommendation. [Action Item #1]
   - E.ON to determine dates for Ghent kick-off meeting. The milestone schedule tentatively has this schedule for the week of October 4th. [Action Item #2]
4. E.ON requested B&V provide a DVD of the Phase I report. [Action Item #3]
5. B&V distributed a draft copy of the Project Instruction Memorandum (PIM). The communication contacts and project filing system were discussed in some detail.
   - E.ON will investigate setting up a document storage file system to mimic the Documentum system proposed by B&V in the PIM. [Action item #4]
   - B&V to copy Eileen on all correspondence with the plants.
   - Copy Audrey.Jackson@eon-us.com for copy to E.ON file mailbox.
   - B&V will establish and iBackup FTP site to facilitate large file transfer. [Action item #6]
   - E.ON will determine personnel assignments for document review. [Action Item #7]
6. B&V distributed a template of a standard monthly report. E.ON approved of the basic format and data of the monthly report template.
   - In addition to the Summary of Engineering Costs contained in the standard monthly report, E.ON requested a financial engineering cost estimate at the end of each month. Copy Mike Rooney on monthly reports. [Action Item #5]
   - Monthly reports will typically be sent during the second week of the following month.
7. E.ON requested to use the same weekly telephone conference date of Monday, 2 pm EST. B&V will check for conflicts and advise. [Action item #8]

8. B&V distributed an example action item list used during the Phase I work. It was agreed to use the same format for Phase II. The action item list will be divided by facility.
9. E.ON prefers to provide document review comments in a table log format.
10. E.ON is purchasing a trailer for the Mill Creek site that may offer some additional project meeting space.
11. Eileen Saunders provided an alternate contact number for her at Ghent (502-347-4023). B&V to update PIM with contact information. [Action Item #9]
12. B&V distributed a draft data request and inventory of data/information already in B&V's possession. E.ON asked B&V to carefully scrutinize the information request so as to not request information we may already have. B&V to finalize the initial data request and inventory list and submit it to E.ON as soon as possible. [Action item #10]
13. The administrative kick-off meeting concluded at approximately 4:30 pm.

Day 2, September 15, 2010

The second day of kick-off meetings began at 9 am at Mill Creek.

14. Eileen began the meeting with introductions and a brief summary of the project scope.
15. Gary Revlett provided a presentation of the main regulatory drivers influencing the coal-fired fleet. These drivers include the new NOx and SO2 NAAQS standards, Utility MACT for hazardous air pollutants, and the proposed Clean Air Transport Rule (CATR). Gary explained that these current and pending regulations are the drivers for the Phase II work. Gary provided an updated table that can be used as the initial design basis titled "Estimated Limits & Compliance Dates for Future New Air Requirement Mill Creek Station".
16. Scott Straight addressed the meeting stating that the current company strategy does not have E.ON self-compliant (as a fleet) with NOx credits until 2016. E.ON would like to be self-compliant by 2013-2014. Scott asked the group to evaluate the possibility of accelerating the installation of SCRs on Mill Creek Units 1 and 2. This is also being considered at Ghent. (Note: Over the course of the next two days, this scenario was given consideration. A separate email correspondence addressing this issue was prepared and sent to E.ON on September 17, 2010, a copy of which is attached herein.) [Action Item #16]
17. B&V provided a presentation summary of the results of the August 5th and 6th Mill Creek AQC Screen Workshop. The presentation summarized the workshop purpose and attendees, an overview of the current plant basis, AQC technologies and options considered, and recommendations of the workshop. A copy of the workshop presentation summary slides is attached here in for reference.
    - E.ON requested B&V review the pros and cons of the NID system as part of the technology validation task. Action item #11]
18. E.ON advised that Alex Betz would be the Mill Creek plant contact for information requests.
19. E.ON will be contacting Hitachi, BPI, Foster Wheeler, and Alstom, and/or others to evaluate the status of the existing scrubbers and determine the extent they can be

refurbished. E.ON is to lead this effort with support from B&V as requested. [Action item #12] Results of the evaluation will be provided to B&V

20. If the new Unit 4 WFGD and stack requires the relocation of the ammonia storage area, it may be possible to consolidate it with the ammonia storage requirements for the new Unit 1 and 2 SCRs.
21. It may be possible to reuse Unit 4's fans on Unit 3 should the existing fans become superfluous in the new Unit 4 arrangement. It then may be possible to reuse the Unit 3 fans on Unit 1 and/or unit 2.
22. E.ON confirmed there is no "sacred ground" around the existing units, areas reserved for other uses and unavailable for use in the AQCS upgrade. B&V requested if any balance-of-plant upgrades are currently under consideration that should be taken into account in the AQCS work, beyond the plans for an additional ball mill at the limestone prep building.
23. Following lunch, E.ON and B&V personnel continue site walk down activities, concluding at approximately 5:30 pm. Some observations from this walk down are identified below.
    - Unit 4 fabric filter likely to be required to be installed above the Unit 4 scrubber electrical building.
    - Unit 3 would be tied into the current Unit 4 scrubber after the new Unit 4 FGD is built. The old Unit 3 scrubber would be torn down to allow new AQC equipment to be potentially located in that area.
    - Unit 3 and 4 structural steel was generally in good shape for lower areas that could be inspected. Higher areas of Unit 3 & 4 could not be assessed due to the large flue gas leaks in the duct that limited access for personal safety reasons.
    - Duct configuration will be complicated, but appears possible, and will depend on the specific fan arrangement and if new ID fans or booster fans will be used.

Day 3, September 16, 2010

The third and final day of meetings began at 9 am at Mill Creek.

24. B&V summarized the major findings of the walk downs for Eileen and began preparing white board sketches of the preliminary AQC control configurations discussed over the last two days in preparation for a site de-briefing scheduled for the early afternoon.
25. After a break in the morning rain, an additional walk down of Units 1 and 2 was conducted before lunch to review the structural integrity of the Unit 1 and Unit 2 steel for additional AQC equipment.
26. At 1:15 pm, B&V presented de-briefing of the site walk down findings and preliminary AQC control configurations. Two sketches were prepared for the meeting. One illustrated the preliminary AQC configuration options for Units 3 and 4, while the second sketch addressed Units 1 and 2 and the possibility of accelerating the SCR schedule. Pictures of the two white board sketches are attached here in for reference.
    - As a result of the workshop discussions, the potential for locating the Unit 4 fabric filter/NIDs unit and new scrubber, plus a new chimney, to the south of Unit 4 was

considered. The original location for the new scrubber and chimney considered was in the area of the demolished thickener south of the limestone prep building. This location, however, involved crossing the limestone conveyor with relatively high ductwork, plus moving both an overhead Unit 3 and Unit 4 345kV T-line and the ammonia tanks and electrical building to provide necessary working space for new construction.

- Alternately, it was determined that there is likely sufficient space for the new Unit 4 AQCS train directly south of Unit 4, running more or less straight east to west with the new chimney located opposite of the Unit 4 turbine building. This arrangement, if it fits, has the advantage of relatively short ductwork runs, no impact to the overhead T-line, and no impact to the existing ammonia tank farm. It would, however, require relocation of the existing annex building and lab, plus limit construction access to one side of the train. B&V will continue evaluation of this arrangement as first choice for Unit 4, with the thickener area location used as a fall-back alternate.
- Should either of the above arrangements fit, it appeared that it would be advantageous to upgrade the existing Unit 4 scrubber in place and reuse it for Unit 3. The flue gas from Unit 3 would be rerouted to the Unit 4 scrubber in the short term (Phase I) and the Unit 3 scrubber demo'd. A new Unit 3 fabric filter/NIDs unit could be built in its place and tied into the Unit 3 ductwork as Phase II of a two phase construction sequence at Unit 3.
- Both Unit 1 and Unit 2 offer significant challenges in the addition of an SCR as an immediate modification (refer to Sep 17th email, attached herein for reference). The existing ESP at both units is located within a few feet of the boiler structure, leaving insufficient room to route ductwork to a new SCR overhead of the ESP. The ESP would have to be demolished or extensively modified before the SCR could be constructed, resulting in either an extended outage while the ESP is moved or reconstructed or the installation of a separate new ESP in another location prior to installation of the SCR. In addition, area available for new structures for either Units 1 or 2 is very limited, by the narrow alleyway between Units 1 and 3 for Unit 1 and by the new RO facility north of the powerblock at Unit 2. No obvious arrangement for the AQCS upgrades at Units 1 and 2 were immediately noted, and additional investigation will be required.

27. B&V commented on the poor condition of the structural steel at the existing scrubbers, especially at Units 1 and 2. Relatively isolated examples of steel corrosion, most likely due to exposure to flue gas, were noted in the superstructures at the Unit 3 and 4 scrubbers. However, severe corrosion and loss of structural mass was noted in a significant number of areas at Units 1 and 2. The most severe damage noted was in lighter components, such as platform and grating, but instances of chemical attack on the major structural steel members were also noted on Units 1 and 2. E.ON agreed to provide the results of recent studies assessing the structural steel. [Action Item #13]
28. New AQC will likely restrict vehicle and maintenance access in some areas of the facility. E.ON agreed to provide the minimum access dimensions for use in the analysis. [Action Item #14]
29. E.ON noted that the existing Unit 4 AQCS (ESP and scrubber) were powered by the Unit 4 aux power supply. Should the Unit 4 scrubber be reused for Unit 3, an alternate source of aux power for the refurbished equipment must be included. Otherwise, an outage on Unit 4 would result in the loss of AQCS for Unit 3.

30. E.ON noted that no aux power supply greater than 4160V is currently available in the immediate plant area. However, two free 14kV breakers are available in the switchyard as potential sources of medium voltage power for new loads such as fans in the AQCS upgrade. E.ON also noted that B&V Ann Arbor completed a short circuit study for the plant in the 1990's. B&V to review this study. [Action item #15]

31. The meeting concluded at approximately 3 pm.

ACTION ITEMS

#	Description	Responsible	Due Date
1	Determine location for Mill Creek Task 6 Technology Selection meeting during 2nd wk of November	E.ON	10/15/10
2	Determine dates for Ghent kick-off meeting	E.ON	9/23/10
3	Provide DVD copy of Phase I Report	B&V	9/24/10
4	Use B&V file system to set up E.ON document storage	E.ON	TBD
5	Provide engineering cost estimate at end of each month and copy Mike Rooney on monthly reports	B&V	End of Month
6	Create IBackup FTP site for large file transfer	B&V	9/24/10
7	Determine personnel assignments for document review	E.ON	TBD
8	Determine if a Monday, 2 pm EST project conference call time will work for B&V project team	B&V	9/23/10
9	Update PIM with Eileen's Ghent contact information	B&V	9/24/10
10	Prepare data inventory and information request	B&V	9/24/10
11	Evaluate pros and cons of NID system for November technology validation presentation	B&V	Nov 2010
12	Schedule vendors for evaluation of existing scrubbers	E.ON	TBD
13	Provide structural steel study assessments	E.ON	9/24/10
14	Provide minimum access dimension box	E.ON	9/24/10
15	Review B&V electrical study conducted in the 1990s	B&V	9/24/10
16	Evaluate the possibility of accelerating the installation of SCRs on Mill Creek Units 1 and 2	E.ON and B&V	TBD

ATTACHMENTS

- Agenda
- Attendance roster
- B&V email of September 17, 2010 addressing the acceleration of the SCR installation schedule for Mill Creek Units 1 and 2.
- August 5th and 6th Mill Creek AQC Workshop Summary Presentation.
- Pictures of the September 16, 2010 white board sketches from the de-brief meeting.

cc: All Attendees
File

AGENDA

Phase II Air Quality Control Study – Kickoff Meeting and Site Visit
E.ON - Mill Creek Station
September 14 - 16, 2010
Location: E.ON Broadway Office Complex and Mill Creek

Day 1, September 14th, Arrive 1 pm (Broadway Office Complex)

I. Introductions
II. Review Project Scope
III. Review Project Schedule
IV. Review Project Deliverables
V. Project Administration
   a. Communication
   b. File System
   c. Monthly Reports
   d. Weekly Conference Calls/Action Item List
   e. Invoicing
VI. Project Documentation
VII. Information Request

Day 1, September 14th, Arrive 1 pm (Mill Creek)

I. Arrive on Site and Introductions
II. Begin Initial Escorted Site Walk Down

Day 2, September 15th, Arrive 8 am (Mill Creek)

I. Introductions
II. Environmental Drivers Presentation (E.ON – Gary R.)
III. Aug 5-6th AQC Workshop Results Presentation (B&V – Rick L and Anand M.)
IV. Lunch (on site)
V. Continue Escorted Site Walk Down and Data Collection

Day 3, September 16th, Arrive 8 am (Mill Creek)

I. Continue Escorted Site Walk Down and Data Collection
II. Lunch (off site)
III. Site Debriefing Meeting
IV. Depart (no later than 4 pm)

Eon AQC Mill Creek 1pm-4:30p. 9/14/10

Admin Kick-off Meeting

Kyle Lucas	913-458-9062	lucaskj@bv.com
M.R. WEHRLY	913-458-7131	wehrlymr.com
Mike Mooney	502-627-3671	mike.mooney@eon-us.com
Eileen Saunders	502-627-2431	eileen.saunders@eon-us.com
MIKE KING	313 618-8657	kingml@bv.com
Tim Hillman	913-458-7928	hillmantm@bv.com.

EON AQC Mill Creek Plant Kickoff 9/15/10

9am - 11:30

Kyle Lucas	B&V	913-458-9062 lucaskj@bv.com	Asst PM / EON MNG
Rick Lausman	B&V	913 458 7528 LAUSMANRL@BV.COM	AQC Eng
Mike Mooney	EON	mike.mooney@EON-US.com 502-627-3671	Budget Analyst
Bill Moehrke		william.moehrke@EON-US.COM 502-627-6369	PROJECT COORD.
Tim Hillman	B&V	913-458-7928 hillmantm@bv.com	B&V PM
Monty Hintz	B&V	913-458-2464 hintzme@bv.com	B&V civil/struct
M.R. Wehrly	B&V	913 458-7131 wehrlymr@bv.com	B&V Eng. Mgr.
Kevin Siers	EON-US	502-817-3545	Production Leader
Michael Stevens	EON-US	502-933-6518	Production Supv / Comp.
Jim Nichols	EON-US	502-933-6643	Prod Supv.
Mike Buckner	LG&E	502-933-6515	Production Manager
Mike Kirkland	LG&E	502-933-6565	General Manager
Kenny Craigmyle	EON	502-627-6366	Project Coordinator
Eileen Saunders	EON	502-627-2431	MGR, Major Capital Project
Gary Revlett	EON	502-627-4621	MGR, Environmental Affairs
Joe Didelot	EON	502-933-6559	MGR, MAINT. MC
Scott Straight	"	" 627-2701	Director - PE
Alex Betz	LG&E	502-933-6602	Mech. Eng., Mill Creek
Anand Mahabaleshwarkar	B&V	913 4587736	AQC Section Lead

Hillman, Timothy M.

From: Hillman, Timothy M.
Sent: Friday, September 17, 2010 12:01 PM
To: 'Saunders, Eileen'
Cc: Lausman, Rick L.; Lucas, Kyle J.; Mahabaleshwarkar, Anand; Wehrly, M. R.; Hintz, Monty E.
Subject: 168908.14.1000 100917 Mill Creek - Acceleration of MC 1 and 2 SCR Installation

Eileen,

Anand and the rest of the team combined notes in this email to present both a high level and somewhat detailed summary of the issues surrounding Scott's inquiry about accelerating the installation schedule of SCRs at Mill Creek Units 1 and 2. Hopefully this will assist you in the pending management decision process.

Thanks for all you planning and organization this week. I thought the meetings and site walk downs were very helpful and meaningful.

Tim.

Summary

The most direct path of accelerating the installation of SCRs on Units 1 and 2 would be to construct the new SCRs with the existing ESPs in place. Unfortunately, this is hampered by the close proximity of the existing dry ESPs to the boilers. As a result, there is no room to route ductwork to and from the new SCRs. Therefore, any acceleration of Unit 1 and 2's new SCR schedule would likely require the original Phase 1 approach of building a new ESP and/or PJFF/NID *first*, in order that the existing ESP could be demolished to make room for the new SCR and ductwork.

Details and Basis

Available SCR Options for MC 1 & 2:

Option 1. High-dust SCR located above the existing dry ESP
Option 2. High-dust SCR located at new location with new air heater placed directly under the new SCR reactor
Option 3. Tail-end, low-dust SCR located on new ground downstream of existing ESP, with flue gas reheat

Challenges Presented by the Economizer Outlet and the Close Proximity of the Existing Dry ESP:

- For SCR Options 1 and 2, the economizer outlet duct would need to be routed eastwards out of the boiler building through the east boiler building wall to flow the flue gas to the SCR reactor inlet, located either per Option 1 or 2. The arrangement of the existing dry ESP, located to the east and at approximately same elevation as the economizer outlet duct, along with its close proximity to the boiler building wall, are all preventing the routing of new SCR inlet duct towards the east direction. Similarly, due to presence of boiler support steel inside the boiler building, it is nearly impossible to route the ductwork out to either the north or south side.
- Also, for Option 1, the new SCR outlet duct needs to be connected back to the existing air heater, which is located directly underneath the economizer. This creates additional congestion in the same area and presents ductwork support challenges with the current boiler steel. On the other hand, for Option 2, it is possible to install a new air heater underneath the new SCR reactor at another location and connect the flue gas stream to the new dry ESP and/or PJFF/NID. However, the routing of the SCR inlet ductwork out of the boiler building for Option 2 still faces the same challenges as Option 1.
- The tail-end, low-dust SCR (Option 3) will increase the capital and O&M cost due to the need for flue gas reheating and another air heater to maintain the SCR operating temperature. Therefore, Option 3 is not considered feasible in this preliminary review.

Solutions to above challenges:

- For SCR Options 1 and 2, routing of the new SCR ductwork makes the demolition of the existing dry ESPs inevitable.

Therefore, in order to create room for a new SCR, a new dry ESP and/or PJFF/NID system will need to be installed first, while the units are online. Once the new dry ESP and/or PJFF/NID system is installed and operating, the existing dry ESP can be demolished to create room for the new SCR. The ID fan and or booster fan requirements can also be finalized based on the BOP challenges, including aux power availability.

- Option 3 is believed to be capital and O&M cost intensive, and is therefore not considered feasible in this preliminary review.

Regards,

Tim Hillman | Project Manager
Power Generation - Environmental Services
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

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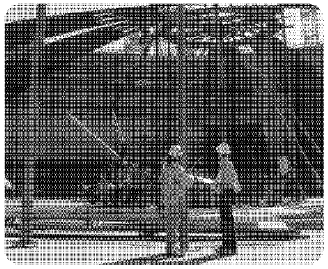
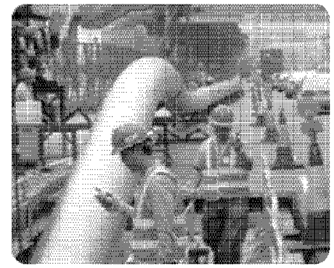
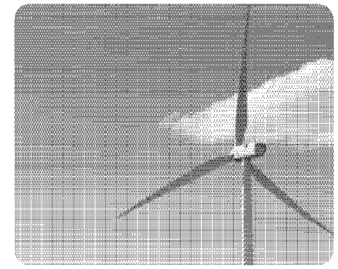


Alternative FGD Technology Workshop Review

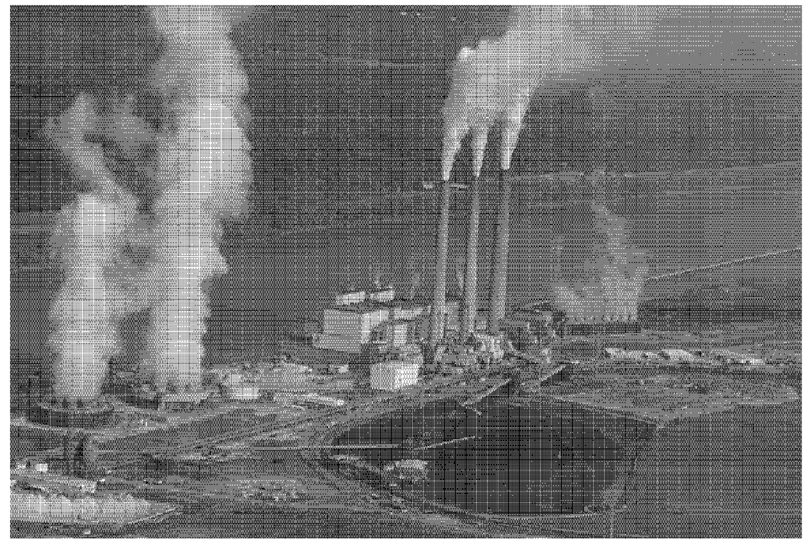
e·on | U.S.

Black & Veatch

September 2010

Agenda

- Drivers
- Overview workshop
- Current plant basis
- Technologies and options discussed
- Recommendations of workshop



Regulatory drivers – still uncertainty

Program Name	Regulated Pollutants	Forecasted Date for Compliance
BART	SAM (MC3 Only)	Within 6 months of final Title V
1-hour NAAQS for NO_x	NO_x	2015 -2017
1-hour NAAQS for SO_2	SO_2	2016
Clean Air Transport Rule	NO_x SO_2	Beginning in 2012 Phase in 2014
New EGU MACT	Mercury Acids (HCl) Metals (PM) Metals (AS) Organics (CO) Dioxin/Furan	Estimated January, 2015; with 1-yr extension - January, 2016

Workshop attendees

E.ON US

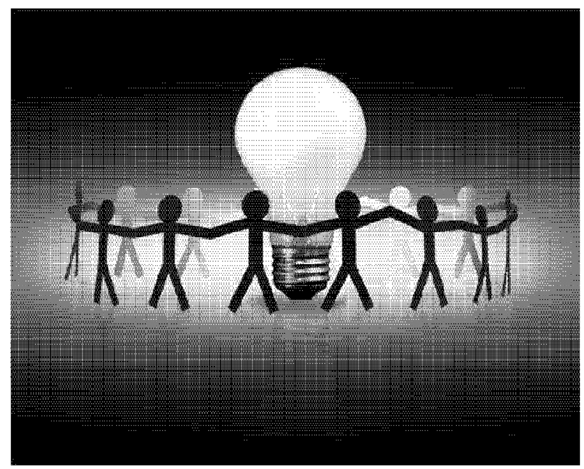
- Scott Straight — Dir. Proj. Engineering
- Phillip Imber — Sr. Chem. Engineer
- Ronald Gregory — Mgr Major Projects
- Gary Revlett — Mgr Air Section & Environmental Affairs
- Mike Kirkland — Mill Creek Plant Manager

Black & Veatch

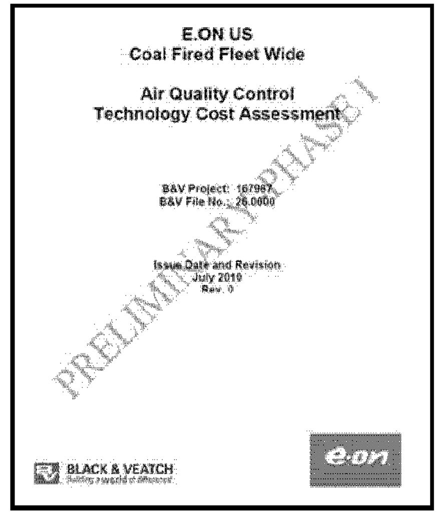
- Tim Hillman — Project Manager
- Mike Ballard — Construction
- Anand Mahabaleshwarkar — AQCS
- Rick Lausman — AQCS

Workshop purpose

- Review Phase 1 B&V evaluation
- Review current plant constraints
- Brainstorm potential for lower cost yet effective alternatives



Phase 1 B&V evaluation


E.ON US
Coal Fired Fleet Wide

Air Quality Control
Technology Cost Assessment

B&V Project: 167987
B&V File No.: 26.0000

Issue Date and Revision
July 2010
Rev. 0

PRELIMINARY PHASE I

BLACK & VEATCH

e.on

- Fleet wide review
- Screen technologies
- Conceptual design
- Limited time constraints
- New wet FGD and fabric filters for each Mill Creek unit

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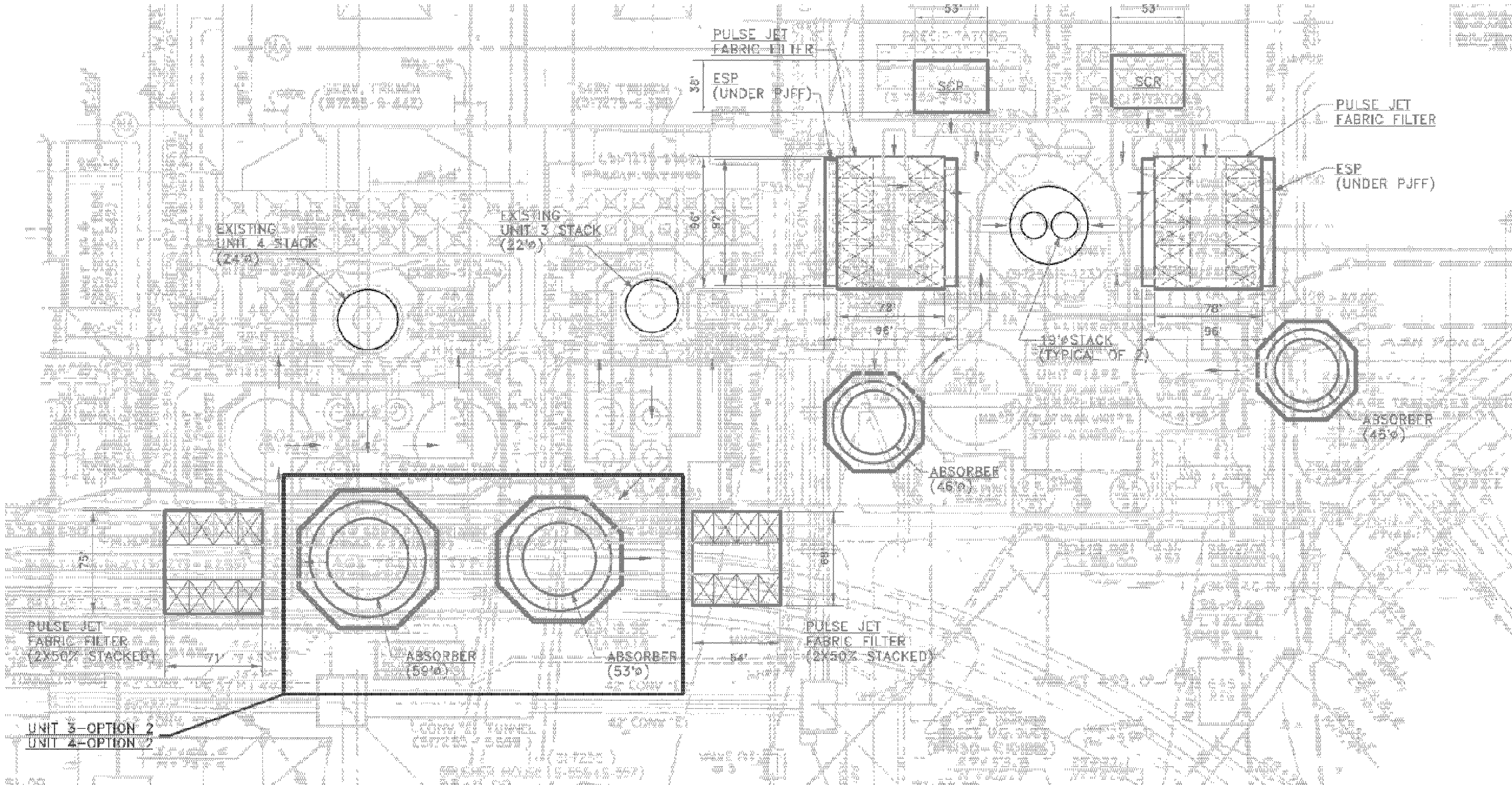
Mill Creek phase 1 potential layout - example



September 2010

Current conditions and future targets

Unit	MW	Current Emissions lb/MBtu	Current Removal %	Future Removal %
1	330	0.48	92	96
2	330	0.48	92	96
3	425	0.36	86	96
4	525	0.12	92	98
Plant	1610	0.36		
Plant	Targets	0.25 lb/MBtu		96%

Uncontrolled SO2 Emissions 6.2 lb/MBtu

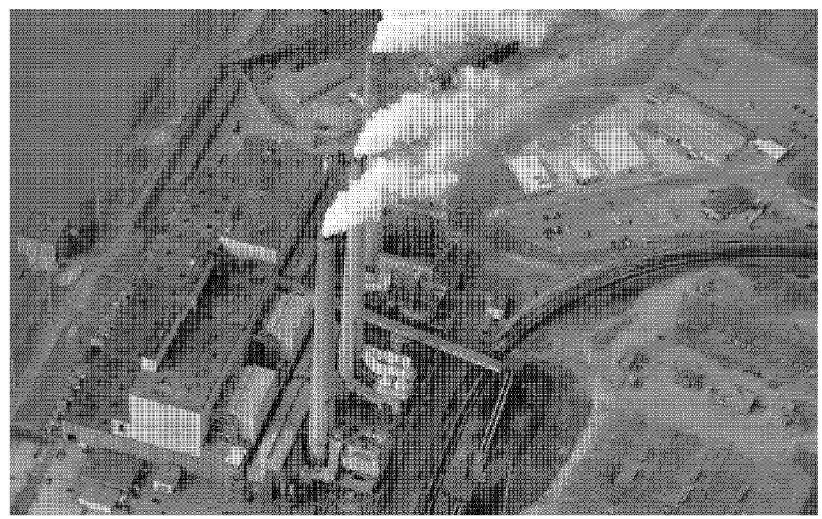
HAPS Issues

- E.ON.US emissions tests are just being finished
- Hg controls are expected for MC units
- Acid gases are likely acceptable
- Uncertainty if plant-wide averaging for Hg will be available
- Speciated metal emissions are also low at MC units

Hg

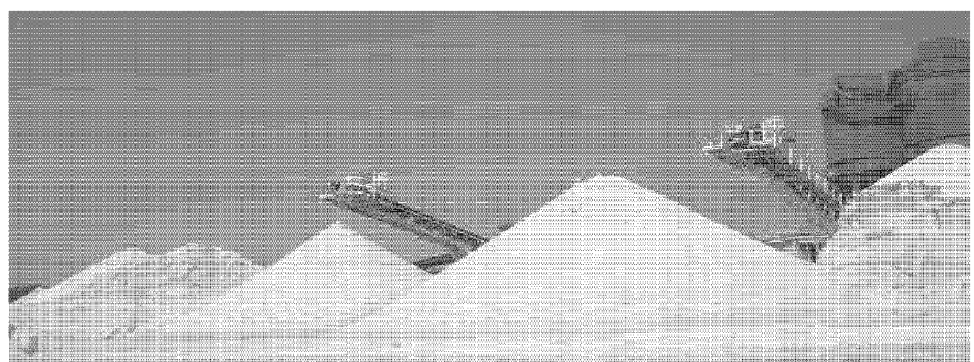
Site specific criteria

- Existing wet FGD
- Condition of FGD and structural steel
- Dewatering system and material handling in place
- Limestone grinding issues
- High sulfur fuel
- Fly ash sale requirement
- Mercury control
- Available space
- ....Other ....



Byproduct Issues

- Mill Creek needs to be able to sell ash due to landfill limitations
- Water emission issues and future limitations may be an issue
- Wastewater stream is currently going to ash ponds



Current FGD conditions

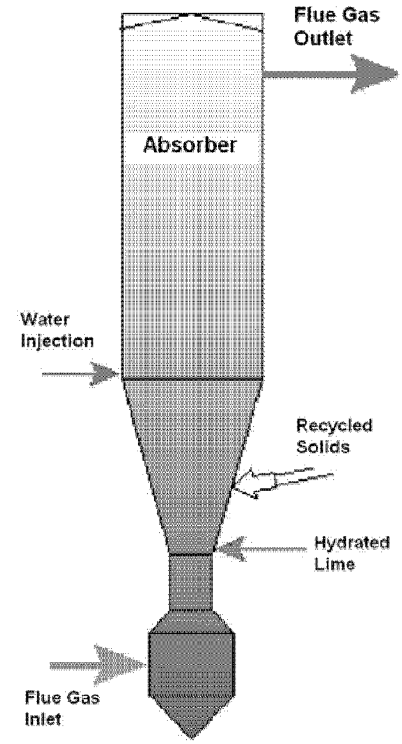
- All scrubbers are basically in a constant rebuilding mode
- Scrubbers are good for another 20 years structurally speaking
- MC1 and MC2 had trays added in 2002 which are now wearing thin
- Top of modules need to be placed
- MC1 and MC2 all duct work has been replaced that wasn't replaced during the wet stack conversion
- Pumps conditions are acceptable with some on MC 1 and MC2 previously replaced

Current FGD conditions - continued

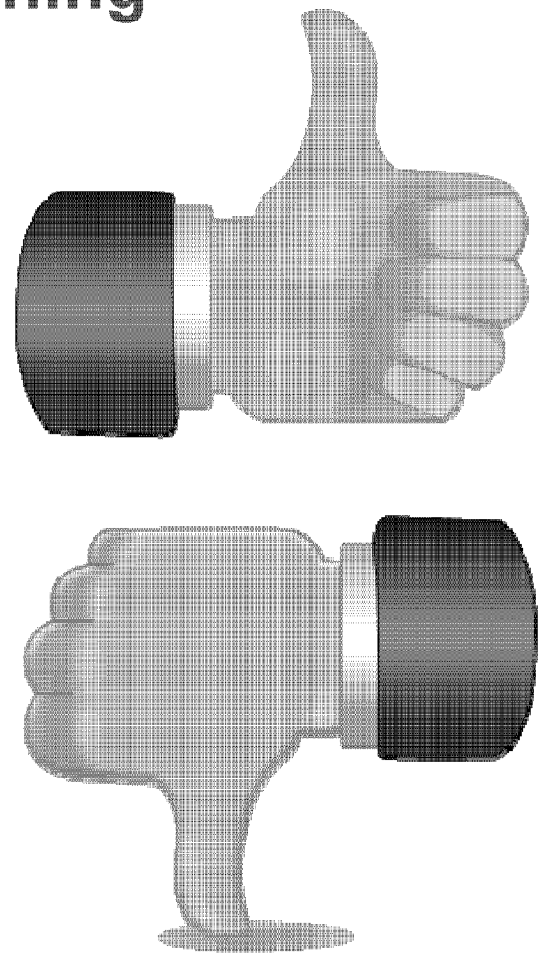
- MC3 and MC4 FGD had trays added in 2000
- MC4 top of modules and duct work needs to be replaced
- MC4 contact trays need replacement
- MC3 scrubber structure is good, although mixing is poor
- MC3 has underground reaction tanks and recycle pumps which cause maintenance and reliability issues.

Technology review

- Semi-dry FGD
  - Provides acid gas control (SO_3)
  - Limits waste water production
  - High sulfur fuel is an issue
  - Reagent costs
  - Different technologies provide different advantages - NIDS vs CDS



Factors for upgrading or abandoning existing FGD



- Expected life of unit
- Improvement level required
- Condition of existing FGD
- Space considerations
- Cost comparison to new FGD
- Technical or physical limitations
- Orphaned components

Preliminary workshop results

- Build a new WFGD for MC4
- Upgrade MC4's existing WFGD and use it for MC3
- Upgrade MC1 and MC2's existing WFGDs
- Add fabric filters to all four units
- Add PAC for Hg control
- Add duct injection systems for SO_3 control.
- As an alternative to the fabric filter, add NID system

Workshop results

Planned Future

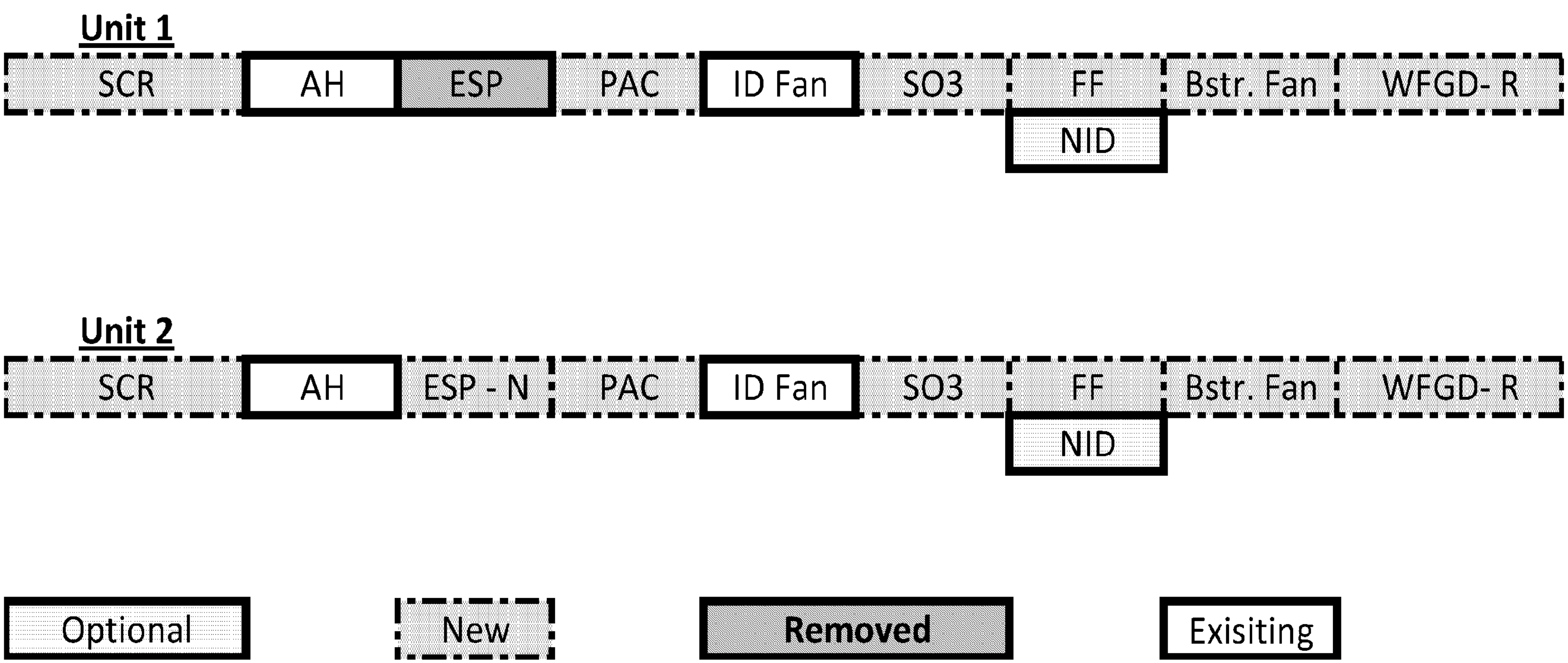
Unit No.	Technology	Schedule Priority
1	FGD upgrade	1
2	FGD upgrade	4
3	Unit 4 FGD with modification	3
4	New FGD	2

Workshop results

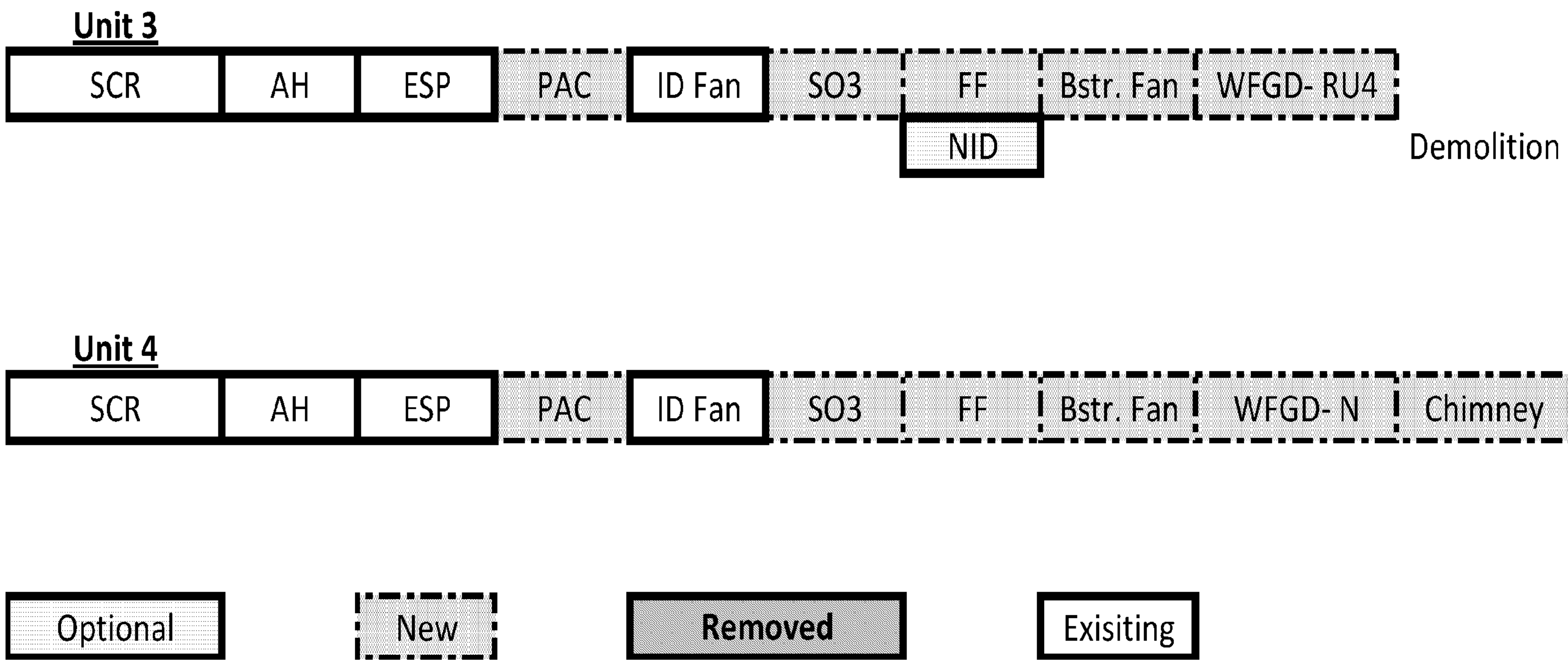
Preliminary Schedule

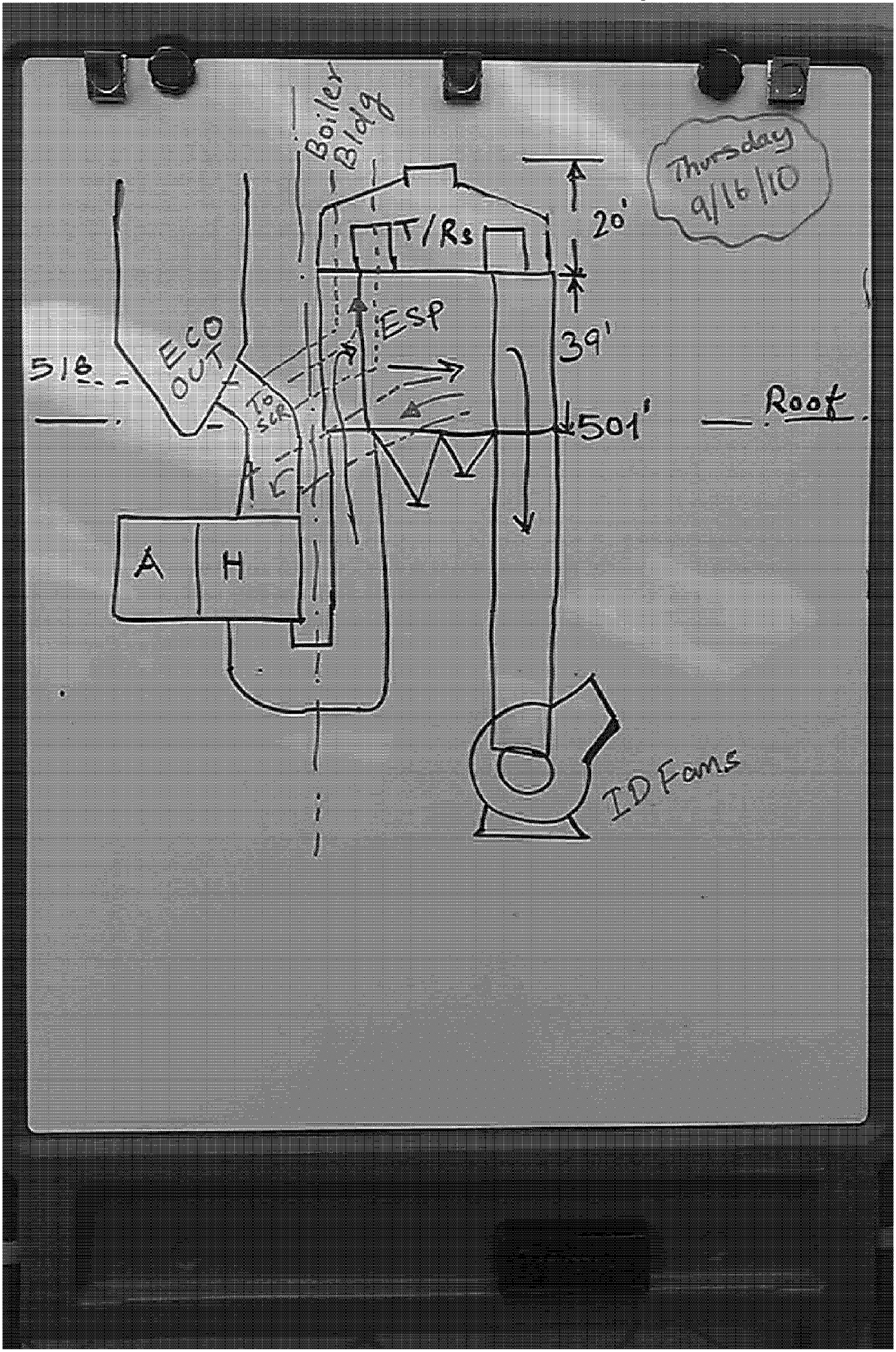
Unit	FGD	FF	SCR	Fans	Chimney	FF Location
1	2012	2014	2016	2014	Existing	In road
2	2013 or 4th - 2013	2013	2015	2013	Existing	To open area north
3	1st Qtr 2014	Apr 2015		2015	Existing	Road with fans in Unit 3 FGD area
4	4th - 2013	4th - 2013	Relocate NH3	2013	Likely New	South side of plant

Proposed equipment lineups- Unit 1 & 2



Proposed equipment lineups- Unit 3 & 4




Boiler Bldg
Thursday 9/16/10
T/Rs
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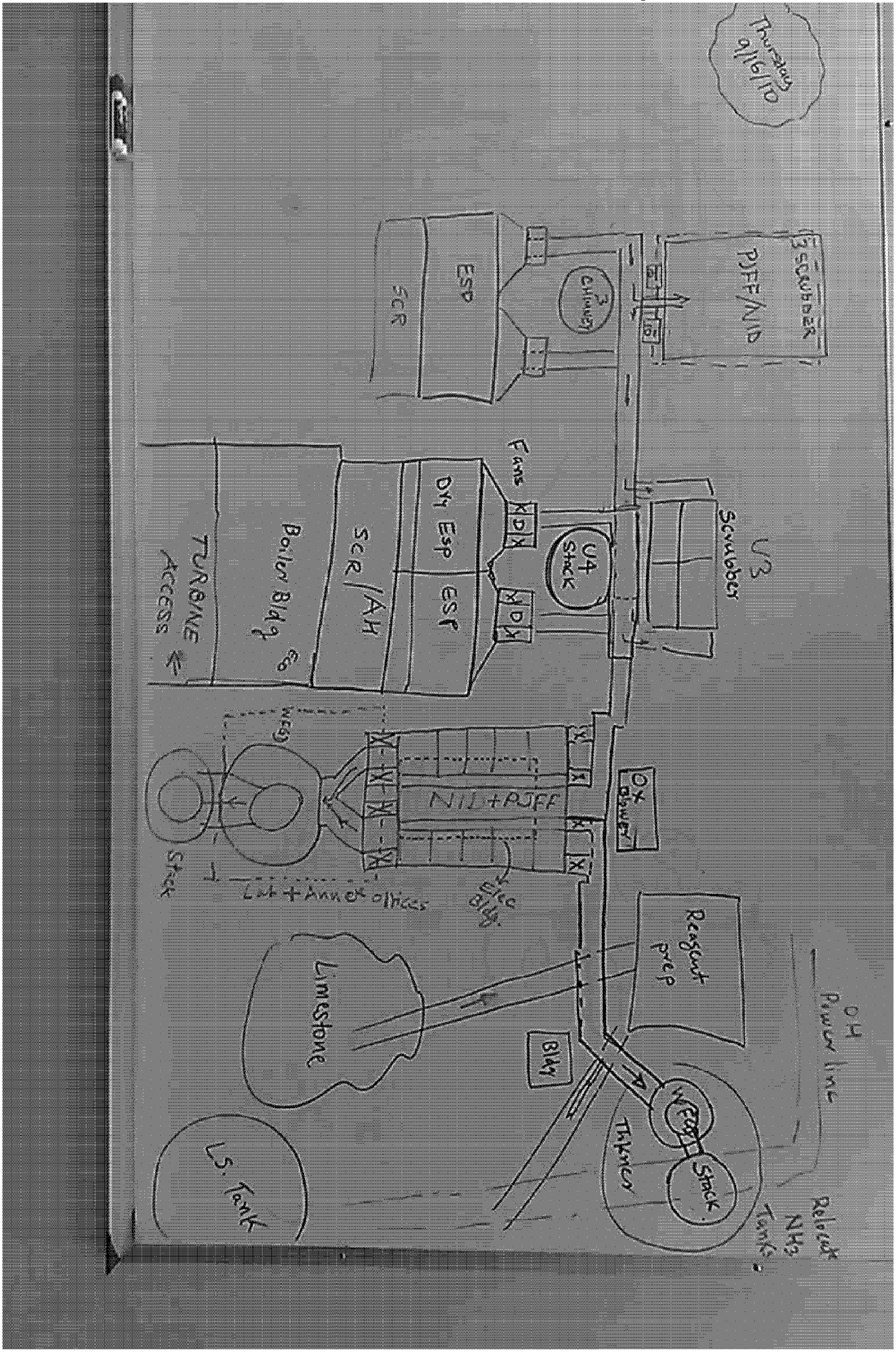
Thursday 9/16/10
3 Scrubber
PJFF/NID
3 Chimney
ESP
SCR
Fans
Dry ESP
ESP
SCR/AH
Boiler Bldg
TURBINE ACCESS
U4 Stack
U3 Scrubber
NID+PJFF
Ox blower
WESP
Stack
Lab + Annex offices
Elec Bldg.
Reagent prep
Limestone
Bldg
OH Power line
WFGD
Stack
Thickener
Relocate NH3 Tanks
L.S. Tank

From:	Eileen Saunders
To:	saundersfam4@gmail.com; Saunders, Eileen
Sent:	8/15/2010 2:43:00 PM
Subject:	EON US Comments-6-23-10 (rev 1).xlsx
Attachments:	EON US Comments-6-23-10 (rev 1).xlsx

ENVIRONMENTAL COMPLIANCE AQCS PROJECT

e·on U.S.

Due Date:

Description:

Item No	ent reference or s	By	Comment Dat	EON US Comments	Black and Veatch Response	Response Date
1	3.3.1.1	ELS	6/23/2010	Contingencies are placed per technology versus per Unit. Are the contingencies different per technology?		
2	3.2.2.2	ELS		Does the additional fan power that was estimated represent general industry standards when preparing this type of estimate?		
3	4.6	TH/TT		Units 1 and 2 were decommissioned in 2003.		
4	4.6.1	TH/TT		Green River Units 1 & 2 were placed in service in 1948 and have been retired in place since 2003.		
5	4.6.6	ELS		Spacing issue in the last sentence.		
6	Appendix E	ELS		Trimble County indicated that they would prefer to eliminate the use of booster fans and enhance their current fans. The booster fans are included in their co		
7	Appendix G	ELS		Please correct the Mill Creek Arrangement Drawings.		
8	Appendix G	ELS		Can B&V provided a drawing that shows a location for a combined PJFF?		
9	Appendix G	ELS		Since the Ghent PJFF will potentially be in the same area, would a combined PJFF be applicable for those units?		
10	Appendix H	ELS		General- The demolition costs are very confusing and seem extraordinarily high. Please explain the types of costs that were included for this item (i.e. remova		
11	Appenix H	ELS		Please verify that all Units have Demolition Costs as some were missing (i.e. Cane Run)		
12	Appendix H	ELS		For the Ghent 2 SCR's, there were no AH modifications listed. Where did B&V capture basket modifications (i.e. enamel). What is driving the MC AH modifi		
13	Appendix H	ELS		Please explain the process for estimating the construction difficulty costs.		
14	Appendix I	ELS		General- Please work for consistency in describing the tie-ins. Some sheets say what the outage is for and others do not.		
15	Appendix I	ELS		For Ghent 2, please explain the By-Pass and End Caps comment in year 2.		
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13	st estimate. Please explain the rationale of leaving them in and explain if there were other suggestions asked by the plant that were not included. Lastly, there were several corrections submitted with the Technology Optio																		
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17	l only). This is a critical clarification as E.ON has to show removal costs differently in our financial reports. Example, Ghent Unit 2 has demolition cost of $6m for PJFF and $9m for Ghent 2 SCR. We can't understand h																		
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19	cations cost? In general, please clarify the AH modifications or lack thereof for the units.																		
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13	ns. Those items should be corrected in the final report (see Ghent as an example).												
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17	ow B&V came up with those costs. There was more removal of ductwork in other areas on the plant site that did not cost this much. Please clarify.												
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From:	Conroy, Robert
To:	Thompson, Paul; Voyles, John
CC:	Bellar, Lonnie
Sent:	8/25/2010 8:21:12 AM
Subject:	Unit life Q/A from ECR
Attachments:	2009 ECR Filing PSC 1-4.docx; 2009 ECR Filing PSC 2-1.docx

Paul/John,

Attached are the two questions from the KPSC in the 2009 ECR Plan proceeding related to the remaining life of Brown. In the supplemental response (PSC 2-1) we did not specifically reference "Group 1" or "Group 2" units, however, the concept of greater than 20 years (Group 1) and greater than 10 years (Group 2) remaining life is explained.

Robert M. Conroy
Director, Rates
E.ON U.S. Services Inc.
(502) 627-3324 (phone)
(502) 627-3213 (fax)
(502) 741-4322 (mobile)
robert.conroy@eon-us.com

KENTUCKY UTILITIES COMPANY

Response to Initial Data Request of Commission Staff
Dated August 19, 2009

Case No. 2009-00197

Question No. 4

Witness: John N. Voyles, Jr.

Q-4. Refer to pages 22--23 of the Direct Testimony of John N. Voyles, Jr. ("Voyles Testimony") regarding the Brown Station Ash Treatment Basin Expansion (Project 29).

a. On pages 22-23, Mr. Voyles refers to increasing the elevation of the auxiliary pond to 900 feet, an elevation at which it "is projected to contain sufficient capacity for bottom ash storage for approximately 30 years." Does KU believe it needs such capacity for 30 years at the Brown Station? Explain the response.

b. On page 23, Mr. Voyles discusses the reports prepared by Fuller, Mossbarger, Scott, and May ("FMSM''). Describe, generally, the process under which FMSM was selected to perform the analysis of the storage needs at Brown.

A-4. a. Yes. The Brown station is a base-load generating station required to meet the needs of customers. The Auxiliary Pond was initially constructed to 880' and will be used to store all CCP from the station while the main pond's initial phases are being constructed. This temporary use of the auxiliary pond will use the majority of the constructed capacity. The auxiliary pond is now being elevated to 900' and will be used for long term bottom ash storage only. Based on 2005 CCP production data for bottom ash, the original design life of the Auxiliary Pond was 20 years; changes in actual CCP production rates cause the projected life to vary and the projection is now 30 years, for bottom ash storage only. If the auxiliary pond were to be used for all ash storage, then the projected design life would be less than three years.

The incremental increase in elevation from 880' to 900' is, in the Company's best engineering judgment, the increase that maximizes the value of the proposed construction expense being incurred and minimizes overall costs to its customers. Additionally, the design for the Auxiliary Pond will use the gypsum produced by the FGD currently under construction as fill material in the increased impoundment elevation. If the Auxiliary Pond were being elevated to a lower height than is planned, KU would have to utilize some of the capacity of the auxiliary pond to store the gypsum not used in the auxiliary pond extension, thereby reducing the projected life of the pond.

Further, KU is utilizing the phased approach to construction of the main pond expansion in order to enhance its ability to flexibly respond to unanticipated circumstances. Should the expected utilization of the Brown station change significantly, planned increases in the vertical elevation of the main pond could be optimized or eliminated and the ash/gypsum transfer system modified to use remaining capacity in both the main pond, or in the event of a station shutdown, the auxiliary pond

b. The analysis of the storage needs at E.W. Brown was competitively bid to local and national Civil and Geotechnical Engineering firms with experience in developing CCP storage facilities in 2005. Companies included in the competitive RFP process were MACTEC, Burns & McDonnell, and Stantec (formerly FMSM). See also the response to Question No. 24.

KENTUCKY UTILITIES COMPANY

Response to Second Data Request of Commission Staff
Dated September 11, 2009

Case No. 2009-00197

Question No. 1

Witness: Charles R. Schram

Q-1. Refer to the response to Item 4.a. of the Commission Staffs First Data Request ("Staffs First Request"). The question was intended to focus on whether KU anticipates that the Brown Station will continue in service for 30 years into the future. With the ages of the units being 38, 46, and 52 years, describe KU's expectations for their expected service lives.

A-1. As stated in the 2008 IRP (Volume III, Optimal Expansion Plan Analysis, pg 13-14) no additional retirements are currently planned; and the continued operation of the Brown units remains part of the current least-cost supply plan. Consistent with its IRP requirements, the Company will continue to conduct retirement sensitivities in the determination of its optimal supply-side expansion plan.

KU believes that continuing a prudent level of ongoing maintenance and investment at Brown will ensure the ongoing reliable operation of the units and minimize the potential for a significant mechanical failure.

With respect to Brown Unit 3, KU will maintain the unit in such a way as to ensure, year over year, a minimum 20-year remaining useful life is expected. In other words, for each year KU operates and maintains Brown Unit 3, KU expects to have at least a 20-year remaining useful life commencing in that year. KU has made and plans to make significant investment in FGD and SCR equipment for the continued operation of the unit.

With respect to Brown Units 1 and 2, KU expects the units to have, year over year, a minimum of 10-years remaining useful life. Prudent investments will continue to be made to ensure operation of these units into the future. KU has made significant investment in FGD technology to meet expectations of continued operation of these units. However, changes in environmental laws and regulations or catastrophic failures could alter future operation of this vintage of units.

From:	Jackson, Audrey
To:	Saunders, Eileen
Sent:	6/23/2010 3:56:25 PM
Subject:	Document Comment Blank (2).xlsx
Attachments:	Document Comment Blank (2) (2) (2) (2).xlsx

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From:	Shedrick Saunders
To:	Saunders, Eileen; Shedrick Saunders
Sent:	6/23/2010 7:55:58 PM
Subject:	E.ON Comments
Attachments:	EON US Comments-6-23-10 (rev 1).xlsx

<META HTTP-EQUIV="Content-Type" CONTENT="text/html; charset=us-ascii">
Comment for B&V

ENVIRONMENTAL COMPLIANCE AQCS PROJECT

e·on U.S.

Due Date:

Description:

Item No	ent reference or s	By	Comment Dat	EON US Comments	Black and Veatch Response	Response Date
1	3.3.1.1	ELS	6/23/2010	Contingencies are placed per technology versus per Unit. Are the contingencies different per technology?		
2	3.2.2.2	ELS		Does the additional fan power that was estimated represent general industry standards when preparing this type of estimate?		
3	4.6	TH/TT		Units 1 and 2 were decommissioned in 2003.		
4	4.6.1	TH/TT		Green River Units 1 & 2 were placed in service in 1948 and have been retired in place since 2003.		
5	4.6.6	ELS		Spacing issue in the last sentence.		
6	Appendix E	ELS		Trimble County indicated that they would prefer to eliminate the use of booster fans and enhance their current fans. The booster fans are included in their co		
7	Appendix G	ELS		Please correct the Mill Creek Arrangement Drawings.		
8	Appendix G	ELS		Can B&V provided a drawing that shows a location for a combined PJFF?		
9	Appendix G	ELS		Since the Ghent PJFF will potentially be in the same area, would a combined PJFF be applicable for those units?		
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11	Appenix H	ELS		Please verify that all Units have Demolition Costs as some were missing (i.e. Cane Run)		
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From:	Saunders, Eileen
To:	'Hillman, Timothy M.'
CC:	Straight, Scott; Lucas, Kyle J.; Mahabaleshwarkar, Anand
Sent:	6/24/2010 8:09:14 AM
Subject:	EON US Comments-6-23-10 (rev 1) (2).xlsx
Attachments:	EON US Comments-6-23-10 (rev 1) (2).xlsx

Tim,

Enclosed, please find the first round of comments regarding the AQCS report. If I receive additional comments throughout the week, I will send them on to you. However, you requested a response by June 24, 2010 and I wanted to send you what I had up to this point.

I will be in meetings throughout the day but feel free to email me as I will have my Blackberry with me.

Thank you,

Eileen

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22	15	Appendix I	ELS		For Ghent 2, please explain the By-Pass and End Caps comment in year 2.						
23	16	General	ELS		Please consider the comments regarding the MC arrangements and other scenarios we discussed during our June 21, 2010 conference call part of our respo						
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From: Wilson, Stuart
To: Garrett, Chris
CC: Schram, Chuck; Karavayev, Louanne
Sent: 6/25/2010 11:45:11 AM
Subject: FW: Status

Another update (seem email below from Eileen)...

Lou Anne is ready to drop the new numbers into the summary form as soon as we get them.

Stuart

From: Saunders, Eileen
Sent: Friday, June 25, 2010 11:26 AM
To: Wilson, Stuart
Subject: FW: Status

Stuart,

Here is an update from B&V confirming that I will receive something today. I don't expect to receive it before close of business but they have surprised me and sent deliverables early before so maybe that will be the case today!

Just wanted to keep you informed.

Thanks,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Friday, June 25, 2010 9:15 AM
To: Saunders, Eileen
Cc: Hillman, Timothy M.
Subject: RE: Status

Eileen,
Yes, I believe we'll be able to send you the draft cost summary later today for the two scenarios at Mill Creek.

Regards,
Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

From: Saunders, Eileen [mailto:Eileen.Saunders@eon-us.com]
Sent: Friday, June 25, 2010 7:36 AM
To: Lucas, Kyle J.
Subject: Status

Kyle,

Are we still on track to receive the new scenarios/numbers for Mill Creek today? The generation planning folks asked me this morning so I figured I would just check in with you.

Thanks,

Eileen

From: Lucas, Kyle J.
To: Saunders, Eileen
CC: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent: 6/25/2010 1:43:05 PM
Subject: 167987.26.0000 100625-New AQC Scenarios at MC
Attachments: Draft Mill Creek Costs - Option 1&2 062510.pdf

Eileen,
Attached please find the draft cost summary for the following two Mill Creek scenarios for the WFGD options. The detailed cost and subsequent support information will be included within the report document.

1. Modification of Mill Creek 3 and 4 scrubbers from a 2-50% module configuration to a single 100% module configuration each. The scenario will not consider potential space limitations as a fatal flaw due to the rail/road access and will also not include the costs for moving the rail.

2. Modification of Mill Creek 1 and 2 scrubbers from two single separate modules to a one single combined larger scrubber module located near the roadway. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report but merge into the single scrubber then back to the existing stack.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

From: Saunders, Eileen [mailto:Eileen.Saunders@eon-us.com]
Sent: Monday, June 21, 2010 4:07 PM
To: Lucas, Kyle J.
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand; Straight, Scott
Subject: RE: 167987.10.0100 100621-New AQC Scenarios

Kyle,

After the call, Scott and I reviewed the S&L report from 1999 and discovered that the ESP's were moved to the side not the SCRs. Therefore, Scott said it didn't make sense for me to forward those drawings on to you. You do not need to relocate the SCRs.

Your other assumptions are correct. Please proceed.

Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Monday, June 21, 2010 4:20 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.10.0100 100621-New AQC Scenarios

Eileen,
From our conference call today, EON requested additional AQC scenarios be reviewed and costs developed beyond those scenarios assumed in the draft AQC study. The scenarios requested include the following:

Modification of Mill Creek 3 and 4 scrubbers from a 2-50% module configuration to a single 100% module configuration each. The scenario will not consider potential space limitations as a fatal flaw due to the rail/road access and will also not include the costs for moving the rail. This scenario will be looked at separately as an additional AQC option for Units 3 and 4.

Also, we reviewed the original scenario data and found that this scenario was only partially completed before it was modified to the 2-50% module configuration. Thus, B&V can revisit and provide the draft costs data by Friday 6/25 COB with approval today.

Modification of Mill Creek 1 and 2 scrubbers from two single separate modules to a one single combined larger scrubber module located near the roadway or off to the side of unit. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report but merge into the single scrubber then back to the existing stack. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

B&V can provide the draft costs data by Friday 6/25 COB with approval today.

Move Mill Creek 1 and 2 SCRs to the location on the side of the units as described in the S&L report from 1999 which will be provided by EON. It is assumed that the "approved" AQC technology as presented in the draft report will remain and the only change is the movement of the SCR location. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

Remove Mill Creek 1 and 2 dry ESPs and only use the proposed PJFFs. It is assumed that the "approved" AQC technology as presented in the draft report will remain and the only change is the removal of the dry ESP and associated repositioning of the PJFF (elevated) and duct work. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

Modification of Brown 1 and 2 PJFF from two single separate PJFF to a one single combined PJFF. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report (note that Unit 1 is has LNB and OFA for NOx control) but merge into the single PJFF and then to the combined scrubber and stack. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

·ase review the aforementioned scenarios provide an e-mail authorization for us to proceed with developing the cost information for each scenario. If needed, please modify the scenarios to clarify specific requirements. It is our understanding that the same level of detail for each scenario as presented within the draft AQC report will be provided for these scenarios. Upon receipt of your authorization and clarification of the scenarios, B&V will transmit the technology selection sheets for the updated scenario(s) for EON's review and approval along with a man-hour estimate and schedule for completion.

·ase feel free to contact me with any questions.

gards,
le

Kyle Lucas | Environmental Permitting Manager
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Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

E.ON Mill Creek Draft Costs 6/25/2010

New AQCS Cost Estimates

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Combined Units 1 & 2 WFGD	$509,000,000	$771	$24,301,000	$86,246,000
Combined Units 3 WFGD	$335,000,000	$792	$17,199,000	$57,969,000
Combined Units 4 WFGD	$390,000,000	$743	$19,826,000	$67,289,000

Savings in Cost

AQC Equipment	Capital Cost (CC)	% Savings (CC)	O&M Cost	Levelized Annual Costs
Combined Units 1 & 2 WFGD	$85,000,000	14.31%	$4,644,000	$14,989,000
Combined Units 3 WFGD	$57,000,000	14.54%	$1,712,000	$8,648,000
Combined Units 4 WFGD	$65,000,000	14.29%	$1,949,000	$9,860,000
Total Savings	$207,000,000	--	$8,305,000	$33,497,000

DRAFT

From: Saunders, Eileen
To: Straight, Scott
Sent: 6/25/2010 2:15:49 PM
Subject: FW: 167987.26.0000 100625-New AQC Scenarios at MC
Attachments: Draft Mill Creek Costs - Option 1&2 062510.pdf

Scott,

Are you somewhere that I can call you?

Thanks,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Friday, June 25, 2010 1:43 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100625-New AQC Scenarios at MC

Eileen,
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Email: **lucaskj@bv.com**

From: Saunders, Eileen [mailto:Eileen.Saunders@eon-us.com]
Sent: Monday, June 21, 2010 4:07 PM
To: Lucas, Kyle J.

Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand; Straight, Scott
Subject: RE: 167987.10.0100 100621-New AQC Scenarios

Kyle,

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From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Monday, June 21, 2010 4:20 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.10.0100 100621-New AQC Scenarios

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Modification of Mill Creek 1 and 2 scrubbers from two single separate modules to a one single combined larger scrubber module located near the roadway <u>or</u> off to the side of unit. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report but merge into the single scrubber then back to the existing stack. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

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Savings in Cost

AQC Equipment	Capital Cost (CC)	% Savings (CC)	O&M Cost	Levelized Annual Costs
Combined Units 1 & 2 WFGD	$85,000,000	14.31%	$4,644,000	$14,989,000
Combined Units 3 WFGD	$57,000,000	14.54%	$1,712,000	$8,648,000
Combined Units 4 WFGD	$65,000,000	14.29%	$1,949,000	$9,860,000
Total Savings	$207,000,000	--	$8,305,000	$33,497,000

DRAFT

From:	Karavayev, Louanne
To:	Schram, Chuck
CC:	Wilson, Stuart
Sent:	6/25/2010 4:46:12 PM
Subject:	$/kW cost for FGD, SCR, SNCR
Attachments:	Environmental Summay (rev5 6-3-10).xlsx

Chuck,
From the B&V estimates, the FGD cost is approximately $900/kW on average, and the SCR cost is approximately $350/kW on average. The SNCR cost from our scenario planning analysis was approximately $80/kW on average. The B&V estimates are attached.

Lou Anne Karavayev
E.ON U.S.
Generation Planning
p (502) 627-2563
f (502) 217-4969
e LouAnne.Karavayev@EON-US.com

	A	B	C	D	E	F	G	H
1	Black & Veatch Study Cost Estimates							
2	$ in thousands							
3								
4								
5			**Capital Cost**		**O&M Cost**		**Levelized Annual Costs**	
6	**BROWN**							
7	Brown 1 - Low NOx Burners		$1,156		$0		$141	
8	Brown 1 - Baghouse		$40,000		$1,477		$6,345	
9	Brown 1 - PAC Injection		$1,599		$614		$809	
10	Brown 1 - Neural Networks		$500		$50		$111	
11	Brown 1 - Overfire Air		$767		$132		$225	
12	Total Brown 1		**$44,022**		**$2,273**		**$7,631**	
13								
14	Brown 2 - SCR		$92,000		$3,278		$14,474	
15	Brown 2 - Baghouse		$51,000		$1,959		$8,166	
16	Brown 2 - PAC Injection		$2,476		$1,090		$1,391	
17	Brown 2 - Neural Networks		$500		$50		$111	
18	Brown 2 - Lime Injection		$2,739		$1,155		$1,488	
19	Total Brown 2		**$148,715**		**$7,532**		**$25,630**	
20								
21	Brown 3 - Baghouse		$61,000		$3,321		$10,745	
22	Brown 3 - PAC Injection		$5,426		$2,330		$2,990	
23	Brown 3 - Neural Networks		$1,000		$100		$222	
24	Total Brown 3		**$67,426**		**$5,751**		**$13,957**	
25								
26	**Total Brown**		**$260,163**		**$15,556**		**$47,218**	
27								
28								
29	**GHENT**							
30	Ghent 1 - Baghouse		$131,000		$5,888		$21,831	
31	Ghent 1 - PAC Injection		$6,380		$4,208		$4,984	
32	Ghent 1 - Neural Networks		$1,000		$100		$222	
33	Total Ghent 1		**$138,380**		**$10,196**		**$27,037**	
34								
35	Ghent 2 - SCR		$227,000		$7,078		$34,704	
36	Ghent 2 - Baghouse		$120,000		$5,002		$19,606	
37	Ghent 2 - PAC Injection		$6,109		$2,880		$3,623	
38	Ghent 2 - Lime Injection		$5,483		$2,775		$3,442	
39	Ghent 2 - Neural Networks		$1,000		$100		$222	
40	Total Ghent 2		**$359,592**		**$17,835**		**$61,597**	
41								
42	Ghent 3 - Baghouse		$138,000		$6,122		$22,917	
43	Ghent 3 - PAC Injection		$6,173		$4,134		$4,885	
44	Ghent 3 - Neural Networks		$1,000		$100		$222	
45	Total Ghent 3		**$145,173**		**$10,356**		**$28,024**	
46								

	A	B	C	D	E	F	G	H
47	Ghent 4 - Baghouse		$117,000		$5,363		$19,602	
48	Ghent 4 - PAC Injection		$6,210		$3,896		$4,652	
49	Ghent 4 - Neural Networks		$1,000		$100		$222	
50	Total Ghent 4		$124,210		$9,359		$24,476	
51								
52	**Total Ghent**		**$767,355**		**$47,746**		**$141,134**	
53								
54								
55	**GREEN RIVER**							
56	Green River 3 - SCR		$29,000		$1,040		$4,569	
57	Green River 3 - CDS-FF		$38,000		$6,874		$11,499	
58	Green River 3 - PAC Injection		$1,112		$323		$458	
59	Green River 3 - Neural Networks		$500		$50		$111	
60	Total Green River 3		**$68,612**		**$8,287**		**$16,637**	
61								
62	Green River 4 - SCR		$42,000		$1,442		$6,553	
63	Green River 4 - CDS-FF		$54,000		$10,289		$16,861	
64	Green River 4 - PAC Injection		$1,583		$515		$708	
65	Green River 4 - Neural Networks		$500		$50		$111	
66	Total Green River 4		**$98,083**		**$12,296**		**$24,233**	
67								
68	**Total Green River**		**$166,695**		**$20,583**		**$40,870**	
69								
70								
71	**CANE RUN**							
72	Cane Run 4 - FGD		$152,000		$8,428		$26,926	
73	Cane Run 4 - SCR		$63,000		$2,219		$9,886	
74	Cane Run 4 - Baghouse		$33,000		$1,924		$5,940	
75	Cane Run 4 - PAC Injection		$2,326		$1,087		$1,370	
76	Cane Run 4 - Lime Injection		$2,569		$983		$1,296	
77	Cane Run 4 - Neural Networks		$500		$50		$111	
78	Total Cane Run 4		**$253,395**		**$14,691**		**$45,529**	
79								
80	Cane Run 5 - FGD		$159,000		$8,789		$28,139	
81	Cane Run 5 - SCR		$66,000		$2,421		$10,453	
82	Cane Run 5 - Baghouse		$35,000		$2,061		$6,321	
83	Cane Run 5 - PAC Injection		$2,490		$1,120		$1,423	
84	Cane Run 5 - Lime Injection		$2,752		$1,089		$1,424	
85	Cane Run 5 - Neural Networks		$500		$50		$111	
86	Total Cane Run 5		**$265,742**		**$15,530**		**$47,871**	
87								
88	Cane Run 6 - FGD		$202,000		$10,431		$35,014	
89	Cane Run 6 - SCR		$86,000		$2,793		$13,259	
90	Can Rune 6 - Baghouse		$45,000		$2,672		$8,149	
91	Cane Run 6 - PAC Injection		$3,490		$1,336		$1,761	
92	Cane Run 6 - Lime Injection		$3,873		$1,367		$1,838	

	A	B	C	D	E	F	G	H
93	Cane Run 6 - Neural Networks		$500		$50		$111	
94	Total Can Run 6		$340,863		$18,649		$60,132	
95								
96	**Total Cane Run**		**$860,000**		**$48,870**		**$153,532**	
97								
98								
99	**Mill Creek**							
100	Mill Creek 1 - FGD		$297,000		$14,341		$50,486	
101	Mill Creek 1 - SCR		$97,000		$3,366		$15,171	
102	Mill Creek 1 - Baghouse		$81,000		$3,477		$13,335	
103	Mill Creek 1 - Electrostatic Precipitator		$32,882		$3,581		$7,583	
104	Mill Creek 1 - PAC Injection		$4,412		$2,213		$2,750	
105	Mill Creek 1 - Lime Injection		$4,480		$2,024		$2,569	
106	Mill Creek 1 - Neural Networks		$1,000		$100		$222	
107	Total Mill Creek 1		**$517,774**		**$29,102**		**$92,116**	
108								
109	Mill Creek 2 - FGD		$297,000		$14,604		$50,749	
110	Mill Creek 2 - SCR		$97,000		$3,401		$15,206	
111	Mill Creek 2 - Baghouse		$81,000		$3,518		$13,376	
112	Mill Creek 2 - Electrostatic Precipitator		$32,882		$3,664		$7,666	
113	Mill Creek 2 - PAC Injection		$4,412		$2,340		$2,877	
114	Mill Creek 2 - Lime Injection		$4,480		$2,117		$2,662	
115	Mill Creek 2 - Neural Networks		$1,000		$100		$222	
116	Total Mill Creek 2		**$517,774**		**$29,744**		**$92,758**	
117								
118	Mill Creek 3 - FGD		$392,000		$18,911		$66,617	
119	Mill Creek 3 - Baghouse		$114,000		$4,923		$18,797	
120	Mill Creek 3 - PAC Injection		$5,592		$3,213		$3,894	
121	Mill Creek 3 - Neural Networks		$1,000		$100		$222	
122	Total Mill Creek 3		**$512,592**		**$27,147**		**$89,530**	
123								
124	Mill Creek 4 - FGD		$455,000		$21,775		$77,149	
125	Mill Creek 4 - Baghouse		$133,000		$5,804		$21,990	
126	Mill Creek 4 - PAC Injection		$6,890		$3,858		$4,697	
127	Mill Creek 4 - Neural Networks		$1,000		$100		$222	
128	Total Mill Creek 4		**$595,890**		**$31,537**		**$104,058**	
129								
130	**Total Mill Creek**		**$2,144,030**		**$117,530**		**$378,462**	
131								
132								
133	**TRIMBLE**							
134	Trimble 1 - Baghouse		$128,000		$5,782		$21,360	
135	Trimble 1 - PAC Injection		$6,451		$4,413		$5,198	
136	Trimble 1 - Neural Networks		$1,000		$100		$222	
137	Total Trimble 1		$135,451		$10,295		$26,780	
138								

	A	B	C	D	E	F	G	H
139	**Total Trimble**		**$135,451**		**$10,295**		**$26,780**	
140								
141								
142	**Grand Total**		**$4,333,694**		**$260,580**		**$787,996**	

	A	B	C	D	E
1	Black & Veatch Study Cost Estimates				
2					
3					
4					
5			**MW**		**$/kW**
6	**BROWN**				
7	Brown 1 - Low NOx Burners				$11
8	Brown 1 - Baghouse				$364
9	Brown 1 - PAC Injection				$15
10	Brown 1 - Neural Networks				$5
11	Brown 1 - Overfire Air				$7
12	Total Brown 1		110		**$400**
13					
14	Brown 2 - SCR				$511
15	Brown 2 - Baghouse				$283
16	Brown 2 - PAC Injection				$14
17	Brown 2 - Neural Networks				$3
18	Brown 2 - Lime Injection				$15
19	Total Brown 2		180		**$826**
20					
21	Brown 3 - Baghouse				$133
22	Brown 3 - PAC Injection				$12
23	Brown 3 - Neural Networks				$2
24	Total Brown 3		457		**$148**
25					
26	**Total Brown**		**747**		**$348**
27					
28					
29	**GHENT**				
30	Ghent 1 - Baghouse				$242
31	Ghent 1 - PAC Injection				$12
32	Ghent 1 - Neural Networks				$2
33	Total Ghent 1		541		**$256**
34					
35	Ghent 2 - SCR				$439
36	Ghent 2 - Baghouse				$232
37	Ghent 2 - PAC Injection				$12
38	Ghent 2 - Lime Injection				$11
39	Ghent 2 - Neural Networks				$2
40	Total Ghent 2		517		**$696**
41					
42	Ghent 3 - Baghouse				$264
43	Ghent 3 - PAC Injection				$12
44	Ghent 3 - Neural Networks				$2
45	Total Ghent 3		523		**$278**
46					

	A	B	C	D	E
47	Ghent 4 - Baghouse				$222
48	Ghent 4 - PAC Injection				$12
49	Ghent 4 - Neural Networks				$2
50	Total Ghent 4		526		$236
51					
52	**Total Ghent**		**2,107**		**$364**
53					
54					
55					
56	**GREEN RIVER**				
57	Green River 3 - SCR				$408
58	Green River 3 - CDS-FF				$535
59	Green River 3 - PAC Injection				$16
60	Green River 3 - Neural Networks				$7
61	Total Green River 3		71		**$966**
62					
63	Green River 4 - SCR				$385
64	Green River 4 - CDS-FF				$495
65	Green River 4 - PAC Injection				$15
66	Green River 4 - Neural Networks				$5
67	Total Green River 4		109		**$900**
68					
69	**Total Green River**		**180**		**$926**
70					
71					
72	**CANE RUN**				
73	Cane Run 4 - FGD				$905
74	Cane Run 4 - SCR				$375
75	Cane Run 4 - Baghouse				$196
76	Cane Run 4 - PAC Injection				$14
77	Cane Run 4 - Lime Injection				$15
78	Cane Run 4 - Neural Networks				$3
79	Total Cane Run 4		168		**$1,508**
80					
81	Cane Run 5 - FGD				$878
82	Cane Run 5 - SCR				$365
83	Cane Run 5 - Baghouse				$193
84	Cane Run 5 - PAC Injection				$14
85	Cane Run 5 - Lime Injection				$15
86	Cane Run 5 - Neural Networks				$3
87	Total Cane Run 5		181		**$1,468**
88					
89	Cane Run 6 - FGD				$774
90	Cane Run 6 - SCR				$330
91	Can Rune 6 - Baghouse				$172
92	Cane Run 6 - PAC Injection				$13

	A	B	C	D	E
93	Cane Run 6 - Lime Injection				$15
94	Cane Run 6 - Neural Networks				$2
95	Total Can Run 6		261		$1,306
96					
97	**Total Cane Run**		**610**		**$1,410**
98					
99					
100	**Mill Creek**				
101	Mill Creek 1 - FGD				$900
102	Mill Creek 1 - SCR				$294
103	Mill Creek 1 - Baghouse				$245
104	Mill Creek 1 - Electrostatic Precipitator				$100
105	Mill Creek 1 - PAC Injection				$13
106	Mill Creek 1 - Lime Injection				$14
107	Mill Creek 1 - Neural Networks				$3
108	Total Mill Creek 1		330		**$1,569**
109					
110	Mill Creek 2 - FGD				$900
111	Mill Creek 2 - SCR				$294
112	Mill Creek 2 - Baghouse				$245
113	Mill Creek 2 - Electrostatic Precipitator				$100
114	Mill Creek 2 - PAC Injection				$13
115	Mill Creek 2 - Lime Injection				$14
116	Mill Creek 2 - Neural Networks				$3
117	Total Mill Creek 2		330		**$1,569**
118					
119	Mill Creek 3 - FGD				$927
120	Mill Creek 3 - Baghouse				$270
121	Mill Creek 3 - PAC Injection				$13
122	Mill Creek 3 - Neural Networks				$2
123	Total Mill Creek 3		423		**$1,212**
124					
125	Mill Creek 4 - FGD				$867
126	Mill Creek 4 - Baghouse				$253
127	Mill Creek 4 - PAC Injection				$13
128	Mill Creek 4 - Neural Networks				$2
129	Total Mill Creek 4		525		**$1,135**
130					
131	**Total Mill Creek**		**1,608**		**$1,333**
132					
133					
134	**TRIMBLE**				
135	Trimble 1 - Baghouse				$234
136	Trimble 1 - PAC Injection				$12
137	Trimble 1 - Neural Networks				$2
138	Total Trimble 1		547		$248

	A	B	C	D	E
139					
140	**Total Trimble**		**547**		**$248**
141					
142					
143	**Grand Total**		**5,799**		**$747**

From:	Wilson, Stuart
To:	Karavayev, Louanne
Sent:	6/28/2010 8:48:14 AM
Subject:	FW: 167987.26.0000 100625-New AQC Scenarios at MC
Attachments:	Draft Mill Creek Costs - Option 1&2 062510.pdf

Here are the new B&V numbers. Didn't see this come in on Friday...

Stuart

From: Saunders, Eileen
Sent: Friday, June 25, 2010 3:37 PM
To: Wilson, Stuart
Cc: Voyles, John; Bowling, Ralph; Straight, Scott; Kirkland, Mike; Hudson, Rusty
Subject: FW: 167987.26.0000 100625-New AQC Scenarios at MC

Stuart,

As discussed, please find revised numbers for the WFGD portion of the Mill Creek proposed AQCS compliance strategy. Project Engineering will continue to work with B&V to refine the costs on MC and the other facilities.

Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Friday, June 25, 2010 1:43 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100625-New AQC Scenarios at MC

Eileen,
Attached please find the draft cost summary for the following two Mill Creek scenarios for the WFGD options. The detailed cost and subsequent support information will be included within the report document.

1. Modification of Mill Creek 3 and 4 scrubbers from a 2-50% module configuration to a single 100% module configuration each. The scenario will not consider potential space limitations as a fatal flaw due to the rail/road access and will also not include the costs for moving the rail.

2. Modification of Mill Creek 1 and 2 scrubbers from two single separate modules to a one single combined larger scrubber module located near the roadway. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report but merge into the single scrubber then back to the existing stack.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

From: Saunders, Eileen [mailto:Eileen.Saunders@eon-us.com]
Sent: Monday, June 21, 2010 4:07 PM
To: Lucas, Kyle J.
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand; Straight, Scott
Subject: RE: 167987.10.0100 100621-New AQC Scenarios

Kyle,

After the call, Scott and I reviewed the S&L report from 1999 and discovered that the ESP's were moved to the side not the SCRs. Therefore, Scott said it didn't make sense for me to forward those drawings on to you. You do not need to relocate the SCRs.

Your other assumptions are correct. Please proceed.

Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Monday, June 21, 2010 4:20 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.10.0100 100621-New AQC Scenarios

Eileen,
From our conference call today, EON requested additional AQC scenarios be reviewed and costs developed beyond those scenarios assumed in the draft AQC study. The scenarios requested include the following:

Modification of Mill Creek 3 and 4 scrubbers from a 2-50% module configuration to a single 100% module configuration each. The scenario will not consider potential space limitations as a fatal flaw due to the rail/road access and will also not include the costs for moving the rail. This scenario will be looked at separately as an additional AQC option for Units 3 and 4.

Also, we reviewed the original scenario data and found that this scenario was only partially completed before it was modified to the 2-50% module configuration. Thus, B&V can revisit and provide the draft costs data by Friday 6/25 COB with approval today.

Modification of Mill Creek 1 and 2 scrubbers from two single separate modules to a one single combined larger scrubber module located near the roadway <u>or</u> off to the side of unit. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report but merge into the single scrubber then back to the existing stack. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

B&V can provide the draft costs data by Friday 6/25 COB with approval today.

Move Mill Creek 1 and 2 SCRs to the location on the side of the units as described in the S&L report from 1999 which will be provided by EON. It is assumed that the "approved" AQC technology as presented in the draft report will remain and the only change is the movement of the SCR location. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

Remove Mill Creek 1 and 2 dry ESPs and only use the proposed PJFFs. It is assumed that the "approved" AQC technology as presented in the draft report will remain and the only change is the removal of the dry ESP and associated repositioning of the PJFF (elevated) and duct work. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

Modification of Brown 1 and 2 PJFF from two single separate PJFF to a one single combined PJFF. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report (note that Unit 1 is has LNB and OFA for NOx control) but merge into the single PJFF and then to the combined scrubber and stack. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

ase review the aforementioned scenarios provide an e-mail authorization for us to proceed with developing the cost information for each scenario. If needed, please modify the scenarios to clarify specific requirements. It is our understanding that the same level of detail for each scenario as presented within the draft AQC report will be provided for these scenarios. Upon receipt of your authorization and clarification of the scenarios, B&V will transmit the technology selection sheets for the updated scenario(s) for EON's review and approval along with a man-hour estimate and schedule for completion.

ase feel free to contact me with any questions.

gards,
le

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

E.ON Mill Creek Draft Costs 6/25/2010

New AQCS Cost Estimates

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Combined Units 1 & 2 WFGD	$509,000,000	$771	$24,301,000	$86,246,000
Combined Units 3 WFGD	$335,000,000	$792	$17,199,000	$57,969,000
Combined Units 4 WFGD	$390,000,000	$743	$19,826,000	$67,289,000

Savings in Cost

AQC Equipment	Capital Cost (CC)	% Savings (CC)	O&M Cost	Levelized Annual Costs
Combined Units 1 & 2 WFGD	$85,000,000	14.31%	$4,644,000	$14,989,000
Combined Units 3 WFGD	$57,000,000	14.54%	$1,712,000	$8,648,000
Combined Units 4 WFGD	$65,000,000	14.29%	$1,949,000	$9,860,000
Total Savings	$207,000,000	--	$8,305,000	$33,497,000

From: Hillman, Timothy M.
To: Saunders, Eileen
CC: Mahabaleshwarkar, Anand; Lucas, Kyle J.
Sent: 6/30/2010 10:41:13 AM
Subject: 167987.28.0600 100630 EON AQC Project - Action Item List from 062810 Project Conference Call
Attachments: EON ACTION ITEM LIST 063010.xls

Eileen,

Please find attached the updated action item list from our Monday conference call.

Also, lets plan on using the same conference call dial in number for our conference call meeting next Wednesday (7/7/10) to discuss the next phase of work.

Hope you get feeling better.

Regards,

Tim Hillman | Senior Air Quality Scientist
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

From: Hillman, Timothy M.
Sent: Wednesday, June 23, 2010 1:05 PM
To: 'Saunders, Eileen'
Cc: Mahabaleshwarkar, Anand; Lucas, Kyle J.
Subject: 167987.28.0600 100623 EON AQC Project - Action Item List from 062110 Project Conference Call

Eileen,

Please find attached the updated action item list from our Monday conference call.

Best regards,

Tim Hillman | Senior Air Quality Scientist
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-7928**
Email: **hillmantm@bv.com**

	A	B	C	D	E	F	G	I	J	K
1	ACTION ITEM LIST - EON AIR QUALITY CONTROL STUDY									
2										
3	ITEM #	SOURCE		DESCRIPTION	FILE NO.	RESPONSIBILITY		ATE ADDE	RIG DUE DAT	RR DUE D
4		DOC/MTNG	DATE			CO.	INITIAL			
5	1	Conf Call	5/3/10	Send template for environmental requirements matrix		BV	AM	05/03/10	05/03/10	05/03/10
6	2	Conf Call	5/3/10	Establish a "General" folder in the IBackup document manager		BV	BO	05/03/10	05/04/10	05/03/10
7	3	Conf Call	5/3/10	Set up weekly project status conference call and action item list		BV	TH	05/03/10	05/07/10	05/12/10
8	4	Conf Call	5/3/10	Prepare draft agenda for May 10 kickoff meeting		BV	TH	05/03/10	05/04/10	05/05/10
9	5	Conf Call	5/3/10	Send EON names and disciplines of AQC site teams		BV	AM	05/03/10	05/04/10	05/03/10
10	6	Conf Call	5/3/10	Send previous project invoice format to EON for review		BV	MK/TH	05/03/10	05/06/10	05/05/10
11	7	Conf Call	5/3/10	Prepare a more detailed/specific data request		BV	AM	05/03/10	05/03/10	05/03/10
12	8	Conf Call	5/3/10	Email suggestions for coordination and order of site visits		EON	ES	05/03/10	05/04/10	05/05/10
13	9	Conf Call	5/3/10	Set up contact with EON Fuels		EON	ES	05/03/10	05/04/10	05/04/10
14	10	Conf Call	5/3/10	Determine financial model input requirements (i.e., owner's cost, etc)		EON	ES	05/03/10	05/07/10	
15	11	Kick-Off Mtng	5/10/10	Prepare Meeting Minutes from Kick-off Meeting		BV	KL	05/10/10	05/13/10	05/17/10
16	12	Project Call	5/17/10	Review Kickoff Meeting Minutes		EON	ES	05/17/10	05/18/10	
17	13	Project Call	5/17/10	Issue AQC Recommendation Summaries		BV	KL	5/17/10	05/18-05/20	
18	14	Project Call	5/17/10	Issue Design Basis		BV	KL	5/17/10	05/20/10	05/21/10
19	15	Project Call	5/17/10	Review and Approve AQC Recommendations		EON	ES	5/17/10	05/21/10	05/24/10
20	16	Project Call	5/24/10	Update Design Basis Memo with Revised Data References		BV	AM	05/24/10	05/25/10	06/02/10
21	17	Project Call and S	5/24/10	Issue Capital and O&M Cost Data		BV	KL	05/24/10	COB 06/01/10	05/30/10
22	18	EON Email	6/1/10	AQC Cost Questions on Mill Creek, Brown, and Neural Networks		BV	TH	06/01/10	06/02/10	06/02/10
23	19	EON Email	6/4/10	AQC Cost Questions on Mill Creek and Brown		BV	KL	06/04/10	06/07/10	
24	20	Schedule	6/4/10	Issue Draft Report for EON Review		BV	KL	06/04/10	06/18/10	06/17/10
25	21	Conf Call	6/7/10	Estimate AQC Costs for Brown Units 1 & 2 Combined		BV	AM	06/07/10	06/08/10	

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14	Closed	EON confirmed at 5/10 Kick-off Meeting.									
15	Closed										
16	Closed										
17	Closed										
18	Closed										
19	Closed										
20	Closed	Email of June 2nd with revised Design Basis.									
21	Closed										
22	Closed	Responses provided during 1030 (EST) call.									
23	Closed	Responses provided during Monday (6/7) call.									
24	Closed										
25	Closed	Email of June 8th.									

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26	22	Conf Call	6/7/10	Provide Description of the Fixed and Variable O&M Costs included in the estimate.		BV	AM	06/07/10	06/08/10	
27	23	EON Email	6/10/10	Brown 1 SCR Costs		BV	KL	06/10/10	06/14/10	
28	24	BV Email	6/17/10	Receive EON comments on draft report		EON	ES	06/21/10	06/24/10	06/28/10
29	25	EON Email	6/22/10	Perform 2 additional (out of scope) cost scenarios (out of 4) as described in BV email of		BV	KL	06/22/10	06/25/10	06/25/10
30	26	EON Email	6/22/10	Issue Final Report		BV	KL	06/22/10	07/09/10	
31	27	Conf Call	6/28/10	Ref Item #25 - provide 2 remaining costs scenarios (4 out of 4) as described in BV email		BV	KL	06/28/10	07/06/10	
32	28	Conf Call	6/28/10	Provide Responses to EON Comments (in comment document)		BV	KL	06/28/10	07/09/10	
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26	Closed	Email of June 8th.									
27	Closed	Email of June 14th - Note: Draft Report will have LNB. E.ON to comment during review period whether to use SCR or LNB in the Final Report.									
28	Closed	No additional comments as of conf call 6/28/10.									
29	Closed	Balance of deliverables due with final report.									
30	Open										
31	Open	Balance of deliverables due with final report.									
32	Open	Referencing B&V comment within final report o.k.									
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1	EON	E.ON U.S. SERVICES INC. COMPANY			
2	ES	Eileen Saunders			
3	GB	Greg Black			
4	GR	Gary Revlett			
5					
6					
7					
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9					
10					
11					
12					
13					
14					
15	BV	Black & Veatch (B&V)			
16	TH	Tim Hillman			
17	KL	Kyle Lucas			
18	AM	Anand Mahabaleshwarker			
19	MK	Mike King			
20	BO	Brian O'Neal			

From:	Saunders, Eileen
To:	Straight, Scott
CC:	Ritchey, Stacy
Sent:	6/30/2010 4:00:29 PM
Subject:	Environmental Air Compliance Summary (draft 6-30-10).docx
Attachments:	Environmental Air Compliance Summary (draft 6-30-10).docx

Scott,

Here is a start of the summary for you to review. Please let me know your thoughts and we can finish up tomorrow.

Thanks,

Eileen

Environmental Air Compliance Summary

In May of 2010, Project Engineering was asked to investigate the technological and financial impacts of new Environmental Air regulations on the fleet of coal fired units. Black and Veatch was hired and given four weeks to provide Project Engineering with a high level estimate based on site visits, data collection from the plants and industry experience. The points below provide a summary of key findings from that study:

<u>Mill Creek FGDs</u>

- Previous estimates of the air compliance impacts did not include new FGDs at Mill Creek. The current estimate is based on the B&V recommendation "that new limestone scrubbing technology will provide a more reliable long-term solution...considering the state of the existing scrubbers".
- DBA (dibasic acid) was ruled out due to concerns regarding potential legislation restricting waste water streams.
- Several options will be looked into to lower the Mill Creek costs such as a combined WFGD for Units 1 & 2, single modules WFGDs for Units 3 & 4 and the removal but not replacement of ESPS for Units 1 &2.

<u>Pulse Jet Fabric Filters and Powdered Activated Carbon Injection Systems</u>

- Fabric Filters and PAC systems have been recommended for use throughout the fleet. This combination of technology not only addresses mercury restrictions, but also addresses Dioxin/Furan and Particulate Limitations required by the New EGU MACT. These items were not considered in previous estimates.
- The current estimate includes a cost saving provision of combining the Brown Unit 1 and 2 Fabric Filters.

<u>SCR vs. SNCR</u>

- The current estimate recommends the use of SCRs instead of SNCRs. SNCRs use either ammonia or urea as reagents. According to the B&V report, "The optimum temperature range for injection of ammonia or urea is 1,550 to 1900 F. The NOx reduction efficiency of an SNCR system decreases rapidly at temperatures outside this range. A coal fired boiler typically only operates at this range in the backpass of the boiler and the temperature location will change as a function of unit load." Therefore, SNCR's generally are capable of only 50% NOx reduction on consistent basis. This performance level will not meet expected emission limitations.

Escalation Summary

- The current estimate of $4.1 billion has 4% escalation added and is based on a 2014-2016 completion schedule. This schedule was estimated first as it had the least impact to the current outage schedule.
- The delayed schedule calls for all Units to be completed by 2017 which impacts the escalation of the projects. The new estimate under this estimate would potentially be X. *Scott, Stacy and I will work on this number tomorrow. I have been at Ghent in meetings most of the day and she had afternoon meetings.*

Additional Assumptions (Scott-Do you want to include something like this section?)

- The cost estimate does not meet the criteria for Level I Engineering. As Scott and I discussed, it may take 6-8 months to reach that level of Engineering.
- This estimate does not include the outage impact costs.
- This estimate does not include market impacts.
- A generic Neural Network number was used as a means of addressing CO.

From:	Saunders, Eileen
To:	Ritchey, Stacy
Sent:	6/29/2010 8:22:25 AM
Subject:	Environmental Summay (rev5 6-3-10) (3).xlsx
Attachments:	Environmental Summay (rev5 6-3-10) (3).xlsx

	A	B	C	D	E	F	G	H
1	Black & Veatch Study Cost Estimates							
2	$ in thousands							
3								
4								
5			**Capital Cost**		**O&M Cost**		**Levelized Annual Costs**	
6	**BROWN**							
7	Brown 1 - Low NOx Burners		$1,156		$0		$141	
8	Brown 1 - Baghouse		$40,000		$1,477		$6,345	
9	Brown 1 - PAC Injection		$1,599		$614		$809	
10	Brown 1 - Neural Networks		$500		$50		$111	
11	Brown 1 - Overfire Air		$767		$132		$225	
12	Total Brown 1		**$44,022**		**$2,273**		**$7,631**	
13								
14	Brown 2 - SCR		$92,000		$3,278		$14,474	
15	Brown 2 - Baghouse		$51,000		$1,959		$8,166	
16	Brown 2 - PAC Injection		$2,476		$1,090		$1,391	
17	Brown 2 - Neural Networks		$500		$50		$111	
18	Brown 2 - Lime Injection		$2,739		$1,155		$1,488	
19	Total Brown 2		**$148,715**		**$7,532**		**$25,630**	
20								
21	Brown 3 - Baghouse		$61,000		$3,321		$10,745	
22	Brown 3 - PAC Injection		$5,426		$2,330		$2,990	
23	Brown 3 - Neural Networks		$1,000		$100		$222	
24	Total Brown 3		**$67,426**		**$5,751**		**$13,957**	
25								
26	**Total Brown**		**$260,163**		**$15,556**		**$47,218**	
27								
28								
29	**GHENT**							
30	Ghent 1 - Baghouse		$131,000		$5,888		$21,831	
31	Ghent 1 - PAC Injection		$6,380		$4,208		$4,984	
32	Ghent 1 - Neural Networks		$1,000		$100		$222	
33	Total Ghent 1		**$138,380**		**$10,196**		**$27,037**	
34								
35	Ghent 2 - SCR		$227,000		$7,078		$34,704	
36	Ghent 2 - Baghouse		$120,000		$5,002		$19,606	
37	Ghent 2 - PAC Injection		$6,109		$2,880		$3,623	
38	Ghent 2 - Lime Injection		$5,483		$2,775		$3,442	
39	Ghent 2 - Neural Networks		$1,000		$100		$222	
40	Total Ghent 2		**$359,592**		**$17,835**		**$61,597**	
41								
42	Ghent 3 - Baghouse		$138,000		$6,122		$22,917	
43	Ghent 3 - PAC Injection		$6,173		$4,134		$4,885	
44	Ghent 3 - Neural Networks		$1,000		$100		$222	
45	Total Ghent 3		**$145,173**		**$10,356**		**$28,024**	
46								

	A	B	C	D	E	F	G	H
47	Ghent 4 - Baghouse		$117,000		$5,363		$19,602	
48	Ghent 4 - PAC Injection		$6,210		$3,896		$4,652	
49	Ghent 4 - Neural Networks		$1,000		$100		$222	
50	Total Ghent 4		$124,210		$9,359		$24,476	
51								
52	**Total Ghent**		**$767,355**		**$47,746**		**$141,134**	
53								
54								
55	**GREEN RIVER**							
56	Green River 3 - SCR		$29,000		$1,040		$4,569	
57	Green River 3 - CDS-FF		$38,000		$6,874		$11,499	
58	Green River 3 - PAC Injection		$1,112		$323		$458	
59	Green River 3 - Neural Networks		$500		$50		$111	
60	Total Green River 3		**$68,612**		**$8,287**		**$16,637**	
61								
62	Green River 4 - SCR		$42,000		$1,442		$6,553	
63	Green River 4 - CDS-FF		$54,000		$10,289		$16,861	
64	Green River 4 - PAC Injection		$1,583		$515		$708	
65	Green River 4 - Neural Networks		$500		$50		$111	
66	Total Green River 4		**$98,083**		**$12,296**		**$24,233**	
67								
68	**Total Green River**		**$166,695**		**$20,583**		**$40,870**	
69								
70								
71	**CANE RUN**							
72	Cane Run 4 - FGD		$152,000		$8,428		$26,926	
73	Cane Run 4 - SCR		$63,000		$2,219		$9,886	
74	Cane Run 4 - Baghouse		$33,000		$1,924		$5,940	
75	Cane Run 4 - PAC Injection		$2,326		$1,087		$1,370	
76	Cane Run 4 - Lime Injection		$2,569		$983		$1,296	
77	Cane Run 4 - Neural Networks		$500		$50		$111	
78	Total Cane Run 4		**$253,395**		**$14,691**		**$45,529**	
79								
80	Cane Run 5 - FGD		$159,000		$8,789		$28,139	
81	Cane Run 5 - SCR		$66,000		$2,421		$10,453	
82	Cane Run 5 - Baghouse		$35,000		$2,061		$6,321	
83	Cane Run 5 - PAC Injection		$2,490		$1,120		$1,423	
84	Cane Run 5 - Lime Injection		$2,752		$1,089		$1,424	
85	Cane Run 5 - Neural Networks		$500		$50		$111	
86	Total Cane Run 5		**$265,742**		**$15,530**		**$47,871**	
87								
88	Cane Run 6 - FGD		$202,000		$10,431		$35,014	
89	Cane Run 6 - SCR		$86,000		$2,793		$13,259	
90	Can Rune 6 - Baghouse		$45,000		$2,672		$8,149	
91	Cane Run 6 - PAC Injection		$3,490		$1,336		$1,761	
92	Cane Run 6 - Lime Injection		$3,873		$1,367		$1,838	

	A	B	C	D	E	F	G	H
93	Cane Run 6 - Neural Networks		$500		$50		$111	
94	Total Can Run 6		$340,863		$18,649		$60,132	
95								
96	**Total Cane Run**		**$860,000**		**$48,870**		**$153,532**	
97								
98								
99	**Mill Creek**							
100	Mill Creek 1 - FGD		$297,000		$14,341		$50,486	
101	Mill Creek 1 - SCR		$97,000		$3,366		$15,171	
102	Mill Creek 1 - Baghouse		$81,000		$3,477		$13,335	
103	Mill Creek 1 - Electrostatic Precipitator		$32,882		$3,581		$7,583	
104	Mill Creek 1 - PAC Injection		$4,412		$2,213		$2,750	
105	Mill Creek 1 - Lime Injection		$4,480		$2,024		$2,569	
106	Mill Creek 1 - Neural Networks		$1,000		$100		$222	
107	Total Mill Creek 1		**$517,774**		**$29,102**		**$92,116**	
108								
109	Mill Creek 2 - FGD		$297,000		$14,604		$50,749	
110	Mill Creek 2 - SCR		$97,000		$3,401		$15,206	
111	Mill Creek 2 - Baghouse		$81,000		$3,518		$13,376	
112	Mill Creek 2 - Electrostatic Precipitator		$32,882		$3,664		$7,666	
113	Mill Creek 2 - PAC Injection		$4,412		$2,340		$2,877	
114	Mill Creek 2 - Lime Injection		$4,480		$2,117		$2,662	
115	Mill Creek 2 - Neural Networks		$1,000		$100		$222	
116	Total Mill Creek 2		**$517,774**		**$29,744**		**$92,758**	
117								
118	Mill Creek 3 - FGD		$392,000		$18,911		$66,617	
119	Mill Creek 3 - Baghouse		$114,000		$4,923		$18,797	
120	Mill Creek 3 - PAC Injection		$5,592		$3,213		$3,894	
121	Mill Creek 3 - Neural Networks		$1,000		$100		$222	
122	Total Mill Creek 3		**$512,592**		**$27,147**		**$89,530**	
123								
124	Mill Creek 4 - FGD		$455,000		$21,775		$77,149	
125	Mill Creek 4 - Baghouse		$133,000		$5,804		$21,990	
126	Mill Creek 4 - PAC Injection		$6,890		$3,858		$4,697	
127	Mill Creek 4 - Neural Networks		$1,000		$100		$222	
128	Total Mill Creek 4		**$595,890**		**$31,537**		**$104,058**	
129								
130	**Total Mill Creek**		**$2,144,030**		**$117,530**		**$378,462**	
131								
132								
133	**TRIMBLE**							
134	Trimble 1 - Baghouse		$128,000		$5,782		$21,360	
135	Trimble 1 - PAC Injection		$6,451		$4,413		$5,198	
136	Trimble 1 - Neural Networks		$1,000		$100		$222	
137	Total Trimble 1		$135,451		$10,295		$26,780	
138								

	A	B	C	D	E	F	G	H
139	**Total Trimble**		**$135,451**		**$10,295**		**$26,780**	
140								
141								
142	**Grand Total**		**$4,333,694**		**$260,580**		**$787,996**	

	A	B	C	D	E
1	Black & Veatch Study Cost Estimates				
2					
3					
4					
5			**MW**		**$/kW**
6	**BROWN**				
7	Brown 1 - Low NOx Burners				$11
8	Brown 1 - Baghouse				$364
9	Brown 1 - PAC Injection				$15
10	Brown 1 - Neural Networks				$5
11	Brown 1 - Overfire Air				$7
12	Total Brown 1		110		**$400**
13					
14	Brown 2 - SCR				$511
15	Brown 2 - Baghouse				$283
16	Brown 2 - PAC Injection				$14
17	Brown 2 - Neural Networks				$3
18	Brown 2 - Lime Injection				$15
19	Total Brown 2		180		**$826**
20					
21	Brown 3 - Baghouse				$133
22	Brown 3 - PAC Injection				$12
23	Brown 3 - Neural Networks				$2
24	Total Brown 3		457		**$148**
25					
26	**Total Brown**		**747**		**$348**
27					
28					
29	**GHENT**				
30	Ghent 1 - Baghouse				$242
31	Ghent 1 - PAC Injection				$12
32	Ghent 1 - Neural Networks				$2
33	Total Ghent 1		541		**$256**
34					
35	Ghent 2 - SCR				$439
36	Ghent 2 - Baghouse				$232
37	Ghent 2 - PAC Injection				$12
38	Ghent 2 - Lime Injection				$11
39	Ghent 2 - Neural Networks				$2
40	Total Ghent 2		517		**$696**
41					
42	Ghent 3 - Baghouse				$264
43	Ghent 3 - PAC Injection				$12
44	Ghent 3 - Neural Networks				$2
45	Total Ghent 3		523		**$278**
46					

	A	B	C	D	E
47	Ghent 4 - Baghouse				$222
48	Ghent 4 - PAC Injection				$12
49	Ghent 4 - Neural Networks				$2
50	Total Ghent 4		526		$236
51					
52	**Total Ghent**		**2,107**		**$364**
53					
54					
55					
56	**GREEN RIVER**				
57	Green River 3 - SCR				$408
58	Green River 3 - CDS-FF				$535
59	Green River 3 - PAC Injection				$16
60	Green River 3 - Neural Networks				$7
61	Total Green River 3		71		**$966**
62					
63	Green River 4 - SCR				$385
64	Green River 4 - CDS-FF				$495
65	Green River 4 - PAC Injection				$15
66	Green River 4 - Neural Networks				$5
67	Total Green River 4		109		**$900**
68					
69	**Total Green River**		**180**		**$926**
70					
71					
72	**CANE RUN**				
73	Cane Run 4 - FGD				$905
74	Cane Run 4 - SCR				$375
75	Cane Run 4 - Baghouse				$196
76	Cane Run 4 - PAC Injection				$14
77	Cane Run 4 - Lime Injection				$15
78	Cane Run 4 - Neural Networks				$3
79	Total Cane Run 4		168		**$1,508**
80					
81	Cane Run 5 - FGD				$878
82	Cane Run 5 - SCR				$365
83	Cane Run 5 - Baghouse				$193
84	Cane Run 5 - PAC Injection				$14
85	Cane Run 5 - Lime Injection				$15
86	Cane Run 5 - Neural Networks				$3
87	Total Cane Run 5		181		**$1,468**
88					
89	Cane Run 6 - FGD				$774
90	Cane Run 6 - SCR				$330
91	Can Rune 6 - Baghouse				$172
92	Cane Run 6 - PAC Injection				$13

	A	B	C	D	E
93	Cane Run 6 - Lime Injection				$15
94	Cane Run 6 - Neural Networks				$2
95	Total Can Run 6		261		$1,306
96					
97	**Total Cane Run**		**610**		**$1,410**
98					
99					
100	**Mill Creek**				
101	Mill Creek 1 - FGD				$900
102	Mill Creek 1 - SCR				$294
103	Mill Creek 1 - Baghouse				$245
104	Mill Creek 1 - Electrostatic Precipitator				$100
105	Mill Creek 1 - PAC Injection				$13
106	Mill Creek 1 - Lime Injection				$14
107	Mill Creek 1 - Neural Networks				$3
108	Total Mill Creek 1		330		**$1,569**
109					
110	Mill Creek 2 - FGD				$900
111	Mill Creek 2 - SCR				$294
112	Mill Creek 2 - Baghouse				$245
113	Mill Creek 2 - Electrostatic Precipitator				$100
114	Mill Creek 2 - PAC Injection				$13
115	Mill Creek 2 - Lime Injection				$14
116	Mill Creek 2 - Neural Networks				$3
117	Total Mill Creek 2		330		**$1,569**
118					
119	Mill Creek 3 - FGD				$927
120	Mill Creek 3 - Baghouse				$270
121	Mill Creek 3 - PAC Injection				$13
122	Mill Creek 3 - Neural Networks				$2
123	Total Mill Creek 3		423		**$1,212**
124					
125	Mill Creek 4 - FGD				$867
126	Mill Creek 4 - Baghouse				$253
127	Mill Creek 4 - PAC Injection				$13
128	Mill Creek 4 - Neural Networks				$2
129	Total Mill Creek 4		525		**$1,135**
130					
131	**Total Mill Creek**		**1,608**		**$1,333**
132					
133					
134	**TRIMBLE**				
135	Trimble 1 - Baghouse				$234
136	Trimble 1 - PAC Injection				$12
137	Trimble 1 - Neural Networks				$2
138	Total Trimble 1		547		$248

	A	B	C	D	E
139					
140	**Total Trimble**		**547**		**$248**
141					
142					
143	**Grand Total**		**5,799**		**$747**

From:	Lucas, Kyle J.
To:	Saunders, Eileen
CC:	Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent:	7/6/2010 11:28:20 AM
Subject:	167987.26.0000 100706-New AQC Scenarios at MC & Brown
Attachments:	Brown 1 & 2 Capital Costs-Option 2&3 070610.pdf; Draft Mill Creek Costs-Option 1&2-opition3 070610.pdf

Eileen,
Attached please find the draft cost summary for the following remaining Mill Creek and Brown scenarios. The detailed cost and subsequent support information will be included within the report document.

1. Remove Mill Creek 1 and 2 dry ESPs and only use the proposed PJFFs. It is assumed that the "approved" AQC technology as presented in the draft report will remain and the only change is the removal of the dry ESP and associated repositioning of the PJFF (elevated) and duct work. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

2. Modification of Brown 1 and 2 PJFF from two single separate PJFF to a one single combined PJFF. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report (note that Unit 1 is has LNB and OFA for NOx control) but merge into the single PJFF and then to the combined scrubber and stack. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

From: Saunders, Eileen [mailto:Eileen.Saunders@eon-us.com]
Sent: Monday, June 21, 2010 4:07 PM
To: Lucas, Kyle J.
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand; Straight, Scott
Subject: RE: 167987.10.0100 100621-New AQC Scenarios

Kyle,

After the call, Scott and I reviewed the S&L report from 1999 and discovered that the ESP's were moved to the side not the SCRs. Therefore, Scott said it didn't make sense for me to forward those drawings on to you. You do not need to relocate the SCRs.

Your other assumptions are correct. Please proceed.

Thank you,

Eileen

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To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.10.0100 100621-New AQC Scenarios

Eileen,
From our conference call today, EON requested additional AQC scenarios be reviewed and costs developed beyond those scenarios assumed in the draft AQC study. The scenarios requested include the following:

Modification of Mill Creek 3 and 4 scrubbers from a 2-50% module configuration to a single 100% module configuration each. The scenario will not consider potential space limitations as a fatal flaw due to the rail/road access and will also not include the costs for moving the rail. This scenario will be looked at separately as an additional AQC option for Units 3 and 4.

Also, we reviewed the original scenario data and found that this scenario was only partially completed before it was modified to the 2-50% module configuration. Thus, B&V can revisit and provide the draft costs data by Friday 6/25 COB with approval today.

Modification of Mill Creek 1 and 2 scrubbers from two single separate modules to a one single combined larger scrubber module located near the roadway <u>or</u> off to the side of unit. The exhaust gas from each unit will pass through the "approved" AQC technology as presented in the draft report but merge into the single scrubber then back to the existing stack. This scenario will be looked at separately as an additional AQC option for Units 1 and 2.

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le

Kyle Lucas | Environmental Permitting Manager
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Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**

Email: **lucaskj@bv.com**

Cost Revised on: 6/25/2010

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Units 1 & 2 Combined Fabric Filter	**$68,000,000**	**$234**	**$2,789,000**	**$11,065,000**

Cost Revised on: 6/24/2010

AQC Equipment	Capital Cost (CC)	$/kW	O&M Cost	Levelized Annual Costs
Eliminating dry ESP and installing PJFF	$72,000,000	$218	$4,462,000	$13,224,000
Eliminating dry ESP and installing PJFF	$72,000,000	$218	$4,575,000	$13,337,000
Total	$144,000,000	$436	$9,037,000	$26,561,000

DRAFT

From:	Saunders, Eileen
To:	Straight, Scott
Sent:	7/6/2010 11:41:10 AM
Subject:	FW: 167987.26.0000 100706-New AQC Scenarios at MC & Brown
Attachments:	Brown 1 & 2 Capital Costs-Option 2&3 070610.pdf; Draft Mill Creek Costs-Option 1&2-opition3 070610.pdf

Scott,

New numbers from B&V. I am just beginning my review.

Thanks,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Tuesday, July 06, 2010 11:28 AM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100706-New AQC Scenarios at MC & Brown

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Sent: Monday, June 21, 2010 4:07 PM
To: Lucas, Kyle J.
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand; Straight, Scott
Subject: RE: 167987.10.0100 100621-New AQC Scenarios

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Cost Revised on: 6/25/2010

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DRAFT

From:	Lucas, Kyle J.
To:	Saunders, Eileen
CC:	Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent:	5/30/2010 2:43:02 PM
Subject:	167987.26.0000 100530 - EON Draft AQCS Costs - EW Brown
Attachments:	Brown Unit 1 Cost Estimates 052810.pdf; Brown Unit 2 Cost Estimates 052810.pdf; Brown Unit 3 Cost Estimates 052810.pdf

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at EW Brown Units 1-3. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
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Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name:	Brown
Unit:	1
MW	110
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$40,000,000	$364	$1,477,000	$6,345,000
PAC Injection	$1,599,000	$15	$614,000	$809,000
Overfire Air	$767,000	$7	$132,000	$225,000
Low NOx Burners	$1,156,000	$11	$0	$141,000
Neural Networks	$500,000	$5	$50,000	$111,000
Total	$44,022,000	$400	$2,273,000	$7,631,000

DRAFT

Plant Name: Brown
Unit: 2
MW 180
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$92,000,000	$511	$3,278,000	$14,474,000
Fabric Filter	$51,000,000	$283	$1,959,000	$8,166,000
Lime Injection	$2,739,000	$15	$1,155,000	$1,488,000
PAC Injection	$2,476,000	$14	$1,090,000	$1,391,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$148,715,000	$826	$7,532,000	$25,630,000

BROWN UNIT 2 - SCR COSTS

CAPITAL COST

Purchase Contracts		
Civil/Structural	$4,636,000	
Ductwork and Breeching	$3,580,000	
Mechanical - Balance of Plant (BOP)	$1,173,000	
Electrical - Equipment, Raceway	$1,339,000	
VFDs, Motors and Couplings	$500,000	Engineering Estimates
Switchgear and MCCs	$468,000	
Control - DCS Instrumentation	$151,000	
Air Heater Modifications	$0	Engineering Estimates
ID Fans	$1,158,000	Engineering Estimates
Catalyst	$1,883,000	
Selective Catalytic Reduction System (Including Ammonia System)	$1,643,000	
Subtotal Purchase Contract	**$16,531,000**	
Construction Contracts		
Civil/Structural Construction - Super Structures	$2,854,000	
Civil/Structural Construction - Sub-Structures	$742,000	
Mechanical/Chemical Construction	$8,971,000	
Electrical/Control Construction	$4,103,000	
Service Contracts & Construction Indirects	$14,331,000	
Demolition Costs	$6,500,000	Engineering Estimates
Subtotal Construction Contracts	**$37,501,000**	
Construction Difficulty Costs	**$26,250,700**	Engineering Estimates
Total Direct Costs	**$80,282,700**	
Indirect Costs		
Engineering Costs (Includes G&A & Fee)	$2,696,000	
EPC Construction Management (Includes G&A & Fee)	$1,691,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$444,000	
Sales Taxes	$627,000	
Project Contingency	$6,326,000	
Total Indirect Costs	**$11,784,000**	
Total Contracted Costs	**$92,000,000**	
Capital Cost Effectiveness	***$511***	***/kW***

ANNUAL COST

Capacity Factor = 62%

Fixed Annual Costs					
Operating labor	$123,000	1 FTE and	123,325	$/year	
Maintenance labor & materials	$2,408,000	(DC) X 3.0%			
Yearly emissions testing	$25,000	Engineering Estimates			
Catalyst activity testing	$5,000	Engineering Estimates			
Fly ash sampling and analysis	$20,000	Engineering Estimates			
Subtotal Fixed Annual Costs	**$2,581,000**				
Variable Annual Costs					
Reagent	$309,000	215 lb/hr and	530.03	$/ton	
Auxiliary and ID fan power	$186,000	940 kW and	0.03646	$/kWh	
Catalyst replacement	$202,000	50 m3 and	6,500	$/m3	
Subtotal Variable Annual Costs	**$697,000**				
Total Annual Costs	**$3,278,000**				
Levelized Capital Costs	**$11,196,000**	(TCI) X 12.17%	CRF		
Levelized Annual Costs	**$14,474,000**				

BROWN UNIT 2 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$2,646,000			
Mechanical - Balance of Plant (BOP)	$7,580,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$161,000			
Control - DCS Instrumentation	$178,000			
ID Fans	$535,000	Engineering Estimates		
Subtotal Purchase Contract	**$11,100,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,355,000			
Civil/Structural Construction - Sub-Structures	$895,000			
Mechanical/Chemical Construction	$8,956,000			
Electrical/Control Construction	$3,024,000			
Service Contracts & Construction Indirects	$146,000			
Demolition Costs	$5,000,000	Engineering Estimates		
Subtotal Construction Contracts	**$20,376,000**			
Construction Difficulty Costs	**$14,263,200**	Engineering Estimates		
Total Direct Costs	**$45,739,200**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$2,334,000			
EPC Construction Management (Includes G&A & Fee)	$1,527,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$231,000			
Sales Taxes	$82,000			
Project Contingency - 18%	$860,000			
Total Indirect Costs	**$5,034,000**			
Total Contracted Costs	$51,000,000			
Cost Effectiveness	*$283 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	62%	
Maintenance labor and materials	$1,530,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$1,530,000**			
Variable Annual Costs				
Byproduct disposal	$5,000	120 lb/hr and	15	$/ton
Bag replacement cost	$129,000	3,880 bags and	100	$/bag
Cage replacement cost	$65,000	3,880 cages and	50	$/cage
ID fan power	$200,000	1,010 kW and	0.03646	$/kWh
Auxiliary power	$30,000	150 kW and	0.03646	$/kWh
Subtotal Variable Annual Costs	$429,000			
Total Annual Costs	$1,959,000			
Levelized Capital Costs	**$6,207,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$8,166,000			

Brown Unit 2
180 MW
High Level Emissions Control Study

Technology: Lime Injection   **Date:** 5/30/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$133,800	From Previous Mill Creek BACT Study				
Short-term storage silo	$88,800	From Previous Mill Creek BACT Study				
Air blowers	$121,800	From Previous Mill Creek BACT Study				
Rotary feeders	$19,800	From Previous Mill Creek BACT Study				
Injection system	$80,400	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$526,800	From Previous Mill Creek BACT Study				
Instrumentation and controls	$25,200	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$996,600					
Freight	$45,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$1,042,000					
Direct installation costs						
Foundation & supports	$104,000	(PEC) X	10.0%			
Handling & erection	$208,000	(PEC) X	20.0%			
Electrical	$104,000	(PEC) X	10.0%			
Piping	$52,000	(PEC) X	5.0%			
Insulation	$21,000	(PEC) X	2.0%			
Painting	$52,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$541,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$1,658,000					
Indirect Costs						
Engineering	$199,000	(DC) X	12.0%			
Owner's cost	$199,000	(DC) X	12.0%			
Construction management	$166,000	(DC) X	10.0%			
Start-up and spare parts	$25,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$332,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,021,000					
Allowance for Funds Used During Construction (AFDC)	$60,000	[(DC)+(IC)] X	4.50%		1	years (project time length X 1/2)
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,739,000					
Cost Effectiveness	*$15 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$50,000	(DC) X	3.0%			
Operating labor	$123,000	1	FTE and	123,325	$/year	Estimated manpower
Total fixed annual costs	$173,000					
Variable annual costs				62	%	capacity factor
Lime	$754,000	2,100	lb/hr and	132.19	$/ton	
Byproduct disposal cost	$208,000	2,400	lb/hr and	15	$/ton	
Auxiliary power	$20,000	100	kW and	0.03646	$/kWh	
Total variable annual costs	$982,000					
Total direct annual costs (DAC)	$1,155,000					
Indirect Annual Costs						
Cost for capital recovery	$333,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$333,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,488,000					

Brown Unit 2
180 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 5/30/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$151,641	Ratio from Brown Unit 3 BACT Analysis			
Short-term storage silo	$99,650	Ratio from Brown Unit 3 BACT Analysis			
Air blowers	$138,643	Ratio from Brown Unit 3 BACT Analysis			
Rotary feeders	$17,330	Ratio from Brown Unit 3 BACT Analysis			
Injection system	$64,989	Ratio from Brown Unit 3 BACT Analysis			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$415,930	Ratio from Brown Unit 3 BACT Analysis			
Instrumentation and controls	$21,663	Ratio from Brown Unit 3 BACT Analysis			
Subtotal capital cost (CC)	$909,847				
Freight	$23,000	(CC) X	2.5%		
Total purchased equipment cost (PEC)	$933,000				
Direct installation costs					
Foundation & supports	$93,000	(PEC) X	10.0%		
Handling & erection	$187,000	(PEC) X	20.0%		
Electrical	$93,000	(PEC) X	10.0%		
Piping	$47,000	(PEC) X	5.0%		
Insulation	$19,000	(PEC) X	2.0%		
Painting	$47,000	(PEC) X	5.0%		
Demolition	$0	(PEC) X	0.0%		
Relocation	$0	(PEC) X	0.0%		
Total direct installation costs (DIC)	$486,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$1,494,000				
Indirect Costs					
Engineering	$179,000	(DC) X	12.0%		
Owner's cost	$179,000	(DC) X	12.0%		
Construction management	$149,000	(DC) X	10.0%		
Start-up and spare parts	$22,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$299,000	(DC) X	20.0%		
Total indirect costs (IC)	$928,000				
Allowance for Funds Used During Construction (AFDC)	$54,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,476,000				
Cost Effectiveness	*$14 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$45,000	(DC) X	3.0%		
Operating labor	$123,000		1 FTE and	123,325 $/year	Estimated manpower
Total fixed annual costs	$168,000				
Variable annual costs				62 %	capacity factor
Reagent (BPAC)	$896,000		150 lb/hr and	2200 $/ton	
Byproduct disposal cost	$6,000		150 lb/hr and	15 $/ton	
Auxiliary power	$20,000		100 kW and	0.03646 $/kWh	
Total variable annual costs	$922,000				
Total direct annual costs (DAC)	$1,090,000				
Indirect Annual Costs					
Cost for capital recovery	$301,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$301,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,391,000				

Plant Name: Brown
Unit: 3
MW 457
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$61,000,000	$133	$3,321,000	$10,745,000
PAC Injection	$5,426,000	$12	$2,330,000	$2,990,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$67,426,000	$148	$5,751,000	$13,957,000

DRAFT

From:	Lucas, Kyle J.
To:	Saunders, Eileen
CC:	Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent:	5/30/2010 2:53:43 PM
Subject:	167987.26.0000 100530 - EON Draft AQCS Costs - Green River
Attachments:	Green River Unit 3 Cost Estimates 052810.pdf; Green River Unit 4 Cost Estimates 052810.pdf

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Green River Units 3 & 4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Green River
Unit: 3
MW 71
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$29,000,000	$408	$1,040,000	$4,569,000
CDS-FF	$38,000,000	$535	$6,874,000	$11,499,000
PAC Injection	$1,112,000	$16	$323,000	$458,000
Neural Networks	$500,000	$7	$50,000	$111,000
Total	$68,612,000	$966	$8,287,000	$16,637,000

Plant Name: Green River
Unit: 4
MW 109
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$42,000,000	$385	$1,442,000	$6,553,000
CDS-FF	$54,000,000	$495	$10,289,000	$16,861,000
PAC Injection	$1,583,000	$15	$515,000	$708,000
Neural Networks	$500,000	$5	$50,000	$111,000
Total	$98,083,000	$900	$12,296,000	$24,233,000

From:	Lucas, Kyle J.
To:	Saunders, Eileen
CC:	Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent:	5/30/2010 2:59:41 PM
Subject:	167987.26.0000 100530 - EON Draft AQCS Costs - Trimble
Attachments:	Trimble Unit 1 Cost Estimates 052810.pdf

Eileen,

Attached please find the draft AQCS Costs for the approved technologies for Trimble Unit 1. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

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Black & Veatch - Building a World of Difference™
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Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Trimble County
Unit: 1
MW 547
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$128,000,000	$234	$5,782,000	$21,360,000
PAC Injection	$6,451,000	$12	$4,413,000	$5,198,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$135,451,000	$248	$10,295,000	$26,780,000

From:	Lucas, Kyle J.
To:	Saunders, Eileen
CC:	Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent:	5/30/2010 3:09:00 PM
Subject:	167987.26.0000 100530 - EON Draft AQCS Costs - Ghent
Attachments:	Ghent Unit 1 Cost Estimates 052810.pdf; Ghent Unit 2 Cost Estimates 052810.pdf; Ghent Unit 3 Cost Estimates 052810.pdf; Ghent Unit 4 Cost Estimates 052810.pdf

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Ghent Units 1-4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
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Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Ghent
Unit: 1
MW 541
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$131,000,000	$242	$5,888,000	$21,831,000
PAC Injection	$6,380,000	$12	$4,208,000	$4,984,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$138,380,000	$256	$10,196,000	$27,037,000

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E-ON Fleetwide Study | Black & Veatch Cost Estimates | 167987

Plant Name: Ghent
Unit: 2
MW 517
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$227,000,000	$439	$7,078,000	$34,704,000
Fabric Filter	$120,000,000	$232	$5,002,000	$19,606,000
Lime Injection	$5,483,000	$11	$2,775,000	$3,442,000
PAC Injection	$6,109,000	$12	$2,880,000	$3,623,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$359,592,000	$696	$17,835,000	$61,597,000

DRAFT

Plant Name: Ghent
Unit: 3
MW 523
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$138,000,000	$264	$6,122,000	$22,917,000
PAC Injection	$6,173,000	$12	$4,134,000	$4,885,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$145,173,000	$278	$10,356,000	$28,024,000

DRAFT

Plant Name: Ghent
Unit: 4
MW 526
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$117,000,000	$222	$5,363,000	$19,602,000
PAC Injection	$6,210,000	$12	$3,896,000	$4,652,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$124,210,000	$236	$9,359,000	$24,476,000

DRAFT

From:	Lucas, Kyle J.
To:	Saunders, Eileen
CC:	Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent:	5/30/2010 3:23:27 PM
Subject:	167987.26.0000 100530 - EON Draft AQCS Costs - Mill Creek
Attachments:	Mill Creek Unit 1 Cost Estimates 052810.pdf; Mill Creek Unit 2 Cost Estimates 052810.pdf; Mill Creek Unit 3 Cost Estimates 052810.pdf; Mill Creek Unit 4 Cost Estimates 052810.pdf

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Mill Creek Units 1-4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Mill Creek
Unit: 1
MW 330
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$97,000,000	$294	$3,366,000	$15,171,000
WFGD	$297,000,000	$900	$14,341,000	$50,486,000
Fabric Filter	$81,000,000	$245	$3,477,000	$13,335,000
Electrostatic Precipitator	$32,882,000	$100	$3,581,000	$7,583,000
Lime Injection	$4,480,000	$14	$2,024,000	$2,569,000
PAC Injection	$4,412,000	$13	$2,213,000	$2,750,000
Neural Networks	$1,000,000	$3	$100,000	$222,000
Total	$517,774,000	$1,569	$29,102,000	$92,116,000

Plant Name:	Mill Creek
Unit:	2
MW	330
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$97,000,000	$294	$3,401,000	$15,206,000
WFGD	$297,000,000	$900	$14,604,000	$50,749,000
Fabric Filter	$81,000,000	$245	$3,518,000	$13,376,000
Electrostatic Precipitator	$32,882,000	$100	$3,664,000	$7,666,000
Lime Injection	$4,480,000	$14	$2,117,000	$2,662,000
PAC Injection	$4,412,000	$13	$2,340,000	$2,877,000
Neural Networks	$1,000,000	$3	$100,000	$222,000
Total	$517,774,000	$1,569	$29,744,000	$92,758,000

DRAFT

Plant Name: Mill Creek
Unit: 3
MW 423
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
WFGD	$392,000,000	$927	$18,911,000	$66,617,000
Fabric Filter	$114,000,000	$270	$4,923,000	$18,797,000
PAC Injection	$5,592,000	$13	$3,213,000	$3,894,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$512,592,000	$1,212	$27,147,000	$89,530,000

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E-ON Fleetwide Study | Black & Veatch Cost Estimates | 167987

Plant Name: Mill Creek
Unit: 4
MW 525
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
WFGD	$455,000,000	$867	$21,775,000	$77,149,000
Fabric Filter	$133,000,000	$253	$5,804,000	$21,990,000
PAC Injection	$6,890,000	$13	$3,858,000	$4,697,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$595,890,000	$1,135	$31,537,000	$104,058,000

DRAFT

From:	Lucas, Kyle J.
To:	Saunders, Eileen
CC:	Hillman, Timothy M.; Mahabaleshwarkar, Anand
Sent:	5/30/2010 3:34:15 PM
Subject:	167987.26.0000 100530 - EON Draft AQCS Costs - Cane Run
Attachments:	Cane Run Unit 4 Cost Estimates 052810.pdf; Cane Run Unit 5 Cost Estimates 052810.pdf; Cane Run Unit 6 Cost Estimates 052810.pdf

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Cane Run Units 4-6. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
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11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Cane Run
Unit: 4
MW 168
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$63,000,000	$375	$2,219,000	$9,886,000
WFGD	$152,000,000	$905	$8,428,000	$26,926,000
Fabric Filter	$33,000,000	$196	$1,924,000	$5,940,000
Lime Injection	$2,569,000	$15	$983,000	$1,296,000
PAC Injection	$2,326,000	$14	$1,087,000	$1,370,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$253,395,000	$1,508	$14,691,000	$45,529,000

Plant Name:	Cane Run
Unit:	5
MW	181
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$66,000,000	$365	$2,421,000	$10,453,000
WFGD	$159,000,000	$878	$8,789,000	$28,139,000
Fabric Filter	$35,000,000	$193	$2,061,000	$6,321,000
Lime Injection	$2,752,000	$15	$1,089,000	$1,424,000
PAC Injection	$2,490,000	$14	$1,120,000	$1,423,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$265,742,000	$1,468	$15,530,000	$47,871,000

Plant Name:	Cane Run
Unit:	6
MW	261
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$86,000,000	$330	$2,793,000	$13,259,000
WFGD	$202,000,000	$774	$10,431,000	$35,014,000
Fabric Filter	$45,000,000	$172	$2,672,000	$8,149,000
Lime Injection	$3,873,000	$15	$1,367,000	$1,838,000
PAC Injection	$3,490,000	$13	$1,336,000	$1,761,000
Neural Networks	$500,000	$2	$50,000	$111,000
Total	$340,863,000	$1,306	$18,649,000	$60,132,000

DRAFT

From: Karavayev, Louanne
To: Revlett, Gary
CC: Wilson, Stuart
Sent: 7/8/2010 3:49:48 PM
Subject: Emission Rates
Attachments: Environmental Summay (rev5 6-3-10).xlsx

Gary,
Given the addition of emission control equipment (as shown in the attachment) at Brown, Ghent, Mill Creek, and Trimble, what is your best guess at the impact on NOx and Hg emission rates at each unit? Also, would it be okay to assume a 98% SO2 removal rate for a new FGD at Mill Creek? Any input you may have would be very helpful. Feel free to call or email with questions. I am currently working in the 8 N conference room (and should be here for the next several work days), so please call x4723 to reach me. Thank you,

Lou Anne Karavayev
E.ON U.S.
Generation Planning
p (502) 627-2563
f (502) 217-4969
e LouAnne.Karavayev@EON-US.com

	A	B	C	D	E	F	G	H
1	Black & Veatch Study Cost Estimates							
2	$ in thousands							
3								
4								
5			**Capital Cost**		**O&M Cost**		**Levelized Annual Costs**	
6	**BROWN**							
7	Brown 1 - Low NOx Burners		$1,156		$0		$141	
8	Brown 1 - Baghouse		$40,000		$1,477		$6,345	
9	Brown 1 - PAC Injection		$1,599		$614		$809	
10	Brown 1 - Neural Networks		$500		$50		$111	
11	Brown 1 - Overfire Air		$767		$132		$225	
12	Total Brown 1		**$44,022**		**$2,273**		**$7,631**	
13								
14	Brown 2 - SCR		$92,000		$3,278		$14,474	
15	Brown 2 - Baghouse		$51,000		$1,959		$8,166	
16	Brown 2 - PAC Injection		$2,476		$1,090		$1,391	
17	Brown 2 - Neural Networks		$500		$50		$111	
18	Brown 2 - Lime Injection		$2,739		$1,155		$1,488	
19	Total Brown 2		**$148,715**		**$7,532**		**$25,630**	
20								
21	Brown 3 - Baghouse		$61,000		$3,321		$10,745	
22	Brown 3 - PAC Injection		$5,426		$2,330		$2,990	
23	Brown 3 - Neural Networks		$1,000		$100		$222	
24	Total Brown 3		**$67,426**		**$5,751**		**$13,957**	
25								
26	**Total Brown**		**$260,163**		**$15,556**		**$47,218**	
27								
28								
29	**GHENT**							
30	Ghent 1 - Baghouse		$131,000		$5,888		$21,831	
31	Ghent 1 - PAC Injection		$6,380		$4,208		$4,984	
32	Ghent 1 - Neural Networks		$1,000		$100		$222	
33	Total Ghent 1		**$138,380**		**$10,196**		**$27,037**	
34								
35	Ghent 2 - SCR		$227,000		$7,078		$34,704	
36	Ghent 2 - Baghouse		$120,000		$5,002		$19,606	
37	Ghent 2 - PAC Injection		$6,109		$2,880		$3,623	
38	Ghent 2 - Lime Injection		$5,483		$2,775		$3,442	
39	Ghent 2 - Neural Networks		$1,000		$100		$222	
40	Total Ghent 2		**$359,592**		**$17,835**		**$61,597**	
41								
42	Ghent 3 - Baghouse		$138,000		$6,122		$22,917	
43	Ghent 3 - PAC Injection		$6,173		$4,134		$4,885	
44	Ghent 3 - Neural Networks		$1,000		$100		$222	
45	Total Ghent 3		**$145,173**		**$10,356**		**$28,024**	
46								

	A	B	C	D	E	F	G	H
47	Ghent 4 - Baghouse		$117,000		$5,363		$19,602	
48	Ghent 4 - PAC Injection		$6,210		$3,896		$4,652	
49	Ghent 4 - Neural Networks		$1,000		$100		$222	
50	Total Ghent 4		$124,210		$9,359		$24,476	
51								
52	**Total Ghent**		**$767,355**		**$47,746**		**$141,134**	
53								
54								
55	**GREEN RIVER**							
56	Green River 3 - SCR		$29,000		$1,040		$4,569	
57	Green River 3 - CDS-FF		$38,000		$6,874		$11,499	
58	Green River 3 - PAC Injection		$1,112		$323		$458	
59	Green River 3 - Neural Networks		$500		$50		$111	
60	Total Green River 3		**$68,612**		**$8,287**		**$16,637**	
61								
62	Green River 4 - SCR		$42,000		$1,442		$6,553	
63	Green River 4 - CDS-FF		$54,000		$10,289		$16,861	
64	Green River 4 - PAC Injection		$1,583		$515		$708	
65	Green River 4 - Neural Networks		$500		$50		$111	
66	Total Green River 4		**$98,083**		**$12,296**		**$24,233**	
67								
68	**Total Green River**		**$166,695**		**$20,583**		**$40,870**	
69								
70								
71	**CANE RUN**							
72	Cane Run 4 - FGD		$152,000		$8,428		$26,926	
73	Cane Run 4 - SCR		$63,000		$2,219		$9,886	
74	Cane Run 4 - Baghouse		$33,000		$1,924		$5,940	
75	Cane Run 4 - PAC Injection		$2,326		$1,087		$1,370	
76	Cane Run 4 - Lime Injection		$2,569		$983		$1,296	
77	Cane Run 4 - Neural Networks		$500		$50		$111	
78	Total Cane Run 4		**$253,395**		**$14,691**		**$45,529**	
79								
80	Cane Run 5 - FGD		$159,000		$8,789		$28,139	
81	Cane Run 5 - SCR		$66,000		$2,421		$10,453	
82	Cane Run 5 - Baghouse		$35,000		$2,061		$6,321	
83	Cane Run 5 - PAC Injection		$2,490		$1,120		$1,423	
84	Cane Run 5 - Lime Injection		$2,752		$1,089		$1,424	
85	Cane Run 5 - Neural Networks		$500		$50		$111	
86	Total Cane Run 5		**$265,742**		**$15,530**		**$47,871**	
87								
88	Cane Run 6 - FGD		$202,000		$10,431		$35,014	
89	Cane Run 6 - SCR		$86,000		$2,793		$13,259	
90	Can Rune 6 - Baghouse		$45,000		$2,672		$8,149	
91	Cane Run 6 - PAC Injection		$3,490		$1,336		$1,761	
92	Cane Run 6 - Lime Injection		$3,873		$1,367		$1,838	

	A	B	C	D	E	F	G	H
93	Cane Run 6 - Neural Networks		$500		$50		$111	
94	Total Can Run 6		$340,863		$18,649		$60,132	
95								
96	**Total Cane Run**		**$860,000**		**$48,870**		**$153,532**	
97								
98								
99	**Mill Creek**							
100	Mill Creek 1 - FGD		$297,000		$14,341		$50,486	
101	Mill Creek 1 - SCR		$97,000		$3,366		$15,171	
102	Mill Creek 1 - Baghouse		$81,000		$3,477		$13,335	
103	Mill Creek 1 - Electrostatic Precipitator		$32,882		$3,581		$7,583	
104	Mill Creek 1 - PAC Injection		$4,412		$2,213		$2,750	
105	Mill Creek 1 - Lime Injection		$4,480		$2,024		$2,569	
106	Mill Creek 1 - Neural Networks		$1,000		$100		$222	
107	Total Mill Creek 1		**$517,774**		**$29,102**		**$92,116**	
108								
109	Mill Creek 2 - FGD		$297,000		$14,604		$50,749	
110	Mill Creek 2 - SCR		$97,000		$3,401		$15,206	
111	Mill Creek 2 - Baghouse		$81,000		$3,518		$13,376	
112	Mill Creek 2 - Electrostatic Precipitator		$32,882		$3,664		$7,666	
113	Mill Creek 2 - PAC Injection		$4,412		$2,340		$2,877	
114	Mill Creek 2 - Lime Injection		$4,480		$2,117		$2,662	
115	Mill Creek 2 - Neural Networks		$1,000		$100		$222	
116	Total Mill Creek 2		**$517,774**		**$29,744**		**$92,758**	
117								
118	Mill Creek 3 - FGD		$392,000		$18,911		$66,617	
119	Mill Creek 3 - Baghouse		$114,000		$4,923		$18,797	
120	Mill Creek 3 - PAC Injection		$5,592		$3,213		$3,894	
121	Mill Creek 3 - Neural Networks		$1,000		$100		$222	
122	Total Mill Creek 3		**$512,592**		**$27,147**		**$89,530**	
123								
124	Mill Creek 4 - FGD		$455,000		$21,775		$77,149	
125	Mill Creek 4 - Baghouse		$133,000		$5,804		$21,990	
126	Mill Creek 4 - PAC Injection		$6,890		$3,858		$4,697	
127	Mill Creek 4 - Neural Networks		$1,000		$100		$222	
128	Total Mill Creek 4		**$595,890**		**$31,537**		**$104,058**	
129								
130	**Total Mill Creek**		**$2,144,030**		**$117,530**		**$378,462**	
131								
132								
133	**TRIMBLE**							
134	Trimble 1 - Baghouse		$128,000		$5,782		$21,360	
135	Trimble 1 - PAC Injection		$6,451		$4,413		$5,198	
136	Trimble 1 - Neural Networks		$1,000		$100		$222	
137	Total Trimble 1		$135,451		$10,295		$26,780	
138								

	A	B	C	D	E	F	G	H
139	**Total Trimble**		**$135,451**		**$10,295**		**$26,780**	
140								
141								
142	**Grand Total**		**$4,333,694**		**$260,580**		**$787,996**	

	A	B	C	D	E
1	Black & Veatch Study Cost Estimates				
2					
3					
4					
5			**MW**		**$/kW**
6	**BROWN**				
7	Brown 1 - Low NOx Burners				$11
8	Brown 1 - Baghouse				$364
9	Brown 1 - PAC Injection				$15
10	Brown 1 - Neural Networks				$5
11	Brown 1 - Overfire Air				$7
12	Total Brown 1		110		**$400**
13					
14	Brown 2 - SCR				$511
15	Brown 2 - Baghouse				$283
16	Brown 2 - PAC Injection				$14
17	Brown 2 - Neural Networks				$3
18	Brown 2 - Lime Injection				$15
19	Total Brown 2		180		**$826**
20					
21	Brown 3 - Baghouse				$133
22	Brown 3 - PAC Injection				$12
23	Brown 3 - Neural Networks				$2
24	Total Brown 3		457		**$148**
25					
26	**Total Brown**		**747**		**$348**
27					
28					
29	**GHENT**				
30	Ghent 1 - Baghouse				$242
31	Ghent 1 - PAC Injection				$12
32	Ghent 1 - Neural Networks				$2
33	Total Ghent 1		541		**$256**
34					
35	Ghent 2 - SCR				$439
36	Ghent 2 - Baghouse				$232
37	Ghent 2 - PAC Injection				$12
38	Ghent 2 - Lime Injection				$11
39	Ghent 2 - Neural Networks				$2
40	Total Ghent 2		517		**$696**
41					
42	Ghent 3 - Baghouse				$264
43	Ghent 3 - PAC Injection				$12
44	Ghent 3 - Neural Networks				$2
45	Total Ghent 3		523		**$278**
46					

	A	B	C	D	E
47	Ghent 4 - Baghouse				$222
48	Ghent 4 - PAC Injection				$12
49	Ghent 4 - Neural Networks				$2
50	Total Ghent 4		526		$236
51					
52	**Total Ghent**		**2,107**		**$364**
53					
54					
55					
56	**GREEN RIVER**				
57	Green River 3 - SCR				$408
58	Green River 3 - CDS-FF				$535
59	Green River 3 - PAC Injection				$16
60	Green River 3 - Neural Networks				$7
61	Total Green River 3		71		**$966**
62					
63	Green River 4 - SCR				$385
64	Green River 4 - CDS-FF				$495
65	Green River 4 - PAC Injection				$15
66	Green River 4 - Neural Networks				$5
67	Total Green River 4		109		**$900**
68					
69	**Total Green River**		**180**		**$926**
70					
71					
72	**CANE RUN**				
73	Cane Run 4 - FGD				$905
74	Cane Run 4 - SCR				$375
75	Cane Run 4 - Baghouse				$196
76	Cane Run 4 - PAC Injection				$14
77	Cane Run 4 - Lime Injection				$15
78	Cane Run 4 - Neural Networks				$3
79	Total Cane Run 4		168		**$1,508**
80					
81	Cane Run 5 - FGD				$878
82	Cane Run 5 - SCR				$365
83	Cane Run 5 - Baghouse				$193
84	Cane Run 5 - PAC Injection				$14
85	Cane Run 5 - Lime Injection				$15
86	Cane Run 5 - Neural Networks				$3
87	Total Cane Run 5		181		**$1,468**
88					
89	Cane Run 6 - FGD				$774
90	Cane Run 6 - SCR				$330
91	Can Rune 6 - Baghouse				$172
92	Cane Run 6 - PAC Injection				$13

	A	B	C	D	E
93	Cane Run 6 - Lime Injection				$15
94	Cane Run 6 - Neural Networks				$2
95	Total Can Run 6		261		$1,306
96					
97	**Total Cane Run**		**610**		**$1,410**
98					
99					
100	**Mill Creek**				
101	Mill Creek 1 - FGD				$900
102	Mill Creek 1 - SCR				$294
103	Mill Creek 1 - Baghouse				$245
104	Mill Creek 1 - Electrostatic Precipitator				$100
105	Mill Creek 1 - PAC Injection				$13
106	Mill Creek 1 - Lime Injection				$14
107	Mill Creek 1 - Neural Networks				$3
108	Total Mill Creek 1		330		**$1,569**
109					
110	Mill Creek 2 - FGD				$900
111	Mill Creek 2 - SCR				$294
112	Mill Creek 2 - Baghouse				$245
113	Mill Creek 2 - Electrostatic Precipitator				$100
114	Mill Creek 2 - PAC Injection				$13
115	Mill Creek 2 - Lime Injection				$14
116	Mill Creek 2 - Neural Networks				$3
117	Total Mill Creek 2		330		**$1,569**
118					
119	Mill Creek 3 - FGD				$927
120	Mill Creek 3 - Baghouse				$270
121	Mill Creek 3 - PAC Injection				$13
122	Mill Creek 3 - Neural Networks				$2
123	Total Mill Creek 3		423		**$1,212**
124					
125	Mill Creek 4 - FGD				$867
126	Mill Creek 4 - Baghouse				$253
127	Mill Creek 4 - PAC Injection				$13
128	Mill Creek 4 - Neural Networks				$2
129	Total Mill Creek 4		525		**$1,135**
130					
131	**Total Mill Creek**		**1,608**		**$1,333**
132					
133					
134	**TRIMBLE**				
135	Trimble 1 - Baghouse				$234
136	Trimble 1 - PAC Injection				$12
137	Trimble 1 - Neural Networks				$2
138	Total Trimble 1		547		$248

	A	B	C	D	E
139					
140	**Total Trimble**		**547**		**$248**
141					
142					
143	**Grand Total**		**5,799**		**$747**

From: Saunders, Eileen
To: Raque, Gary; Ritchey, Stacy
Sent: 6/1/2010 8:32:33 AM
Subject: FW: 167987.26.0000 100530 - EON Draft AQCS Costs - EW Brown
Attachments: Brown Unit 1 Cost Estimates 052810.pdf; Brown Unit 2 Cost Estimates 052810.pdf; Brown Unit 3 Cost Estimates 052810.pdf

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From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 2:43 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - EW Brown

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at EW Brown Units 1-3. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Brown
Unit: 1
MW 110
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$40,000,000	$364	$1,477,000	$6,345,000
PAC Injection	$1,599,000	$15	$614,000	$809,000
Overfire Air	$767,000	$7	$132,000	$225,000
Low NOx Burners	$1,156,000	$11	$0	$141,000
Neural Networks	$500,000	$5	$50,000	$111,000
Total	$44,022,000	$400	$2,273,000	$7,631,000

DRAFT

Plant Name: Brown
Unit: 2
MW 180
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$92,000,000	$511	$3,278,000	$14,474,000
Fabric Filter	$51,000,000	$283	$1,959,000	$8,166,000
Lime Injection	$2,739,000	$15	$1,155,000	$1,488,000
PAC Injection	$2,476,000	$14	$1,090,000	$1,391,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$148,715,000	$826	$7,532,000	$25,630,000

BROWN UNIT 2 - SCR COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$4,636,000			
Ductwork and Breeching	$3,580,000			
Mechanical - Balance of Plant (BOP)	$1,173,000			
Electrical - Equipment, Raceway	$1,339,000			
VFDs, Motors and Couplings	$500,000	Engineering Estimates		
Switchgear and MCCs	$468,000			
Control - DCS Instrumentation	$151,000			
Air Heater Modifications	$0	Engineering Estimates		
ID Fans	$1,158,000	Engineering Estimates		
Catalyst	$1,883,000			
Selective Catalytic Reduction System (Including Ammonia System)	$1,643,000			
Subtotal Purchase Contract	**$16,531,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,854,000			
Civil/Structural Construction - Sub-Structures	$742,000			
Mechanical/Chemical Construction	$8,971,000			
Electrical/Control Construction	$4,103,000			
Service Contracts & Construction Indirects	$14,331,000			
Demolition Costs	$6,500,000	Engineering Estimates		
Subtotal Construction Contracts	**$37,501,000**			
Construction Difficulty Costs	**$26,250,700**	Engineering Estimates		
Total Direct Costs	**$80,282,700**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$2,696,000			
EPC Construction Management (Includes G&A & Fee)	$1,691,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$444,000			
Sales Taxes	$627,000			
Project Contingency	$6,326,000			
Total Indirect Costs	**$11,784,000**			
Total Contracted Costs	**$92,000,000**			
Capital Cost Effectiveness	***$511***	***/kW***		

ANNUAL COST

			Capacity Factor =	62%
Fixed Annual Costs				
Operating labor	$123,000	1 FTE and	123,325 $/year	
Maintenance labor & materials	$2,408,000	(DC) X 3.0%		
Yearly emissions testing	$25,000	Engineering Estimates		
Catalyst activity testing	$5,000	Engineering Estimates		
Fly ash sampling and analysis	$20,000	Engineering Estimates		
Subtotal Fixed Annual Costs	**$2,581,000**			
Variable Annual Costs				
Reagent	$309,000	215 lb/hr and	530.03 $/ton	
Auxiliary and ID fan power	$186,000	940 kW and	0.03646 $/kWh	
Catalyst replacement	$202,000	50 m3 and	6,500 $/m3	
Subtotal Variable Annual Costs	**$697,000**			
Total Annual Costs	**$3,278,000**			
Levelized Capital Costs	**$11,196,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$14,474,000**			

BROWN UNIT 2 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$2,646,000			
Mechanical - Balance of Plant (BOP)	$7,580,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$161,000			
Control - DCS Instrumentation	$178,000			
ID Fans	$535,000	Engineering Estimates		
Subtotal Purchase Contract	**$11,100,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,355,000			
Civil/Structural Construction - Sub-Structures	$895,000			
Mechanical/Chemical Construction	$8,956,000			
Electrical/Control Construction	$3,024,000			
Service Contracts & Construction Indirects	$146,000			
Demolition Costs	$5,000,000	Engineering Estimates		
Subtotal Construction Contracts	**$20,376,000**			
Construction Difficulty Costs	**$14,263,200**	Engineering Estimates		
Total Direct Costs	**$45,739,200**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$2,334,000			
EPC Construction Management (Includes G&A & Fee)	$1,527,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$231,000			
Sales Taxes	$82,000			
Project Contingency - 18%	$860,000			
Total Indirect Costs	**$5,034,000**			
Total Contracted Costs	$51,000,000			
Cost Effectiveness	*$283 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	62%	
Maintenance labor and materials	$1,530,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$1,530,000**			
Variable Annual Costs				
Byproduct disposal	$5,000	120 lb/hr and	15	$/ton
Bag replacement cost	$129,000	3,880 bags and	100	$/bag
Cage replacement cost	$65,000	3,880 cages and	50	$/cage
ID fan power	$200,000	1,010 kW and	0.03646	$/kWh
Auxiliary power	$30,000	150 kW and	0.03646	$/kWh
Subtotal Variable Annual Costs	$429,000			
Total Annual Costs	$1,959,000			
Levelized Capital Costs	**$6,207,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$8,166,000			

Brown Unit 2
180 MW
High Level Emissions Control Study

Technology: Lime Injection

Date: 5/30/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$133,800	From Previous Mill Creek BACT Study				
Short-term storage silo	$88,800	From Previous Mill Creek BACT Study				
Air blowers	$121,800	From Previous Mill Creek BACT Study				
Rotary feeders	$19,800	From Previous Mill Creek BACT Study				
Injection system	$80,400	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$526,800	From Previous Mill Creek BACT Study				
Instrumentation and controls	$25,200	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$996,600					
Freight	$45,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$1,042,000					
Direct installation costs						
Foundation & supports	$104,000	(PEC) X	10.0%			
Handling & erection	$208,000	(PEC) X	20.0%			
Electrical	$104,000	(PEC) X	10.0%			
Piping	$52,000	(PEC) X	5.0%			
Insulation	$21,000	(PEC) X	2.0%			
Painting	$52,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$541,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$1,658,000					
Indirect Costs						
Engineering	$199,000	(DC) X	12.0%			
Owner's cost	$199,000	(DC) X	12.0%			
Construction management	$166,000	(DC) X	10.0%			
Start-up and spare parts	$25,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$332,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,021,000					
Allowance for Funds Used During Construction (AFDC)	$60,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,739,000					
Cost Effectiveness	*$15 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$50,000	(DC) X	3.0%			
Operating labor	$123,000	1	FTE and	123,325	$/year	Estimated manpower
Total fixed annual costs	$173,000					
Variable annual costs				62	%	capacity factor
Lime	$754,000	2,100	lb/hr and	132.19	$/ton	
Byproduct disposal cost	$208,000	2,400	lb/hr and	15	$/ton	
Auxiliary power	$20,000	100	kW and	0.03646	$/kWh	
Total variable annual costs	$982,000					
Total direct annual costs (DAC)	$1,155,000					
Indirect Annual Costs						
Cost for capital recovery	$333,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$333,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,488,000					

Brown Unit 2
180 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 5/30/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$151,641	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$99,650	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$138,643	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$17,330	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$64,989	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$415,930	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$21,663	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$909,847					
Freight	$23,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$933,000					
Direct installation costs						
Foundation & supports	$93,000	(PEC) X	10.0%			
Handling & erection	$187,000	(PEC) X	20.0%			
Electrical	$93,000	(PEC) X	10.0%			
Piping	$47,000	(PEC) X	5.0%			
Insulation	$19,000	(PEC) X	2.0%			
Painting	$47,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$486,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$1,494,000					
Indirect Costs						
Engineering	$179,000	(DC) X	12.0%			
Owner's cost	$179,000	(DC) X	12.0%			
Construction management	$149,000	(DC) X	10.0%			
Start-up and spare parts	$22,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$299,000	(DC) X	20.0%			
Total indirect costs (IC)	$928,000					
Allowance for Funds Used During Construction (AFDC)	$54,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,476,000					
Cost Effectiveness	*$14 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$45,000	(DC) X	3.0%			
Operating labor	$123,000		1 FTE and	123,325 $/year		Estimated manpower
Total fixed annual costs	$168,000					
Variable annual costs				62 %		capacity factor
Reagent (BPAC)	$896,000		150 lb/hr and	2200 $/ton		
Byproduct disposal cost	$6,000		150 lb/hr and	15 $/ton		
Auxiliary power	$20,000		100 kW and	0.03646 $/kWh		
Total variable annual costs	$922,000					
Total direct annual costs (DAC)	$1,090,000					
Indirect Annual Costs						
Cost for capital recovery	$301,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$301,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,391,000					

Plant Name: Brown
Unit: 3
MW 457
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$61,000,000	$133	$3,321,000	$10,745,000
PAC Injection	$5,426,000	$12	$2,330,000	$2,990,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$67,426,000	$148	$5,751,000	$13,957,000

DRAFT

From:	Saunders, Eileen
To:	Raque, Gary; Ritchey, Stacy
Sent:	6/1/2010 8:32:46 AM
Subject:	FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Green River
Attachments:	Green River Unit 3 Cost Estimates 052810.pdf; Green River Unit 4 Cost Estimates 052810.pdf

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 2:54 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Green River

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Green River Units 3 & 4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Green River
Unit: 3
MW 71
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$29,000,000	$408	$1,040,000	$4,569,000
CDS-FF	$38,000,000	$535	$6,874,000	$11,499,000
PAC Injection	$1,112,000	$16	$323,000	$458,000
Neural Networks	$500,000	$7	$50,000	$111,000
Total	$68,612,000	$966	$8,287,000	$16,637,000

Plant Name:	Green River
Unit:	4
MW	109
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$42,000,000	$385	$1,442,000	$6,553,000
CDS-FF	$54,000,000	$495	$10,289,000	$16,861,000
PAC Injection	$1,583,000	$15	$515,000	$708,000
Neural Networks	$500,000	$5	$50,000	$111,000
Total	$98,083,000	$900	$12,296,000	$24,233,000

DRAFT

From: Saunders, Eileen
To: Raque, Gary; Ritchey, Stacy
Sent: 6/1/2010 8:32:55 AM
Subject: FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Trimble
Attachments: Trimble Unit 1 Cost Estimates 052810.pdf

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:00 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Trimble

Eileen,

Attached please find the draft AQCS Costs for the approved technologies for Trimble Unit 1. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Trimble County
Unit: 1
MW 547
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$128,000,000	$234	$5,782,000	$21,360,000
PAC Injection	$6,451,000	$12	$4,413,000	$5,198,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$135,451,000	$248	$10,295,000	$26,780,000

From: Saunders, Eileen
To: Raque, Gary; Ritchey, Stacy
Sent: 6/1/2010 8:33:04 AM
Subject: FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Ghent
Attachments: Ghent Unit 1 Cost Estimates 052810.pdf; Ghent Unit 2 Cost Estimates 052810.pdf; Ghent Unit 3 Cost Estimates 052810.pdf; Ghent Unit 4 Cost Estimates 052810.pdf

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From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:09 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Ghent

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Ghent Units 1-4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Ghent
Unit: 1
MW 541
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$131,000,000	$242	$5,888,000	$21,831,000
PAC Injection	$6,380,000	$12	$4,208,000	$4,984,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$138,380,000	$256	$10,196,000	$27,037,000

Plant Name: Ghent
Unit: 2
MW 517
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$227,000,000	$439	$7,078,000	$34,704,000
Fabric Filter	$120,000,000	$232	$5,002,000	$19,606,000
Lime Injection	$5,483,000	$11	$2,775,000	$3,442,000
PAC Injection	$6,109,000	$12	$2,880,000	$3,623,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$359,592,000	$696	$17,835,000	$61,597,000

DRAFT

Plant Name:	Ghent
Unit:	3
MW	523
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$138,000,000	$264	$6,122,000	$22,917,000
PAC Injection	$6,173,000	$12	$4,134,000	$4,885,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$145,173,000	$278	$10,356,000	$28,024,000

DRAFT

Plant Name: Ghent
Unit: 4
MW 526
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$117,000,000	$222	$5,363,000	$19,602,000
PAC Injection	$6,210,000	$12	$3,896,000	$4,652,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$124,210,000	$236	$9,359,000	$24,476,000

From: Saunders, Eileen
To: Raque, Gary; Ritchey, Stacy
Sent: 6/1/2010 8:33:12 AM
Subject: FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Mill Creek
Attachments: Mill Creek Unit 1 Cost Estimates 052810.pdf; Mill Creek Unit 2 Cost Estimates 052810.pdf; Mill Creek Unit 3 Cost Estimates 052810.pdf; Mill Creek Unit 4 Cost Estimates 052810.pdf

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From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:23 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Mill Creek

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Mill Creek Units 1-4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
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Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

E-ON Fleetwide Study | Black & Veatch Cost Estimates | 167987

Plant Name: Mill Creek
Unit: 1
MW 330
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$97,000,000	$294	$3,366,000	$15,171,000
WFGD	$297,000,000	$900	$14,341,000	$50,486,000
Fabric Filter	$81,000,000	$245	$3,477,000	$13,335,000
Electrostatic Precipitator	$32,882,000	$100	$3,581,000	$7,583,000
Lime Injection	$4,480,000	$14	$2,024,000	$2,569,000
PAC Injection	$4,412,000	$13	$2,213,000	$2,750,000
Neural Networks	$1,000,000	$3	$100,000	$222,000
Total	$517,774,000	$1,569	$29,102,000	$92,116,000

Plant Name: Mill Creek
Unit: 2
MW 330
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$97,000,000	$294	$3,401,000	$15,206,000
WFGD	$297,000,000	$900	$14,604,000	$50,749,000
Fabric Filter	$81,000,000	$245	$3,518,000	$13,376,000
Electrostatic Precipitator	$32,882,000	$100	$3,664,000	$7,666,000
Lime Injection	$4,480,000	$14	$2,117,000	$2,662,000
PAC Injection	$4,412,000	$13	$2,340,000	$2,877,000
Neural Networks	$1,000,000	$3	$100,000	$222,000
Total	$517,774,000	$1,569	$29,744,000	$92,758,000

Plant Name: Mill Creek
Unit: 3
MW 423
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
WFGD	$392,000,000	$927	$18,911,000	$66,617,000
Fabric Filter	$114,000,000	$270	$4,923,000	$18,797,000
PAC Injection	$5,592,000	$13	$3,213,000	$3,894,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$512,592,000	$1,212	$27,147,000	$89,530,000

DRAFT

Plant Name:	Mill Creek
Unit:	4
MW	525
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
WFGD	$455,000,000	$867	$21,775,000	$77,149,000
Fabric Filter	$133,000,000	$253	$5,804,000	$21,990,000
PAC Injection	$6,890,000	$13	$3,858,000	$4,697,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$595,890,000	$1,135	$31,537,000	$104,058,000

DRAFT

From:	Saunders, Eileen
To:	Raque, Gary; Ritchey, Stacy
Sent:	6/1/2010 8:33:20 AM
Subject:	FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Cane Run
Attachments:	Cane Run Unit 4 Cost Estimates 052810.pdf; Cane Run Unit 5 Cost Estimates 052810.pdf; Cane Run Unit 6 Cost Estimates 052810.pdf

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:34 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Cane Run

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Cane Run Units 4-6. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
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11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

E-ON Fleetwide Study   Black & Veatch Cost Estimates   167987

Plant Name: Cane Run
Unit: 4
MW 168
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$63,000,000	$375	$2,219,000	$9,886,000
WFGD	$152,000,000	$905	$8,428,000	$26,926,000
Fabric Filter	$33,000,000	$196	$1,924,000	$5,940,000
Lime Injection	$2,569,000	$15	$983,000	$1,296,000
PAC Injection	$2,326,000	$14	$1,087,000	$1,370,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$253,395,000	$1,508	$14,691,000	$45,529,000

Plant Name: Cane Run
Unit: 5
MW 181
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$66,000,000	$365	$2,421,000	$10,453,000
WFGD	$159,000,000	$878	$8,789,000	$28,139,000
Fabric Filter	$35,000,000	$193	$2,061,000	$6,321,000
Lime Injection	$2,752,000	$15	$1,089,000	$1,424,000
PAC Injection	$2,490,000	$14	$1,120,000	$1,423,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$265,742,000	$1,468	$15,530,000	$47,871,000

Plant Name: Cane Run
Unit: 6
MW 261
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$86,000,000	$330	$2,793,000	$13,259,000
WFGD	$202,000,000	$774	$10,431,000	$35,014,000
Fabric Filter	$45,000,000	$172	$2,672,000	$8,149,000
Lime Injection	$3,873,000	$15	$1,367,000	$1,838,000
PAC Injection	$3,490,000	$13	$1,336,000	$1,761,000
Neural Networks	$500,000	$2	$50,000	$111,000
Total	$340,863,000	$1,306	$18,649,000	$60,132,000

From: Saunders, Eileen
To: Ritchey, Stacy; Raque, Gary
Sent: 6/1/2010 12:15:40 PM
Subject: Environmental Summay (rev3 6-1-10).xlsx
Attachments: Environmental Summay (rev3 6-1-10).xlsx

Updated

	A	B	C	D	E	F	G	H	I	J
1	Black & Veatch Study Cost Estimates									
2	$ in thousands									
3										
4										
5			**Capital Cost**		**O&M Cost**		**Total Capital and O&M**		**Levelized Annual Costs**	
6	**BROWN**									
7	Brown 1 - Low NOx Burners		$1,156		$0		$1,156		$141	
8	Brown 1 - Baghouse		$40,000		$1,477		$41,477		$6,345	
9	Brown 1 - PAC Injection		$1,599		$614		$2,213		$809	
10	Brown 1 - Neural Networks		$500		$50		$550		$111	
11	Brown 1 - Overfire Air		$767		$132		$899		$225	
12	Total Brown 1		**$44,022**		**$2,273**		**$46,295**		**$7,631**	
13										
14	Brown 2 - SCR		$92,000		$3,278		$95,278		$14,474	
15	Brown 2 - Baghouse		$51,000		$1,959		$52,959		$8,166	
16	Brown 2 - PAC Injection		$2,476		$1,090		$3,566		$1,391	
17	Brown 2 - Neural Networks		$500		$50		$550		$111	
18	Brown 2 - Lime Injection		$2,739		$1,155		$3,894		$1,488	
19	Total Brown 2		**$148,715**		**$7,532**		**$156,247**		**$25,630**	
20										
21	Brown 3 - Baghouse		$61,000		$3,321		$64,321		$10,745	
22	Brown 3 - PAC Injection		$5,426		$2,330		$7,756		$2,990	
23	Brown 3 - Neural Networks		$1,000		$100		$1,100		$222	
24	Total Brown 3		**$67,426**		**$5,751**		**$73,177**		**$13,957**	
25										
26	**Total Brown**		**$260,163**		**$15,556**		**$275,719**		**$47,218**	
27										
28										
29	**GHENT**									
30	Ghent 1 - Baghouse		$131,000		$5,888		$136,888		$21,831	
31	Ghent 1 - PAC Injection		$6,380		$4,208		$10,588		$4,984	
32	Ghent 1 - Neural Networks		$1,000		$100		$1,100		$222	
33	Total Ghent 1		**$138,380**		**$10,196**		**$148,576**		**$27,037**	
34										
35	Ghent 2 - SCR		$227,000		$7,078		$234,078		$34,704	
36	Ghent 2 - Baghouse		$120,000		$5,002		$125,002		$19,606	
37	Ghent 2 - PAC Injection		$6,109		$2,880		$8,989		$3,623	
38	Ghent 2 - Lime Injection		$5,483		$2,775		$8,258		$3,442	
39	Ghent 2 - Neural Networks		$1,000		$100		$1,100		$222	
40	Total Ghent 2		**$359,592**		**$17,835**		**$377,427**		**$61,597**	
41										
42	Ghent 3 - Baghouse		$138,000		$6,122		$144,122		$22,917	
43	Ghent 3 - PAC Injection		$6,173		$4,134		$10,307		$4,885	
44	Ghent 3 - Neural Networks		$1,000		$100		$1,100		$222	
45	Total Ghent 3		**$145,173**		**$10,356**		**$155,529**		**$28,024**	
46										

	A	B	C	D	E	F	G	H	I	J
47	Ghent 4 - Baghouse		$117,000		$5,363		$122,363		$19,602	
48	Ghent 4 - PAC Injection		$6,210		$3,896		$10,106		$4,652	
49	Ghent 4 - Neural Networks		$1,000		$100		$1,100		$222	
50	Total Ghent 4		$124,210		$9,359		$133,569		$24,476	
51										
52	**Total Ghent**		**$767,355**		**$47,746**		**$815,101**		**$141,134**	
53										
54										
55	**GREEN RIVER**									
56	Green River 3 - SCR		$29,000		$1,040		$30,040		$4,569	
57	Green River 3 - CDS-FF		$38,000		$6,874		$44,874		$11,499	
58	Green River 3 - PAC Injection		$1,112		$323		$1,435		$458	
59	Green River 3 - Neural Networks		$500		$50		$550		$111	
60	Total Green River 3		**$68,612**		**$8,287**		**$76,899**		**$16,637**	
61										
62	Green River 4 - SCR		$42,000		$1,442		$43,442		$6,553	
63	Green River 4 - CDS-FF		$54,000		$10,289		$64,289		$16,861	
64	Green River 4 - PAC Injection		$1,583		$515		$2,098		$708	
65	Green River 4 - Neural Networks		$500		$50		$550		$111	
66	Total Green River 4		**$98,083**		**$12,296**		**$110,379**		**$24,233**	
67										
68	**Total Green River**		**$166,695**		**$20,583**		**$187,278**		**$40,870**	
69										
70										
71	**CANE RUN**									
72	Cane Run 4 - FGD		$152,000		$8,428		$160,428		$26,926	
73	Cane Run 4 - SCR		$63,000		$2,219		$65,219		$9,886	
74	Cane Run 4 - Baghouse		$33,000		$1,924		$34,924		$5,940	
75	Cane Run 4 - PAC Injection		$2,326		$1,087		$3,413		$1,370	
76	Cane Run 4 - Lime Injection		$2,569		$983		$3,552		$1,296	
77	Cane Run 4 - Neural Networks		$500		$50		$550		$111	
78	Total Cane Run 4		**$253,395**		**$14,691**		**$268,086**		**$45,529**	
79										
80	Cane Run 5 - FGD		$159,000		$8,789		$167,789		$28,139	
81	Cane Run 5 - SCR		$66,000		$2,421		$68,421		$10,453	
82	Cane Run 5 - Baghouse		$35,000		$2,061		$37,061		$6,321	
83	Cane Run 5 - PAC Injection		$2,490		$1,120		$3,610		$1,423	
84	Cane Run 5 - Lime Injection		$2,752		$1,089		$3,841		$1,424	
85	Cane Run 5 - Neural Networks		$500		$50		$550		$111	
86	Total Cane Run 5		**$265,742**		**$15,530**		**$281,272**		**$47,871**	
87										
88	Cane Run 6 - FGD		$202,000		$10,431		$212,431		$35,014	
89	Cane Run 6 - SCR		$86,000		$2,793		$88,793		$13,259	
90	Can Rune 6 - Baghouse		$45,000		$2,672		$47,672		$8,149	
91	Cane Run 6 - PAC Injection		$3,490		$1,336		$4,826		$1,761	
92	Cane Run 6 - Lime Injection		$3,873		$1,367		$5,240		$1,838	

	A	B	C	D	E	F	G	H	I	J
93	Cane Run 6 - Neural Networks		$500		$50		$550		$111	
94	Total Can Run 6		$340,863		$18,649		$359,512		$60,132	
95										
96	**Total Cane Run**		**$860,000**		**$48,870**		**$908,870**		**$153,532**	
97										
98										
99	**Mill Creek**									
100	Mill Creek 1 - FGD		$297,000		$14,341		$311,341		$50,486	
101	Mill Creek 1 - SCR		$97,000		$3,366		$100,366		$15,171	
102	Mill Creek 1 - Baghouse		$81,000		$3,477		$84,477		$13,335	
103	Mill Creek 1 - Electrostatic Precipitator		$32,882		$3,581		$36,463		$7,583	
104	Mill Creek 1 - PAC Injection		$4,412		$2,213		$6,625		$2,750	
105	Mill Creek 1 - Lime Injection		$4,480		$2,024		$6,504		$2,569	
106	Mill Creek 1 - Neural Networks		$1,000		$100		$1,100		$222	
107	Total Mill Creek 1		**$517,774**		**$29,102**		**$546,876**		**$92,116**	
108										
109	Mill Creek 2 - FGD		$297,000		$14,604		$311,604		$50,749	
110	Mill Creek 2 - SCR		$97,000		$3,401		$100,401		$15,206	
111	Mill Creek 2 - Baghouse		$81,000		$3,518		$84,518		$13,376	
112	Mill Creek 2 - Electrostatic Precipitator		$32,882		$3,664		$36,546		$7,666	
113	Mill Creek 2 - PAC Injection		$4,412		$2,340		$6,752		$2,877	
114	Mill Creek 2 - Lime Injection		$4,480		$2,117		$6,597		$2,662	
115	Mill Creek 2 - Neural Networks		$1,000		$100		$1,100		$222	
116	Total Mill Creek 2		**$517,774**		**$29,744**		**$547,518**		**$92,758**	
117										
118	Mill Creek 3 - FGD		$392,000		$18,911		$410,911		$66,617	
119	Mill Creek 3 - Baghouse		$114,000		$4,923		$118,923		$18,797	
120	Mill Creek 3 - PAC Injection		$5,592		$3,213		$8,805		$3,894	
121	Mill Creek 3 - Neural Networks		$1,000		$100		$1,100		$222	
122	Total Mill Creek 3		**$512,592**		**$27,147**		**$539,739**		**$89,530**	
123										
124	Mill Creek 4 - FGD		$455,000		$21,775		$476,775		$77,149	
125	Mill Creek 4 - Baghouse		$133,000		$5,804		$138,804		$21,990	
126	Mill Creek 4 - PAC Injection		$6,890		$3,858		$10,748		$4,697	
127	Mill Creek 4 - Neural Networks		$1,000		$100		$1,100		$222	
128	Total Mill Creek 4		**$595,890**		**$31,537**		**$627,427**		**$104,058**	
129										
130	**Total Mill Creek**		**$2,144,030**		**$117,530**		**$2,261,560**		**$378,462**	
131										
132										
133	**TRIMBLE**									
134	Trimble 1 - Baghouse		$128,000		$5,782		$133,782		$21,360	
135	Trimble 1 - PAC Injection		$6,451		$4,413		$10,864		$5,198	
136	Trimble 1 - Neural Networks		$1,000		$100		$1,100		$222	
137	Total Trimble 1		$135,451		$10,295		$145,746		$26,780	
138										

	A	B	C	D	E	F	G	H	I	J
139	**Total Trimble**		**$135,451**		**$10,295**		**$145,746**		**$26,780**	
140										
141										
142	**Grand Total**		**$4,333,694**		**$260,580**		**$4,594,274**		**$787,996**	

From:	Saunders, Eileen
To:	Ritchey, Stacy; Raque, Gary
Sent:	6/1/2010 12:17:16 PM
Subject:	FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Cane Run
Attachments:	Cane Run Unit 4 Cost Estimates 052810.pdf; Cane Run Unit 5 Cost Estimates 052810.pdf; Cane Run Unit 6 Cost Estimates 052810.pdf

phone

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:34 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Cane Run

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Cane Run Units 4-6. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Cane Run
Unit: 4
MW 168
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$63,000,000	$375	$2,219,000	$9,886,000
WFGD	$152,000,000	$905	$8,428,000	$26,926,000
Fabric Filter	$33,000,000	$196	$1,924,000	$5,940,000
Lime Injection	$2,569,000	$15	$983,000	$1,296,000
PAC Injection	$2,326,000	$14	$1,087,000	$1,370,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$253,395,000	$1,508	$14,691,000	$45,529,000

DRAFT

Plant Name: Cane Run
Unit: 5
MW 181
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$66,000,000	$365	$2,421,000	$10,453,000
WFGD	$159,000,000	$878	$8,789,000	$28,139,000
Fabric Filter	$35,000,000	$193	$2,061,000	$6,321,000
Lime Injection	$2,752,000	$15	$1,089,000	$1,424,000
PAC Injection	$2,490,000	$14	$1,120,000	$1,423,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$265,742,000	$1,468	$15,530,000	$47,871,000

DRAFT

E-ON Fleetwide Study | Black & Veatch Cost Estimates | 167987

Plant Name: Cane Run
Unit: 6
MW 261
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$86,000,000	$330	$2,793,000	$13,259,000
WFGD	$202,000,000	$774	$10,431,000	$35,014,000
Fabric Filter	$45,000,000	$172	$2,672,000	$8,149,000
Lime Injection	$3,873,000	$15	$1,367,000	$1,838,000
PAC Injection	$3,490,000	$13	$1,336,000	$1,761,000
Neural Networks	$500,000	$2	$50,000	$111,000
Total	$340,863,000	$1,306	$18,649,000	$60,132,000

From:	Saunders, Eileen
To:	Ritchey, Stacy; Raque, Gary
Sent:	6/1/2010 12:17:49 PM
Subject:	FW: E.ON AQC - Design Basis
Attachments:	Design Basis for E-ON 052110b.pdf

FYI

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Friday, May 21, 2010 10:52 AM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand; Mehta, Pratik D.
Subject: E.ON AQC - Design Basis

Eileen,
Attached is the design basis we have quickly developed for each unit based on the noted fuels and other information provided by E.ON. The design basis is reflects the estimate of boiler and equipment operation based using the current unit emissions from the Matrix. B&V will use this information as the baseline for each unit and from this point the approved AQC technologies will be added and costs developed. Again, this is just one point/step of the overall costing process and can be revised in later phases of the project.
Please review this information and feel free to provide comments by Monday morning for consideration.

Regards,
Kyle

Kyle Lucas | Environmental Permitting Manager
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Email: **lucaskj@bv.com**

EON
EW Brown, Ghent, Cane Run, Mill Creek, Trimble County, Green River
Design Basis
5/21/2010

Unit Designation	EW Brown			Ghent				Cane Run			Mill Creek				Trimble County		Green River		Reference
	1	2	3	1	2	3	4	4	5	6	1	2	3	4	1	2	3	4	
Ultimate Coal analysis, wet basis																			
Carbon, %	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	61.20	65.41	65.41	B&V Combustion Calculations
Hydrogen, %	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.46	4.46	B&V Combustion Calculations
Sulfur, %	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	2.60	2.60	B&V Combustion Calculations
Nitrogen, %	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.34	1.34	B&V Combustion Calculations
Chlorine, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	B&V Combustion Calculations
Oxygen, %	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.89	6.69	6.69	B&V Combustion Calculations
Ash, %	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	9.00	9.00	B&V Combustion Calculations
Moisture, %	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	10.50	10.50	B&V Combustion Calculations
Higher Heating Value, Btu/lb	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,600	11,600	B&V Combustion Calculations
Trace Metal Analysis, ppm																			
Antimony (Sb)	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.07	1.07	Data from E-ON
Arsenic (As)	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	10.00	10.00	Data from E-ON
Barium (Ba)	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	49.00	49.00	Data from E-ON
Cadmium (Cd)	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.30	0.30	Data from E-ON
Chlorine (Cl)	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1845.00	1845.00	Data from E-ON
Chromium (Cr)	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	17.00	17.00	Data from E-ON
Fluorine (F)	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	98.00	71.00	71.00	Data from E-ON
Lead (Pb)	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	Data from E-ON
Magnesium (Mg)	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	684.00	509.00	509.00	Data from E-ON
Mercury (Hg)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.10	0.10	Data from E-ON
Nickel (Ni)	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	14.00	14.00	Data from E-ON
Selenium (Se)	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	1.93	1.93	Data from E-ON
Strontium (Sr)	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	30.00	30.00	Data from E-ON
Vanadium (V)	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	Data from E-ON
Zinc (Zn)	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	50.00	50.00	Data from E-ON
Ash Analysis, % by mass																			
Alumina (Al2O3)	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	21.69	19.45	19.45	Data from E-ON
Barium Oxide (BaO)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	Data from E-ON
Lime (CaO)	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.89	2.89	Data from E-ON
Iron Oxide (Fe2O3)	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	19.90	19.90	Data from E-ON
Magnesia (MgO)	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	Data from E-ON
Manganese Oxide (MnO)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	Data from E-ON
Phosphorous Pentoxide (P2O5)	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.21	0.21	Data from E-ON
Potassium Oxide (K2O)	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.41	2.41	Data from E-ON
Silica (SiO2)	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	45.88	49.65	49.65	Data from E-ON
Sodium Oxide (Na2O)	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.77	0.77	Data from E-ON
Strontium Oxide (SrO)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	Data from E-ON
Sulfur Trioxide (SO3)	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.47	2.47	Data from E-ON
Titania (TiO2)	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.08	1.08	Data from E-ON
Undetermined	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	Data from E-ON
Unit Characteristics																			
Gross Turbine Generator Load, MW	110	180	457	541	517	523	526	168	181	261	330	330	423	525	547	760	75	109	B&V Combustion Calculations
Boiler Efficiency, % (HHV)	85.32	86.73	86.53	85.74	86.83	86.31	86.77	85.12	87.14	87.09	85.40	85.40	86.51	86.51	86.88	86.92	89.02	85.25	B&V Combustion Calculations
Boiler Heat Input, MBtu/hr (HHV)	999.80	1,665.50	4,120.43	5,369	4,327	5,496	5,473	1,603	1,757	2,589	3,224	3,311	4,209	5,122	5,310	6,583	848	1,150	B&V Combustion Calculations
Coal Flow Rate, lb/hr	89,268	148,705	367,895	479,375	386,339	490,714	468,661	143,125	156,875	231,161	287,857	295,625	375,804	457,321	474,107	587,768	73,103	99,138	B&V Combustion Calculations
Capacity Factor, %	44.00	62.00	57.00	81.00	71.00	78.00	77.00	60.00	62.00	54.00	68.00	70.00	75.00	75.00	85.00	87.00	26.00	32.00	Data from E-ON
Fly Ash Portion of Total Ash, %	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	B&V Combustion Calculations
Air Heater Leakage, %	10.0	10.0	10.0	10.0	10.0	10.0	10.0	16.7	17.0	7.8	10.0	10.0	10.0	10.0	10.0	6.0	6.8	6.8	B&V Combustion Calculations
Excess Air, %	34.352	18.258	16.848	18.258	21.926	21.926	20.433	20.00	20.00	20.00	20.00	20.00	20.00	20.00	18.258	19.700	25.000	25.000	B&V Combustion Calculations
Economizer Outlet Conditions																			
Flue Gas Temperature, F	650	730	730	729	610	731	791	580	630	617	760	760	690	640	700	586	475	610	B&V Combustion Calculations
Flue Gas Pressure, in. w.g.	-8.0	-3.7	-5.0	-3.2	-5.1	-5.1	-4.5	-4.0	-3.0	-4.0	-5.0	-5.0	-5.0	-5.0	-6.0	-6.0	-5.0	-6.0	B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	1,090,927	1,615,221	3,952,267	5,206,933	4,316,060	5,482,104	5,397,559	1,575,668	1,727,042	2,544,856	3,169,029	3,254,545	4,137,234	5,034,667	5,149,714	6,455,853	886,785	1,202,598	B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm	509,072	796,739	1,955,176	2,563,081	1,922,533	2,718,161	2,805,958	680,015	779,254	1,137,376	1,608,445	1,651,849	1,979,343	2,303,938	2,490,348	2,816,034	345,095	536,927	B&V Combustion Calculations
Uncontrolled Sulfur Dioxide Concentration, lb/MBtu	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	4.48	4.48	= % Sulfur in Coal x 20,000 / HHV
Uncontrolled Sulfur Dioxide Mass Flow Rate, lb/hr	5,993	9,983	24,697	32,161	25,936	32,942	32,805	9,608	10,531	15,518	19,324	19,846	25,228	30,701	31,828	39,458	3,798	5,150	B&V Combustion Calculations
Uncontrolled PM Concentration, lb/MBtu	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	8.746	6.334	6.334	B&V Combustion Calculations
Uncontrolled PM Mass Flow Rate, lb/hr	8,744	14,566	36,037	46,957	37,844	48,068	47,867	14,020	15,367	22,643	28,197	28,958	36,812	44,797	46,441	57,575	5,371	7,284	= Uncontrolled PM (lb/MBtu) x Heat Input (MBtu/hr)
Uncontrolled Mercury Concentration, lb/TBtu	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	10.71	8.62	8.62	= Hg in Coal (ppm) x Coal Flow Rate (lb/hr) / Heat Input (MBtu/hr)
Uncontrolled HCl Mass Flow Rate, lb/hr	147	244.63	605.21	789	636	807	804	235	258	380	474	486	618	752	780	967	139	188	= HCl in Coal (ppm) / 1,000,000 x Coal Flow Rate (lb/hr) x MW of HCl / MW of Cl
Uncontrolled HCl Concentration, lb/MBtu	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	= HCl Flowrate (lb/hr) / Heat Input (MBtu/hr)
Hot-Side ESP Outlet Conditions																			
Flue Gas Temperature, F					605	708	770											600	B&V Combustion Calculations
Flue Gas Pressure, in. w.g.					-10.80	-10.90	-10.8											-8.1	B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	4,531,863	5,756,209	5,667,437	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	No Hot-side ESP. Unit has a Cold-side ESP	1,262,728	B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm					2,041,027	2,843,960	2,947,083											562,236	B&V Combustion Calculations
Controlled PM Concentration, lb/MBtu					0.0565	0.0451	0.0248											0.08	B&V Combustion Calculations
Controlled PM Mass Flow Rate, lb/hr					244	248	135.73											92	= Controlled PM (lb/MBtu) x Heat Input (MBtu/hr)
Particulate Removal Efficiency, %					99.35	99.48	99.72											98.74	= { 1- Controlled PM (lb/MBtu) / Uncontrolled PM (lb/MBtu) } x 100
SCR Outlet Conditions																			
Flue Gas Temperature, F				729		708	770						690	640	700	586			B&V Combustion Calculations
Flue Gas Pressure, in. w.g.				-13.2		-20.90	-20.8						-13.0	-13.0	-16.0	-11.0			B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	No SCR	No SCR	New SCR Planned for 2012	5,311,071	No SCR	5,871,333	5,780,766	No SCR	No SCR	No SCR	No SCR	No SCR	4,219,979	5,135,360	5,252,708	6,584,970	No SCR	No SCR	B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm				2,682,371		2,977,658	3,085,629						2,061,162	2,399,175	2,606,716	2,910,365			B&V Combustion Calculations
Controlled NOx Concentration, lb/MBtu				0.0639		0.0479	0.0627						0.0584	0.0589	0.076	0.076			Data from E-ON
Controlled NOx Mass Flow Rate, lb/hr				343		263	343						246	302	404	500			= Controlled NOx (lb/MBtu) x Heat Input (MBtu/hr)
Air Heater Outlet Conditions																			
Flue Gas Temperature, F	350	330	340	361	309	322	309	369	299	318	375	375	330	330	320	324	243	363	B&V Combustion Calculations
Flue Gas Pressure, in. w.g.	-14.00	-8.00	-18.00	-22.4	-18.60	-36.10	-29.4	-8.0	-6.0	-8.0	-10.0	-10.0	-18.0	-18.0	-22.5	-16.0	-9.0	-13.5	B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	1,200,020	1,776,743	4,347,494	5,842,179	4,985,049	6,458,467	6,358,865	1,839,262	2,021,310	2,744,081	3,485,932	3,580,000	4,641,976	5,648,896	5,777,979	6,980,068	947,426	1,349,077	B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm	415,851	589,646	1,498,187	2,091,568	1,657,754	2,288,309	2,175,592	641,787	642,552	896,674	1,229,416	1,262,592	1,581,582	1,924,653	1,965,750	2,345,528	280,496	473,593	B&V Combustion Calculations
Cold-Side ESP Outlet Conditions																			
Flue Gas Temperature, F	340	320	330	358				369	299	318	340	340	330	330	320	324	230		B&V Combustion Calculations
Flue Gas Pressure, in. w.g.	-18.00	-12.00	-19.00	-25.7				-9.1	-6.8	-9.8	-14.0	-14.0	-23.0	-21.0	-25.5	-18.0	-11.0		B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	1,260,021	1,865,580	4,564,869	6,134,288	No Cold-side ESP. Unit has a Hot-side ESP	No Cold-side ESP. Unit has a Hot-side ESP	No Cold-side ESP. Unit has a Hot-side ESP	1,931,225	2,122,376	2,881,285	3,660,228	3,759,000	4,874,075	5,931,341	6,066,878	7,398,872	994,797	No Cold-side ESP. Unit has a Hot-side ESP	B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm	436,197	618,296	1,559,510	2,209,920				676,568	676,855	947,034	1,250,977	1,284,735	1,684,442	2,039,199	2,082,968	2,502,995	290,916		B&V Combustion Calculations
Controlled PM Concentration, lb/MBtu	0.241	0.1	0.1	0.023				0.041	0.034	0.024	0.0385	0.0443	0.0517	0.0354	0.017	0.31	0.063		Data from E-ON
Controlled PM Mass Flow Rate, lb/hr	241	166.55	412.04	123				66	60	62	124	147	218	181	90	2041	53		= Controlled PM (lb/MBtu) x Heat Input (MBtu/hr)
Particulate Removal Efficiency, %	97.24	98.86	98.86	99.74				99.53	99.61	99.73	99.56	99.49	99.41	99.60	99.81	96.46	99.01		= { 1- Controlled PM (lb/MBtu) / Uncontrolled PM (lb/MBtu) } x 100
Fabric Filter Outlet Conditions																			
Flue Gas Temperature, F																313			B&V Combustion Calculations
Flue Gas Pressure, in. w.g.																-23.1			B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	No Fabric Filter	7,398,872	No Fabric Filter	No Fabric Filter	B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm																2,500,664			B&V Combustion Calculations
Controlled PM Concentration, lb/MBtu																0.015			Data from E-ON
Controlled PM Mass Flow Rate, lb/hr																99			= Controlled PM from fabric Filter (lb/MBtu) x Heat Input (MBtu/hr)
Particulate Removal Efficiency, %																95.16			= { 1- FF Controlled PM (lb/MBtu) / ESP Controlled PM (lb/MBtu) } x 100
ID Fan Outlet Conditions																			
Flue Gas Temperature, F	356.05	332.17	346.44	376.94	325.52	346.34	333.60	379.03	306.39	327.81	354.85	355.15	348.83	348.83	340.08	334.60	235.91	371.55	B&V Combustion Calculations
Flue Gas Pressure, in. w.g.	10.00	10.00	10.00	6.10	11.40	5.90	14.60	8.00	7.00	8.00	10.00	10.00	10.00	10.00	10.00	15.77	1.00	1.00	B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	1,260,021	1,865,580	4,564,869	6,134,288	4,985,049	6,458,467	6,358,865	1,931,225	2,122,376	2,881,285	3,660,228	3,759,000	4,874,075	5,931,341	6,066,878	7,398,872	994,797	1,349,077	B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm	415,059	594,805	1,481,211	2,086,965	1,571,913	2,119,437	2,010,799	656,526	660,654	917,824	1,200,841	1,233,697	1,588,066	1,932,543	1,954,644	2,334,113	284,775	461,503	B&V Combustion Calculations

EON
EW Brown, Ghent, Cane Run, Mill Creek, Trimble County, Green River
Design Basis
5/21/2010

Unit Designation	EW Brown			Ghent				Cane Run			Mill Creek				Trimble County		Green River		Reference
	1	2	3	1	2	3	4	4	5	6	1	2	3	4	1	2	3	4	
Scrubber Outlet Conditions	(For 3 units combined to a common/shared scrubber)																		
Flue Gas Temperature, F	129.64			131.74	128.04	129.28	128.50	131.19	125.96	128.80	130.30	130.32	129.60	129.60	129.24	129.43	No Scrubber	No Scrubber	B&V Combustion Calculations
Flue Gas Pressure, in. w.g.	2.00			1.70	1.50	2.00	1.60	2.00	2.00	2.00	1.00	1.00	1.00	1.00	2.00	6.00			B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr	8,136,097			6,534,149	5,252,980	6,834,132	6,711,801	2,056,206	2,226,116	3,036,144	3,879,298	3,984,228	5,157,618	6,277,442	6,413,722	7,813,543			B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm	2,029,766			1,643,977	1,306,064	1,705,743	1,671,656	517,157	550,120	754,452	972,502	998,878	1,291,025	1,571,359	1,598,535	1,927,087			B&V Combustion Calculations
Controlled Sulfur Dioxide Mass Flow Rate, lb/hr	679			805	865	824	821	659	736	1,750	1,515	1,556	2,441	2,407	441	546			B&V Combustion Calculations
Controlled Sulfur Dioxide Concentration, lb/MBtu	0.10			0.150	0.200	0.150	0.150	0.411	0.419	0.676	0.47	0.47	0.58	0.47	0.083	0.083			= Controlled SO_2 (lb/hr) / Heat Input (MBtu/hr)
Sulfur Dioxide Removal Efficiency, %	98.33			97.50	96.67	97.50	97.50	93.15	93.02	88.73	92.17	92.17	90.33	92.17	98.62	98.62			= { 1- Controlled SO_2 (lb/MBtu) / Uncontrolled SO_2 (lb/MBtu) } x 100
Wet ESP Outlet Conditions																			
Flue Gas Temperature, F	No WESP			No WESP	No WESP	No WESP	No WESP	No WESP	No WESP	No WESP	No WESP	No WESP	No WESP	No WESP	No WESP	129.43	No WESP	No WESP	B&V Combustion Calculations
Flue Gas Pressure, in. w.g.																2.00			B&V Combustion Calculations
Flue Gas Mass Flow Rate, lb/hr																7,813,543			B&V Combustion Calculations
Volumetric Flue Gas Flow Rate, acfm																1,945,943			B&V Combustion Calculations
Stack Outlet Emissions[1]																			
Sulfur Dioxide Emission Concentration, lb/MBtu	0.10	0.10	0.10	0.15	0.20	0.15	0.15	0.411	0.419	0.676	0.47	0.47	0.58	0.47	0.083	0.083	4.48	4.48	Data from E-ON
Sulfur Dioxide Emission Rate, lb/hr	100	167	412	805	865	824	821	659	736	1,750	1,515	1.556	2,441	2,407	441	546	3,798	5,150	= SO_2 Emission (lb/MBtu) x Heat Input (MBtu/hr)
PM Emission Concentration, lb/MBtu	0.241	0.1	0.1	0.023	0.0565	0.0451	0.0248	0.041	0.034	0.024	0.0385	0.0443	0.0517	0.0354	0.017	0.015	0.063	0.08	Data from E-ON
PM Emission Rate, lb/hr	241	167	412	123	244	248	136	66	60	62	124	147	218	181	90	99	53	92	= PM Emission (lb/MBtu) x Heat Input (MBtu/hr)
NOx Emission Concentration, lb/MBtu	0.4463	0.4374	0.3319	0.0639	0.276	0.0479	0.0627	0.3394	0.3843	0.272	0.3169	0.3139	0.0584	0.0589	0.076	0.076	0.4011	0.3864	Data from E-ON
NOx Emission Rate, lb/hr	446	728	1,368	343	1,194	263	343	544	675	704	1,022	1,039	246	302	404	500	340	444	= NOx Emission (lb/MBtu) x Heat Input (MBtu/hr)
Hg Emission Concentration, lb/TBtu	5.0	5.0	5.0	2.0	3.5	2.0	2.0	3.5	3.5	3.5	3.0	3.0	2.5	2.5	1.2	1.0	5.5	5.5	Data from E-ON
Hg Emission Rate, lb/hr	5.00E-03	8.33E-03	2.06E-02	1.07E-02	1.51E-02	1.10E-02	1.09E-02	5.61E-03	6.15E-03	9.06E-03	9.67E-03	9.93E-03	1.05E-02	1.28E-02	6.37E-03	6.58E-03	4.66E-03	6.33E-03	= Hg Emission (lb/TBtu) x Heat Input (MBtu/hr) / 1,000,000
HCl Emission Concentration, lb/MBtu	0.002	0.002	0.002	0.0015	0.0017	0.0015	0.0015	0.00095	0.00095	0.00095	0.0015	0.0015	0.0015	0.0015	0.00085	0.00085	0.017	0.017	Data from E-ON
HCl Emission Rate, lb/hr	2	3	8	8	7	8	8	2	2	2	5	5	6	8	5	6	14	20	= HCl Emission (lb/MBtu) x Heat Input (MBtu/hr)
CO Emission Concentration, lb/MBtu	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	CO Emissions are not known
CO Emission Rate, lb/hr	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	CO Emissions are not known
Dioxin/Furan Emission Concentration, lb/MBtu	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Dioxin/Furan Emissions are not known
Dioxin/Furan Emission Rate, lb/hr	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Dioxin/Furan Emissions are not known

Notes:

1. Current Outlet Emissions as noted in E-ON Matrix

Revision History:

Rev	Date	Description
0	5/21/2010	Initial Issue

From: Saunders, Eileen
To: Fraley, Jeffrey; Pabian, Brad; Carman, Barry
Sent: 6/3/2010 2:36:05 PM
Subject: FW: 167987.26.0000 100530 - EON Draft AQCS Costs - EW Brown
Attachments: Brown Unit 1 Cost Estimates 052810.pdf; Brown Unit 2 Cost Estimates 052810.pdf; Brown Unit 3 Cost Estimates 052810.pdf

All,

Please find the Draft costs I received from B&V. Ralph Bowling is on vacation but I reviewed the information with John Voyles and Scott Straight today. As discussed recently by Paul Thompson in the manager's meeting, the issues surrounding these studies are highly sensitive. Therefore, I ask that you are careful in how you distribute or discuss the information at your station. Please note that the numbers are not final and we are still working with B&V to refine the technology options so the estimate may change.

Also, B&V is working on a report that will include the backup information regarding how these numbers were developed, site arrangements and simple flow diagrams. Once I receive that information, I will send that along to you.

If you have any questions, please let me know.

Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 2:43 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - EW Brown

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at EW Brown Units 1-3. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

E-ON Fleetwide Study | Black & Veatch Cost Estimates | 167987

Plant Name: Brown
Unit: 1
MW 110
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$40,000,000	$364	$1,477,000	$6,345,000
PAC Injection	$1,599,000	$15	$614,000	$809,000
Overfire Air	$767,000	$7	$132,000	$225,000
Low NOx Burners	$1,156,000	$11	$0	$141,000
Neural Networks	$500,000	$5	$50,000	$111,000
Total	$44,022,000	$400	$2,273,000	$7,631,000

DRAFT

Plant Name:	Brown
Unit:	2
MW	180
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$92,000,000	$511	$3,278,000	$14,474,000
Fabric Filter	$51,000,000	$283	$1,959,000	$8,166,000
Lime Injection	$2,739,000	$15	$1,155,000	$1,488,000
PAC Injection	$2,476,000	$14	$1,090,000	$1,391,000
Neural Networks	$500,000	$3	$50,000	$111,000
Total	$148,715,000	$826	$7,532,000	$25,630,000

BROWN UNIT 2 - SCR COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$4,636,000			
Ductwork and Breeching	$3,580,000			
Mechanical - Balance of Plant (BOP)	$1,173,000			
Electrical - Equipment, Raceway	$1,339,000			
VFDs, Motors and Couplings	$500,000	Engineering Estimates		
Switchgear and MCCs	$468,000			
Control - DCS Instrumentation	$151,000			
Air Heater Modifications	$0	Engineering Estimates		
ID Fans	$1,158,000	Engineering Estimates		
Catalyst	$1,883,000			
Selective Catalytic Reduction System (Including Ammonia System)	$1,643,000			
Subtotal Purchase Contract	**$16,531,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,854,000			
Civil/Structural Construction - Sub-Structures	$742,000			
Mechanical/Chemical Construction	$8,971,000			
Electrical/Control Construction	$4,103,000			
Service Contracts & Construction Indirects	$14,331,000			
Demolition Costs	$6,500,000	Engineering Estimates		
Subtotal Construction Contracts	**$37,501,000**			
Construction Difficulty Costs	**$26,250,700**	Engineering Estimates		
Total Direct Costs	**$80,282,700**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$2,696,000			
EPC Construction Management (Includes G&A & Fee)	$1,691,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$444,000			
Sales Taxes	$627,000			
Project Contingency	$6,326,000			
Total Indirect Costs	**$11,784,000**			
Total Contracted Costs	**$92,000,000**			
Capital Cost Effectiveness	***$511***	***/kW***		

ANNUAL COST

		Capacity Factor =	62%	
Fixed Annual Costs				
Operating labor	$123,000	1 FTE and	123,325	$/year
Maintenance labor & materials	$2,408,000	(DC) X 3.0%		
Yearly emissions testing	$25,000	Engineering Estimates		
Catalyst activity testing	$5,000	Engineering Estimates		
Fly ash sampling and analysis	$20,000	Engineering Estimates		
Subtotal Fixed Annual Costs	**$2,581,000**			
Variable Annual Costs				
Reagent	$309,000	215 lb/hr and	530.03	$/ton
Auxiliary and ID fan power	$186,000	940 kW and	0.03646	$/kWh
Catalyst replacement	$202,000	50 m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$697,000**			
Total Annual Costs	**$3,278,000**			
Levelized Capital Costs	**$11,196,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$14,474,000**			

BROWN UNIT 2 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$2,646,000			
Mechanical - Balance of Plant (BOP)	$7,580,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$161,000			
Control - DCS Instrumentation	$178,000			
ID Fans	$535,000	Engineering Estimates		
Subtotal Purchase Contract	**$11,100,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,355,000			
Civil/Structural Construction - Sub-Structures	$895,000			
Mechanical/Chemical Construction	$8,956,000			
Electrical/Control Construction	$3,024,000			
Service Contracts & Construction Indirects	$146,000			
Demolition Costs	$5,000,000	Engineering Estimates		
Subtotal Construction Contracts	**$20,376,000**			
Construction Difficulty Costs	**$14,263,200**	Engineering Estimates		
Total Direct Costs	**$45,739,200**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$2,334,000			
EPC Construction Management (Includes G&A & Fee)	$1,527,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$231,000			
Sales Taxes	$82,000			
Project Contingency - 18%	$860,000			
Total Indirect Costs	**$5,034,000**			
Total Contracted Costs	$51,000,000			
Cost Effectiveness	*$283*	*/kW*		

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	62%	
Maintenance labor and materials	$1,530,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$1,530,000**			
Variable Annual Costs				
Byproduct disposal	$5,000	120 lb/hr and	15	$/ton
Bag replacement cost	$129,000	3,880 bags and	100	$/bag
Cage replacement cost	$65,000	3,880 cages and	50	$/cage
ID fan power	$200,000	1,010 kW and	0.03646	$/kWh
Auxiliary power	$30,000	150 kW and	0.03646	$/kWh
Subtotal Variable Annual Costs	$429,000			
Total Annual Costs	$1,959,000			
Levelized Capital Costs	**$6,207,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$8,166,000			

Brown Unit 2
180 MW
High Level Emissions Control Study

Technology: Lime Injection   **Date:** 5/30/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$133,800	From Previous Mill Creek BACT Study				
Short-term storage silo	$88,800	From Previous Mill Creek BACT Study				
Air blowers	$121,800	From Previous Mill Creek BACT Study				
Rotary feeders	$19,800	From Previous Mill Creek BACT Study				
Injection system	$80,400	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$526,800	From Previous Mill Creek BACT Study				
Instrumentation and controls	$25,200	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$996,600					
Freight	$45,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$1,042,000					
Direct installation costs						
Foundation & supports	$104,000	(PEC) X	10.0%			
Handling & erection	$208,000	(PEC) X	20.0%			
Electrical	$104,000	(PEC) X	10.0%			
Piping	$52,000	(PEC) X	5.0%			
Insulation	$21,000	(PEC) X	2.0%			
Painting	$52,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$541,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$1,658,000					
Indirect Costs						
Engineering	$199,000	(DC) X	12.0%			
Owner's cost	$199,000	(DC) X	12.0%			
Construction management	$166,000	(DC) X	10.0%			
Start-up and spare parts	$25,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$332,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,021,000					
Allowance for Funds Used During Construction (AFDC)	$60,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,739,000					
Cost Effectiveness	*$15 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$50,000	(DC) X	3.0%			
Operating labor	$123,000	1	FTE and	123,325	$/year	Estimated manpower
Total fixed annual costs	$173,000					
Variable annual costs				62	%	capacity factor
Lime	$754,000	2,100	lb/hr and	132.19	$/ton	
Byproduct disposal cost	$208,000	2,400	lb/hr and	15	$/ton	
Auxiliary power	$20,000	100	kW and	0.03646	$/kWh	
Total variable annual costs	$982,000					
Total direct annual costs (DAC)	$1,155,000					
Indirect Annual Costs						
Cost for capital recovery	$333,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$333,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,488,000					

Brown Unit 2
180 MW
High Level Emissions Control Study

Technology: PAC Injection

Date: 5/30/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$151,641	Ratio from Brown Unit 3 BACT Analysis			
Short-term storage silo	$99,650	Ratio from Brown Unit 3 BACT Analysis			
Air blowers	$138,643	Ratio from Brown Unit 3 BACT Analysis			
Rotary feeders	$17,330	Ratio from Brown Unit 3 BACT Analysis			
Injection system	$64,989	Ratio from Brown Unit 3 BACT Analysis			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$415,930	Ratio from Brown Unit 3 BACT Analysis			
Instrumentation and controls	$21,663	Ratio from Brown Unit 3 BACT Analysis			
Subtotal capital cost (CC)	$909,847				
Freight	$23,000	(CC) X	2.5%		
Total purchased equipment cost (PEC)	$933,000				
Direct installation costs					
Foundation & supports	$93,000	(PEC) X	10.0%		
Handling & erection	$187,000	(PEC) X	20.0%		
Electrical	$93,000	(PEC) X	10.0%		
Piping	$47,000	(PEC) X	5.0%		
Insulation	$19,000	(PEC) X	2.0%		
Painting	$47,000	(PEC) X	5.0%		
Demolition	$0	(PEC) X	0.0%		
Relocation	$0	(PEC) X	0.0%		
Total direct installation costs (DIC)	$486,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$1,494,000				
Indirect Costs					
Engineering	$179,000	(DC) X	12.0%		
Owner's cost	$179,000	(DC) X	12.0%		
Construction management	$149,000	(DC) X	10.0%		
Start-up and spare parts	$22,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$299,000	(DC) X	20.0%		
Total indirect costs (IC)	$928,000				
Allowance for Funds Used During Construction (AFDC)	$54,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	**$2,476,000**				
Cost Effectiveness	***$14 /kW***				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$45,000	(DC) X	3.0%		
Operating labor	$123,000		1 FTE and	123,325 $/year	Estimated manpower
Total fixed annual costs	$168,000				
Variable annual costs				62 %	capacity factor
Reagent (BPAC)	$896,000		150 lb/hr and	2200 $/ton	
Byproduct disposal cost	$6,000		150 lb/hr and	15 $/ton	
Auxiliary power	$20,000		100 kW and	0.03646 $/kWh	
Total variable annual costs	$922,000				
Total direct annual costs (DAC)	$1,090,000				
Indirect Annual Costs					
Cost for capital recovery	$301,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$301,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	**$1,391,000**				

Plant Name:	Brown
Unit:	3
MW	457
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$61,000,000	$133	$3,321,000	$10,745,000
PAC Injection	$5,426,000	$12	$2,330,000	$2,990,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$67,426,000	$148	$5,751,000	$13,957,000

DRAFT

From: Saunders, Eileen
To: Troost, Tom; Harper, Travis
Sent: 6/3/2010 2:37:28 PM
Subject: FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Green River
Attachments: Green River Unit 3 Cost Estimates 052810.pdf; Green River Unit 4 Cost Estimates 052810.pdf

All,

Please find the Draft costs I received from B&V. Ralph Bowling is on vacation but I reviewed the information with John Voyles and Scott Straight today. As discussed recently by Paul Thompson in the manager's meeting, the issues surrounding these studies are highly sensitive. Therefore, I ask that you are careful in how you distribute or discuss the information at your station. Please note that the numbers are not final and we are still working with B&V to refine the technology options so the estimate may change.

Also, B&V is working on a report that will include the backup information regarding how these numbers were developed, site arrangements and simple flow diagrams. Once I receive that information, I will send that along to you.

If you have any questions, please let me know.

Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 2:54 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Green River

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Green River Units 3 & 4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

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Plant Name: Green River
Unit: 3
MW 71
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$29,000,000	$408	$1,040,000	$4,569,000
CDS-FF	$38,000,000	$535	$6,874,000	$11,499,000
PAC Injection	$1,112,000	$16	$323,000	$458,000
Neural Networks	$500,000	$7	$50,000	$111,000
Total	$68,612,000	$966	$8,287,000	$16,637,000

Plant Name: Green River
Unit: 4
MW 109
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$42,000,000	$385	$1,442,000	$6,553,000
CDS-FF	$54,000,000	$495	$10,289,000	$16,861,000
PAC Injection	$1,583,000	$15	$515,000	$708,000
Neural Networks	$500,000	$5	$50,000	$111,000
Total	$98,083,000	$900	$12,296,000	$24,233,000

DRAFT

From:	Saunders, Eileen
To:	Crutcher, Tom; Turner, Haley
Sent:	6/3/2010 2:37:41 PM
Subject:	FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Trimble
Attachments:	Trimble Unit 1 Cost Estimates 052810.pdf

All,

Please find the Draft costs I received from B&V. Ralph Bowling is on vacation but I reviewed the information with John Voyles and Scott Straight today. As discussed recently by Paul Thompson in the manager's meeting, the issues surrounding these studies are highly sensitive. Therefore, I ask that you are careful in how you distribute or discuss the information at your station. Please note that the numbers are not final and we are still working with B&V to refine the technology options so the estimate may change.

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Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:00 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Trimble

Eileen,

Attached please find the draft AQCS Costs for the approved technologies for Trimble Unit 1. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
Black & Veatch - Building a World of Difference™
11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Trimble County
Unit: 1
MW 547
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$128,000,000	$234	$5,782,000	$21,360,000
PAC Injection	$6,451,000	$12	$4,413,000	$5,198,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$135,451,000	$248	$10,295,000	$26,780,000

DRAFT

From:	Saunders, Eileen
To:	Joyce, Jeff; Nix, Stephen; Piening, Carla
Sent:	6/3/2010 2:38:01 PM
Subject:	FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Ghent
Attachments:	Ghent Unit 1 Cost Estimates 052810.pdf; Ghent Unit 2 Cost Estimates 052810.pdf; Ghent Unit 3 Cost Estimates 052810.pdf; Ghent Unit 4 Cost Estimates 052810.pdf

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Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:09 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Ghent

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Ghent Units 1-4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
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11401 Lamar Avenue
Overland Park, KS 66211
Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

Plant Name: Ghent
Unit: 1
MW 541
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$131,000,000	$242	$5,888,000	$21,831,000
PAC Injection	$6,380,000	$12	$4,208,000	$4,984,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$138,380,000	$256	$10,196,000	$27,037,000

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Plant Name:	Ghent
Unit:	2
MW	517
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$227,000,000	$439	$7,078,000	$34,704,000
Fabric Filter	$120,000,000	$232	$5,002,000	$19,606,000
Lime Injection	$5,483,000	$11	$2,775,000	$3,442,000
PAC Injection	$6,109,000	$12	$2,880,000	$3,623,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$359,592,000	$696	$17,835,000	$61,597,000

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Plant Name: Ghent
Unit: 3
MW 523
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$138,000,000	$264	$6,122,000	$22,917,000
PAC Injection	$6,173,000	$12	$4,134,000	$4,885,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$145,173,000	$278	$10,356,000	$28,024,000

DRAFT

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Plant Name: Ghent
Unit: 4
MW 526
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
Fabric Filter	$117,000,000	$222	$5,363,000	$19,602,000
PAC Injection	$6,210,000	$12	$3,896,000	$4,652,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$124,210,000	$236	$9,359,000	$24,476,000

DRAFT

From:	Saunders, Eileen
To:	Kirkland, Mike; Koller, Tiffany; Stevens, Michael
Sent:	6/3/2010 2:38:27 PM
Subject:	FW: 167987.26.0000 100530 - EON Draft AQCS Costs - Mill Creek
Attachments:	Mill Creek Unit 1 Cost Estimates 052810.pdf; Mill Creek Unit 2 Cost Estimates 052810.pdf; Mill Creek Unit 3 Cost Estimates 052810.pdf; Mill Creek Unit 4 Cost Estimates 052810.pdf

All,

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Thank you,

Eileen

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Sunday, May 30, 2010 3:23 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand
Subject: 167987.26.0000 100530 - EON Draft AQCS Costs - Mill Creek

Eileen,

Attached please find the draft AQCS Costs for the approved technologies at Mill Creek Units 1-4. The levelized annual cost was based on the Capital Recovery Factor (CRF) of 12.17% as supplied by EON as part of the economic criteria.

Regards,

Kyle

Kyle Lucas | Environmental Permitting Manager
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11401 Lamar Avenue
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Phone: **(913) 458-9062** | Fax: **(913) 458-9062**
Email: **lucaskj@bv.com**

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Plant Name:	Mill Creek
Unit:	1
MW	330
Project description	High Level Emissions Control Study
Revised on:	05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$97,000,000	$294	$3,366,000	$15,171,000
WFGD	$297,000,000	$900	$14,341,000	$50,486,000
Fabric Filter	$81,000,000	$245	$3,477,000	$13,335,000
Electrostatic Precipitator	$32,882,000	$100	$3,581,000	$7,583,000
Lime Injection	$4,480,000	$14	$2,024,000	$2,569,000
PAC Injection	$4,412,000	$13	$2,213,000	$2,750,000
Neural Networks	$1,000,000	$3	$100,000	$222,000
Total	$517,774,000	$1,569	$29,102,000	$92,116,000

DRAFT

Plant Name: Mill Creek
Unit: 2
MW 330
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
SCR	$97,000,000	$294	$3,401,000	$15,206,000
WFGD	$297,000,000	$900	$14,604,000	$50,749,000
Fabric Filter	$81,000,000	$245	$3,518,000	$13,376,000
Electrostatic Precipitator	$32,882,000	$100	$3,664,000	$7,666,000
Lime Injection	$4,480,000	$14	$2,117,000	$2,662,000
PAC Injection	$4,412,000	$13	$2,340,000	$2,877,000
Neural Networks	$1,000,000	$3	$100,000	$222,000
Total	$517,774,000	$1,569	$29,744,000	$92,758,000

Plant Name: Mill Creek
Unit: 3
MW 423
Project description High Level Emissions Control Study
Revised on: 05/28/10

AQC Equipment	Total Capital Cost	$/kW	O&M Cost	Levelized Annual Costs
WFGD	$392,000,000	$927	$18,911,000	$66,617,000
Fabric Filter	$114,000,000	$270	$4,923,000	$18,797,000
PAC Injection	$5,592,000	$13	$3,213,000	$3,894,000
Neural Networks	$1,000,000	$2	$100,000	$222,000
Total	$512,592,000	$1,212	$27,147,000	$89,530,000

DRAFT